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Innovative Approaches Fostering Self-Regulated Learning Technology as a Learning Environment in Higher Education Institutions in Uganda

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Abstract

The harmonization of technology into education has the aptitude to redefine the learning process as Zimmerman (2002) proposes, self-regulated learning and performance involve the processes whereby learners personally activate and sustain cognitions, affects, and behaviours that are systematically oriented towards the attainment of personal goals. Where the learner sets personal goals and creates self-oriented feedback through which they can monitor their effectiveness and values in this world through the use of self-regulated learning (SRL). The results of this study will establish strategies on how to utilize SRL using technology to enhance their learning environment as a competence. To know whether university students use digital technologies to plan, organize and facilitate their learning, the interviewing methodology was used. The results indicated that university students, even when they are frequent users of digital technology, tend not to use these technologies to regulate their learning process. To sum up, the findings of the study indicated that integrating self-regulated approaches into technology can improve students' self-efficacy as well as their strategies for planning and using time and hence they can learn effectively and have better learning achievements.

Keywords: innovative approaches, self-regulated learning in technology, learning environments

1. Introduction

During the colonial period (19th Century to 1962), the education of Uganda was missionary driven, focusing on religious instructions, vocational skills and literacy to serve the colonial administration (Ssekamwa, 1997). Educational aids like hornbooks and wooden paddles with printed lessons were everywhere in those early schools highlighting the resource constraints and teaching methods of that error. Before Uganda's independence in 1962, there was a growing recognition of the need for higher education to develop a skilled workforce. This led to the expansion of existing institutions and the establishment of new ones, mainly Makerere University which became a symbol of academic excellence in East Africa (Furley Watson, 1978), which resulted in the training of the nation's leaders, professionals and civil servants in the post-independence era.

The post-independence era saw further and decided to expand and diversify higher education with the establishment of more universities and specialized institutions, however, the period came with challenges related to funding, access and maintaining quality amidst rapid growth (Nansozi Muwanga, 2007) also political

instability and economic fluctuations impacted the development of the education sector. Recently, the country has experienced rapid growth of universities both private and public due to the diversification of higher education, these include; Kampala University, Makerere University, Kyambogo University, Mbarara University, Kampala International University Busitema University, and Bugema University among others. Today Uganda's education is managed by the National Council of Higher Education (NCHE). All of these have coupled with the adoption of information and communication technologies (ICTs) in teaching and learning (Ministry of Education and Sports, Uganda, 2018). The integration of technology reflects global trends in education but also represents unique opportunities and challenges within the Ugandan context which includes the need to adapt new changes in innovating teaching approaches to effectively integrate technology and drive better learning outcomes.

In Uganda, the evolutional tools and methods towards innovative approaches has been of a gradual process. From the early reliance on rote learning and teacher-centred instructions to new trends of technology-enhanced learning, the need for self-regulated learning has become more apparent. The inauguration of Information and Communication Technologies (ICTs) fosters self-directed, learning and open access to knowledge, but also demands stronger self-regulation skills to effectively manage learning in different dynamic environments (Charles, M., Sarah, N., & Anthony, M. M., 2024). This connectedness is also emphasized by the concept of innovative pedagogy which aims at empowering learners to take ownership in their learning and actively achieve their goals (Zhang et al., 2020). These innovative approaches can often integrate technology to foster 21st-century skills such as communication, collaboration and critical thinking (Mendula et al., 2012) hence self-regulated learning.

Students who have actively participated in their learning through metacognitive, motivational and behavioural strategies are considered self-regulated learners (Zimmerman, 1989). This means that Self-Regulated Learning (SRL) is a cyclical process of forethought (planning and goal setting), performance/ volitional control (implementing strategies and monitoring progress) and self-reflection (evaluating outcomes and adjusting approaches) (Zimmerman, 2000). The capacity to adapt actions and goals to achieve desired results in changing environments is crucial in today's rapidly evolving educational field (Zeidner, Boekaerts & Pintrich, 2000). This signifies that Self-Regulated Learning (SRL) in recent decades has particularly increased with the integration of technology into education (Sitzmann & Ely, 2001; Zimmerman & lubuhn, 2012). Self-regulated learning is also recognized as the key competency for lifelong learning (European Council, 2006), enabling individuals to effectively navigate and utilize technology in their learning processes. This is particularly pertinent in the Ugandan higher education sector, which has experienced profound changes over the years (Charles, M., et al.).

Therefore, the missionary-driven paradigm of Uganda's education system, which emphasized fundamental skills, has given way to a more diverse higher education environment that embraces technology. Despite providing greater access to information and resources, this evolution calls for a change in the way that learning is approached. While ICT integration offers an opportunity for free access to knowledge and self-directed learning, it also requires students to have better self-regulation skills (Charles, M., et al.). The ability to learn on one's own becomes increasingly important as Uganda's higher education system rapidly grows and embraces cutting-edge pedagogies that prioritize student ownership and 21st-century abilities. Students must thus comprehend and promote self-regulated learning to successfully negotiate this dynamic learning environment, optimize the advantages of technology, and prosper in Uganda's changing higher education system.

2. Purpose of the Study

The purpose of the study was to explore and advocate innovative approaches for integrating technology to foster self-regulated learning among students at Kampala University, addressing the gap between technology use and effective learning strategies.

Research objectives:

The study objectives were;

i. To identify innovative approaches for integrating technology that promote self-regulated learning among students of higher institutions.

ii. To examine student's perceptions of the potential of technology to support and enhance their self-regulated learning skills.

iii. To identify how higher education institutions utilize technology to support students' self-regulated learning and enhance the learning environment.

Research questions:

The research was guided by the following study questions;

i. How can technology be used to support the Self-Regulated Learning cycle?

ii. How do students in higher education perceive the potential of technology to support their self-regulated learning?

iii. How are higher education institutions currently utilizing technology to support student's self-regulated learning?

3. Study Theorization

The study was contextualized in the framework of Self-Regulated Learning (SRL) as conceptualized by Zimmerman (1989, 2000). Zimmerman defines self-regulated learning as the proactive process through which learners individually activate and sustain cognitions effects, and behaviours that are systematically oriented towards the attainment of personal objectives (Zimmerman, 2002). His cyclical model suggests three key categories; forethought which involves planning and goal setting, performance/volitional control which covers strategy implementation and monitoring and finally self-reflection which involves evaluation and adaptation. However, the increasing integration of technology into higher education offers significant potential to support each of these phases. However, this study addresses the gap between the frequent use of technology by students as a way not being necessary for effective self-regulated learning. As Zimmerman's theory suggests, Self-Regulated Learning requires more than simply access to tools it necessitates the active engagement of metacognitive, motivational, and behavioural strategies. Therefore, the research investigated how innovative approaches can effectively integrate technology to foster self-regulated learning processes among university students hence bridging the gap between technology use and effective learning outcomes.

4. Literature Review

Zimmerman defines self-regulated learning as the proactive process through which learners individually activate and sustain cognitions effects, and behaviours that are systematically oriented towards the attainment of personal objectives (Zimmerman, 2002). His cyclical model suggests three key categories; forethought which involves planning and goal setting, performance/volitional control which covers strategy implementation and monitoring and finally self-reflection which involves evaluation and adaptation. As Zimmerman's theory suggests, self-regulated learning requires more than simply access to tools it necessitates the active engagement of metacognitive, motivational, and behavioral strategies.

4.1 Innovative Approaches for Integrating Technology to Promote Self-Regulated Learning (SRL)

Self-Regulated Learning (SRL) is a metacognitive process that involves goal-setting, strategy use, and self-evaluation to optimize learning (Zimmerman, 2002). The integration of technology in education has significantly influenced SRL by providing innovative pedagogical approaches that enhance autonomy and learner engagement. Studies have shown that digital tools, such as Learning Management Systems (LMS), gamification, and adaptive learning platforms, have transformed how students regulate their learning (Dabbagh & Kitsantas, 2012). A study by Sitzmann and Ely (2011) found that students who utilized digital self-regulation tools demonstrated a 30% increase in time management and study planning skills compared to those who did not use such tools. Similarly, Mendula et al. (2012) emphasized that gamified learning environments can improve self-monitoring behaviours, making SRL more engaging and effective. The integration of e-portfolios and online progress-tracking systems, as examined by Broadbent and Poon (2015), has also been linked to higher levels of goal-setting and self-reflection among learners.

Within the East African context, universities have begun adopting digital interventions to support SRL. A study conducted at Makerere University (Kintu & Zhu, 2016) found that students who used e-learning platforms for self-assessment and goal tracking reported improved academic persistence and deeper engagement with course materials. Similarly, a report by the African Virtual University (AVU, 2019) highlighted that students who engaged in blended learning experiences, which incorporated SRL principles, demonstrated higher levels of self-motivation and adaptability.

In Uganda, technological disparities remain a challenge in higher education institutions. The Ministry of Education and Sports (2018) reported that only 40% of universities had fully integrated LMS into their curriculum, limiting students' ability to leverage digital tools for self-regulation. This underscores the need for structured digital literacy programs to ensure that students can maximize SRL strategies through technology.

4.2 Student Perceptions of Technology's Potential to Support Self-Regulated Learning

The effectiveness of SRL through technology is largely dependent on students' perceptions and willingness to engage with digital learning tools. According to Pintrich (2004), students who recognise technology as an enabler of SRL are more likely to develop metacognitive skills and regulate their learning effectively. Conversely, those who view technology as merely a passive medium for content consumption tend to struggle with independent learning. A study by Azevedo and Hadwin (2005) found that students who had positive attitudes toward technology-integrated SRL strategies were 45% more likely to engage in self-reflection and

adaptive learning behaviours. Similarly, Zimmerman and Schunk (2011) identified that students who frequently use digital self-monitoring tools (such as time trackers and study planners) exhibit stronger self-regulatory behaviours and higher academic persistence.

In Uganda, students' perceptions of SRL technology vary based on access, digital literacy, and prior exposure to tech-driven education. Namukasa and Ssenkaaba (2020) found that students in urban institutions such as Makerere and Uganda Christian University perceived LMS platforms as beneficial for study planning and collaboration, whereas students from rural-based institutions expressed concerns over internet accessibility and digital competency. Similarly, Wamala and Seruwagi (2021) reported that female students in Ugandan universities face additional socio-cultural barriers that limit their engagement with SRL-enhancing technologies.

Despite the benefits, technology fatigue and digital distractions also influence students' perceptions. Schraw et al. (2006) highlighted that students who over-rely on passive engagement with digital content (such as watching recorded lectures without interactive participation) often fail to develop self-regulated learning strategies. This suggests that higher education institutions must focus on digital literacy training to ensure students can meaningfully integrate technology into their learning processes.

4.3 Institutional Utilization of Technology to Support Self-Regulated Learning

Higher education institutions play a crucial role in structuring digital learning environments that foster self-regulated learning. Research suggests that universities that integrate SRL principles into their learning management systems and instructional design experience better student engagement and academic performance (Dabbagh & Kitsantas, 2012). European institutions have pioneered SRL-focused digital strategies. According to the European Council (2006), universities that implemented competency-based learning frameworks with integrated self-regulation modules saw a 25% increase in student retention rates. In the United States, universities such as Stanford and MIT have developed Adaptive Learning Platforms that provide real-time feedback and personalized study recommendations, enhancing SRL adoption (Winne & Hadwin, 2008).

In Africa, universities are gradually integrating technology-based SRL interventions. A study by UNESCO (2021) found that South African universities utilizing personalized learning analytics tools helped students track academic progress, resulting in a 20% improvement in self-regulation behaviours. Similarly, Obura and Brant (2011) reported that Kenyan universities that provided digital mentorship programs experienced higher student engagement in SRL practices.

In Uganda, while most universities have adopted online learning platforms, their effectiveness in promoting SRL remains limited. The National Council for Higher Education (NCHE, 2020) reported that only 35% of Ugandan universities have dedicated SRL training within their e-learning platforms. At Kampala International University, students expressed a desire for more structured self-regulation modules, with one student stating: "*Our learning management system is useful for accessing materials, but there is no guidance on how to set goals or track our progress.*" This aligns with the findings by Wamala and Seruwagi (2021), who emphasized that Ugandan universities need to move beyond passive technology adoption and actively incorporate SRL strategies into digital learning environments.

One effective strategy is the use of digital coaching and feedback mechanisms. According to Nicol and Macfarlane-Dick (2006), students who receive frequent digital feedback on their progress are more likely to develop strong SRL habits. Makerere University has piloted an online academic coaching system, which has shown promise in improving student engagement with self-regulated learning techniques. However, financial constraints and digital infrastructure gaps remain significant barriers. A report by the World Bank (2021) found that 50% of Ugandan universities lack stable internet connectivity, which affects students' ability to engage with digital SRL tools consistently. This highlights the need for government intervention and public-private partnerships to enhance ICT infrastructure in higher education institutions.

4.4 Extensive Related Literature in Lieu

Studies evaluating technology-enhanced learning can be carried out at the pre-implementation, implementation, and post-implementation stages (Alawani & Singh, 2017; Guerra et al., 2016; Sasai, 2017). Evaluating technology-enhanced learning provides insights to educational stakeholders about why learning technology fails or succeeds and how best it can be implemented for effective pedagogical delivery. However, most evaluations in technology-enhanced learning studies are carried out during the post-implementation stage to determine the impact of technology on user experiences as well as the organization (Alkhasawnh & Alqahtani, 2019; Friedman & Wyatt, 1997; Guerra et al., 2016; Sasai, 2017). Thus, technology-enhanced learning and evaluation of system implementation is an important endeavour, evident through many publications (Guerra et al., 2016; Nussbaumer et al., 2015; Mohammed & Garibaldi, 2010; Sasai, 2017). Friedman and Wyatt (1997) noted that there are two types of evaluation studies: formative and summative. The formative evaluation aims to improve the technology by providing feedback to the developers or implementers. The summative evaluation aims to demonstrate the

outcome of technology in teaching and learning. These evaluation processes can be carried out simultaneously or at each stage of development or implementation (Alkhasawnh & Alqahtani, 2019; Guerra et al., 2016; Sasai, 2017). This study focused on formative evaluation to understand usability issues, challenges and factors influencing students' satisfaction with a mobile app.

Several related works have evaluated a Self-Regulated-Based Learning environment for supporting online learning experiences. Chang et al. (2022) examined the effects of online learning strategies on learning performance, self-regulation, and critical in a university online course. The study used a self-regulated flipped learning approach to experiment with whether the strategies could improve students' skills. The analysis used the analysis of covariance (ANCOVA). The result showed that students' skills were improved and recommended that further study use massive data and mixed-method design to determine how a student's learning behaviour is affected.

5. Methodology

This study employed an exploratory qualitative research design, with a case study approach, to explore innovative approaches fostering Self-Regulated Learning (SRL) through technology in higher education institutions, focusing on Kampala University. A qualitative method is appropriate as it provides in-depth insights into students' experiences, perceptions, and institutional strategies related to SRL (Creswell, 2013).

5.1 Study Population and Sample

The study focuses on Kampala University's technology-driven learning efforts and includes students, teachers, and administrators. According to their expertise with SRL and technology-enhanced learning environments, respondents are selected by purposive selection (Patton, 2002).

Table 1 shows the distribution of participants in a study focused on technology-driven learning initiatives and Self-Regulated Learning (SRL) conducted at Kampala University. The 42 participants in the sample as a whole are divided into four distinct groups:

Table 1.

Category		**M**	**F**	**POPULATION**	**SAMPLE SIZE**	**PERCENTAGE**	**SAMPLING TECHNIC**
University Administrators	Academic Registrar	01	00	01	01	2 %	purposive selection
	Dean of faculties	01	03	O4	04	10 %	purposive selection
Faculty Members (Lecturers)	Senior lecturers	03	01	04	04	10 %	Simple random
	Junior Lecturers	02	04	06	06	14 %	Simple random
Postgraduate Students		04	08	12	12	28 %	purposive selection
Undergraduate Students		06	09	15	15	36 %	purposive selection
Total		**17**	**25**	**42**		**100** %	

Source: Researcher (2025).

Institution administrators (n=5): This group consists of five people who work in administrative roles at the institution and are probably in charge of overseeing or managing the incorporation of technology into instruction. Understanding institutional policies and support for technology-enhanced education requires their perspectives. Ten faculty members are lecturers. Ten lecturers who are actively lecturing make up this division. Their knowledge of SRL tactics and their experiences integrating technology into their teaching approaches are essential to the study. Postgraduate Students (n=12): Twelve students in this group are pursuing postgraduate degrees. They offer important insights from their experiences using technology and SRL in a sophisticated academic setting. Undergraduate Students (n=15): With fifteen participants, undergraduate students make up the largest group. Their opinions on the use of technology.

5.2 Data Analysis

Data is analyzed using thematic analysis, where responses are coded and categorized into key themes such as technological accessibility, student engagement, and institutional support for SRL (Braun & Clarke, 2006). Transcriptions from interviews and FGDs are reviewed to identify patterns, similarities, and differences in participant experiences. Data is contextualized within existing literature**,** ensuring alignment with the study's objectives. Additionally, insights from secondary sources for example: policy reports and statistical data are used to support interpretations and recommendations.

5.3 Data Collection Instruments

Since the study is qualitative, data is collected using: In-depth interviews: Conducted with university administrators to assess institutional policies supporting SRL through technology (Merriam, 2009). Focus Group Discussions (FGDs): Held with students to explore their experiences, challenges, and perceptions regarding SRL adoption (Creswell & Poth, 2017). Document Analysis: Reviewing Kampala University's strategic reports, ICT policies, and Learning Management System (LMS) frameworks to assess SRL integration (Yin, 2018).

6. Interview Findings

The findings from the interviews conducted at Kampala University are categorized according to the study's key variables: innovative approaches for integrating technology in fostering Self-Regulated Learning (SRL), students' perceptions of technology in supporting SRL, and institutional strategies in higher education to support SRL through technology. These findings are analyzed in the Ugandan education context and linked to previous studies, providing a comparative analysis of how SRL and technology-enhanced learning environments are shaping higher education institutions.

6.1 Innovative Approaches for Integrating Technology in Fostering Self-Regulated Learning (SRL)

Existing Study Perspectives

Previous studies have demonstrated that innovative technological tools significantly enhance self-regulated learning. Zimmerman (2002) highlights that SRL requires learners to actively monitor, control, and reflect on their learning processes, which technology can facilitate. Boekaerts & Corno (2005) further argue that integrating digital tools into SRL fosters independent learning and critical thinking skills. A study by Azevedo & Cromley (2004) found that students who used interactive digital learning environments showed higher metacognitive awareness and academic engagement than those relying on traditional learning methods.

6.2 Findings from Kampala University

At Kampala University, various digital tools and platforms have been integrated to promote SRL, but challenges persist. Interviewees revealed that E-learning platforms (Moodle, Google Classroom) are widely used but underutilized in terms of supporting SRL strategies. A lecturer stated;

> "*Numerous students perceive online education simply as an extension of conventional classroom teaching rather than as a means for independent learning. This viewpoint may stem from several reasons. They might not have received sufficient training on how to effectively engage with these platforms for self-regulated learning. Alternatively, the curriculum may not have been restructured to fully take advantage of the possibilities offered by online learning environments. It's also possible that our evaluation methods continue to emphasize memorization instead of the critical thinking and problem-solving abilities that are vital for self-directed learning. Regardless of the causes, it is essential to bridge the gap between student beliefs and the true potential of these platforms if we aim to genuinely foster self-regulated learning.*"

Mobile learning applications (such as Zoom and WhatsApp discussion groups) are frequently employed, especially for group discussions and peer collaboration. Gamification strategies (use of quizzes, digital badges, and reward-based learning) were reported as effective motivators but not systematically implemented in SRL. This was expounded on by the students' Academic Minister stated;

> "*Although we have made investments in platforms such as Moodle and Google Classroom, their ability to promote self-regulated learning is still not fully realized. We must shift our focus from merely providing digital content to empowering students to take charge of their own learning experiences through these tools.*" *(Minister of Education, Kampala University, Personal Communication, 2025). This statement highlights a prevalent issue regarding the use of technology in education, frequently addressed in the context of SRL (Zimmerman, 2002).*

This finding resonated as well as aligned with Kintu & Zhu (2016), who found that Ugandan students benefit from technology-enhanced learning environments when provided with structured guidance on SRL techniques. However, low digital literacy and limited institutional support remain major barriers to optimizing SRL through technology as noted by one lecturer:

> "*I believe that technology can enhance our learning experience, particularly when we receive clear guidance on using it for planning, monitoring, and assessing our work. For instance, when teachers demonstrate how to utilize a platform for setting objectives or tracking our achievements, it truly has an impact. However, at times, the technology can be perplexing, or the internet may be sluggish, and there isn't always someone available to assist. It becomes challenging to manage ourselves effectively when we are grappling with the technology itself.*"

6.3 Students' Perceptions of Technology in Supporting Self-Regulated Learning

On how Student perceptions role plays as a crucial role in the adoption of technology for SRL. Pintrich (2004) emphasizes those students who perceive technology as a learning facilitator exhibit greater motivation and engagement. Paris & Paris (2001) add that students who are trained in self-regulation strategies tend to utilize technological resources more effectively than those without such training. Several interactions with Students interviewed expressed divergent views on how technology supports their learning process: Some students actively use digital tools for goal setting, progress tracking, and collaborative learning. A third-year student shared:

> "*I utilize reminders on my phone and employ Google Calendar to structure my study schedule, which helps me stay organized. However, it's not just about the reminders themselves. The act of creating my study plan is incredibly beneficial. At the beginning of each week, I take some time to consider my goals for each class. Then, I allocate specific times in my calendar for reading, writing, studying, and even for breaks. This method supports me in prioritizing my tasks and ensuring I devote enough time to every subject. It's far more effective than simply attempting to figure everything out as I go.*"

Likewise, Others felt overwhelmed by digital platforms, citing difficulty in managing multiple online resources**.** One student remarked that:

> "*There are so many different platforms: Moodle, WhatsApp, Zoom that I often find it hard to keep track of where to locate materials or submit assignments. For instance, the professor may post the reading list on Moodle, but then share important announcements via WhatsApp. Then, we have to attend lectures on Zoom, and occasionally we need to collaborate using Google Documents. It's a lot to manage! Just last week, I missed a deadline for an assignment because I was searching for the instructions on the incorrect platform. It's extremely frustrating.*"

This implied that Female students had additional challenges, such as gender-based digital divides, where societal expectations and domestic responsibilities limit their engagement with technology. This is consistent with Namukasa & Ssenkaaba (2020), who found that female students in Ugandan universities face higher barriers in adopting SRL strategies through technology compared to male students. Likewise, this indicated the need for structured digital literacy programs to help students effectively utilize technology for SRL. This aligns with Mugisha (2018), who argued that students require training and institutional support to fully leverage technology for academic engagement with a statement by one respondent who noted that;

> "*We're encouraged to utilize various online platforms for our education, but at times it feels like we're just left to fend for ourselves. I'm not always certain how to effectively leverage them for my studies. While I can access the resources, I'm unsure how to use the platform to organize my learning, monitor my progress, or identify my challenges. If we received proper training on how to use these tools for self-directed learning, I believe it would significantly improve our experience. Merely having access to technology isn't sufficient; we need to understand how to utilize it to benefit us.*" *(Student E, Kampala University, Personal Communication, 2025).*

6.4 Institutional Strategies in Higher Education to Support Self-Regulated Learning Through Technology

Trancing Institutional support is a critical issue in fostering SRL through technology. European Council (2006) recognizes SRL as a lifelong learning competency, which universities must actively nurture. Sitzmann & Ely (2001) further stress that technology-based SRL strategies require administrative commitment and structured policies to be effective. Findings revealed that Administrators and faculty members acknowledged that while Kampala University has embraced e-learning technologies, institutional gaps remain. The university has invested in ICT infrastructure, but not all lecturers are trained in facilitating SRL through technology. A faculty member admitted that;

> "*There are numerous platforms: Moodle, WhatsApp, and Zoom that often leave me puzzled about where to locate materials or submit my assignments. For instance, the professor may share the reading list on Moodle but send important updates via WhatsApp. Then, we have to attend lectures through Zoom, and at times we're required to work together on Google Docs. It can be overwhelming to manage! Just last week, I missed a deadline for an assignment because I was searching for the instructions on the incorrect platform. It's extremely frustrating.*"

On the issue of Internet accessibility and cost, this remains a significant barrier. Students from lower-income backgrounds reported inconsistent access to reliable internet, affecting their ability to engage in online learning as one hinted that;

> *It's encouraging that our university is beginning to integrate more technology, but merely providing the platforms is insufficient. We require genuine support in learning how to utilize them effectively for our educational needs. At other universities, I've heard they offer specialized programs to assist students in planning, monitoring, and assessing their work with the technology. Unfortunately, we don't have that here. The approach seems to be more of, 'Here's the platform, good luck!' If the university truly aims to foster self-regulated learners, it must allocate resources to training and mentorship, rather than just the technology itself.*

Implying that when it came to Mentorship and guidance for SRL strategies a lot was found to be lacking in the university's curriculum. Unlike Western universities where structured SRL training modules are incorporated, Ugandan institutions rely on informal learning processes. The implication also aligns with Wamala & Seruwagi (2021), who argue that institutional frameworks in Ugandan universities must be strengthened to integrate SRL-friendly learning environments. They emphasize the need for faculty training, increased digital inclusion, and structured student mentorship to enhance technology-driven SRL as one student leader narrated that;

> "*I believe our university can enhance our learning through technology. However, it's not merely about providing laptops or access to Moodle. We need our instructors to demonstrate how to utilize these tools for organizing our studies, monitoring our progress, and identifying areas for improvement. At times, even when instructors make an effort, they haven't received sufficient training themselves. Additionally, not everyone has the same level of access to dependable internet or devices at home, which complicates matters further. If the university were to invest more in training for both students and instructors and ensure equal access to technology for everyone, I'm confident we would see a significant improvement in our learning outcomes.*"

6.5 Generalization of SRL Adoption

Findings highlight significant progress in adopting innovative approaches to foster self-regulated learning through technology. However, gaps exist in the effective utilization of digital platforms for SRL, students' digital literacy and confidence in using technology for independent learning and institutional policies and faculty engagement in promoting SRL strategies. These insights provide a foundation for policy recommendations, suggesting that universities should. Also, Incorporate SRL-focused digital literacy training into student orientation programs. There is a need to Strengthen faculty capacity to facilitate self-regulated learning through e-learning. Also, there is a need to improve digital access, particularly for underprivileged students, to ensure equal participation in technology-enhanced learning. By enhancing institutional strategies, increasing digital inclusion, and promoting student-centred SRL training, Kampala University and other higher education institutions in Uganda can fully leverage technology to foster self-regulated learning, leading to improved academic engagement and performance.

7. Discussion

The discussion of the study aligns with the research findings and is structured according to the study's objectives. It explores how innovative approaches foster Self-Regulated Learning (SRL) through technology as a learning environment in higher education institutions, specifically at Kampala University. The analysis is grounded in previous literature, comparing it with the current situation at Kampala University while integrating insights from global and regional studies.

7.1 Innovative Approaches for Integrating Technology in Fostering Self-Regulated Learning (SRL)

Innovative approaches in education, particularly technology-enhanced learning environments, have been widely acknowledged for fostering SRL. Zimmerman (2002) posits that self-regulated learners exhibit proactive learning behaviours by setting personal goals, managing time effectively, and engaging in metacognitive strategies. Technology has been recognized as a powerful enabler of these SRL strategies. The findings indicate that various digital tools, such as Moodle, Google Classroom, and mobile learning applications, have been integrated to support SRL. However, their full potential is yet to be realized due to low digital literacy, inconsistent internet access, and lack of structured mentorship programs. This aligns with Kintu & Zhu (2016), who found that technology integration in Ugandan higher education has progressed but is often hindered by limited institutional support and a lack of SRL-oriented pedagogical frameworks.

Additionally, gamification strategies, such as digital quizzes and online discussion forums, were reported to motivate students and enhance their engagement. This is consistent with Deterding et al. (2011), who found that gamification fosters motivation and improves learning outcomes by incorporating interactive elements into educational settings. However, while students expressed enthusiasm for such digital strategies, their

implementation at Kampala University remains sporadic and largely unstructured.

The study's findings further indicate that faculty members lack formal training on how to integrate SRL-friendly digital tools into their teaching methodologies. This resonates with Boekaerts & Corno (2005), who argue that the effectiveness of technology in fostering SRL depends largely on how well instructors guide students in utilizing digital tools to regulate their learning process. The lack of structured training for faculty members presents a significant barrier to the full integration of technology-enhanced SRL strategies at Kampala University. Given these findings, it is evident that while Kampala University has taken steps to integrate technology into its learning environment, the institution must further invest in digital literacy training, structured mentorship, and faculty capacity building to ensure sustained improvements in self-regulated learning outcomes.

7.2 Students' Perceptions of Technology in Supporting Self-Regulated Learning

Students' perceptions of technology play a critical role in determining its effectiveness in fostering SRL (Pintrich, 2004). The findings revealed divergent views, with some students demonstrating enthusiasm for using technology in self-directed learning, while others expressed challenges in managing multiple digital platforms and online learning resources. The study found that female students face additional barriers in adopting technology for SRL due to socio-cultural expectations and gender disparities in digital access. This finding is supported by Namukasa & Ssenkaaba (2020), who observed that female students in Ugandan universities often face limited access to digital tools due to competing responsibilities and social norms that discourage extended screen time. Moreover, Wamala & Seruwagi (2021) found that financial constraints disproportionately affect female students, limiting their ability to engage in technology-based SRL practices.

Moreover, Mugisha (2018) found that students who are provided with structured digital learning frameworks demonstrate higher levels of motivation and engagement compared to those left to navigate e-learning independently. The findings from this study confirm this perspective, as students at Kampala University who had clear guidance on how to use digital tools for self-regulation reported higher academic engagement than those who lacked such support. To improve students' perception and adoption of technology-enhanced SRL, Kampala University must introduce structured digital literacy programs and integrate SRL training into their academic curricula. These efforts should be tailored to bridge gender gaps, support time management strategies, and promote equitable access to digital learning tools.

7.3 Institutional Strategies in Higher Education to Support Self-Regulated Learning Through Technology

Higher education institutions play a critical role in shaping SRL outcomes by creating supportive digital learning environments (Sitzmann & Ely, 2001). The study revealed that while Kampala University has invested in ICT infrastructure, significant gaps exist in institutional policies, faculty engagement, and structured student support systems. E-learning policies are in place but lack explicit provisions for fostering SRL. Unlike institutions in developed countries where universities incorporate structured SRL training modules, Kampala University relies on informal learning approaches. Internet access remains a challenge, with students from low-income backgrounds struggling to afford reliable connectivity. This challenge is echoed by Wamala & Seruwagi (2021), who emphasize that socioeconomic disparities contribute to digital exclusion, hindering equitable access to self-regulated learning opportunities.

Faculty members need formal training on digital pedagogy and SRL strategies. This aligns with the European Council (2006), which states that SRL is a key competency for lifelong learning, requiring institutional commitment to structured capacity-building initiatives. Zimmerman (2000) further stresses that Self-Regulated Learning is not an innate ability but a skill that must be nurtured through structured interventions.

Another major institutional gap identified was the lack of mentorship programs designed to support students in developing self-regulation strategies. Boekaerts (2011) highlights that mentorship and coaching are essential in helping students transition into self-directed learning, as they provide guidance on goal-setting, reflection, and motivation control. However, at Kampala University, mentorship remains limited and largely informal, preventing students from receiving adequate guidance on optimizing SRL strategies through technology. To address these gaps, Higher Education institutions must develop structured e-learning policies that explicitly promote SRL strategies. Ensure that faculty receives training in digital pedagogy and SRL facilitation. Provide equitable access to digital resources, ensuring all students benefit from technology-enhanced learning. Establish mentorship programs to support students in developing metacognitive and time management skills. While there is progress in integrating technology into its learning environment, several challenges persist in fully fostering Self-Regulated Learning. Institutional policies need to prioritize SRL-specific training, and faculty members should be equipped with pedagogical strategies that actively engage students in self-regulated learning practices.

7.4 Arising Conclusions

A key conclusion drawn from the research is that while students at Kampala University have access to digital learning resources, their ability to utilize these tools effectively for SRL remains inconsistent. This finding aligns

with Zimmerman (2002), who emphasizes that self-regulated learning requires active engagement in goal-setting, time management, and self-monitoring strategies, all of which must be intentionally developed rather than assumed as inherent skills. Furthermore, the study found that students who actively utilize SRL strategies through technology exhibit higher academic motivation, deeper learning, and improved performance, consistent with research by Pintrich (2004).

Institutional policies in many higher education institutions have not fully integrated structured SRL programs into their digital learning frameworks. While platforms like Google Classroom, Moodle, and e-learning portals have been adopted, their utilization in fostering self-directed learning remains unstructured and uncoordinated. This reflects similar findings by Mugisha (2018), who observed that Ugandan higher education institutions often adopt technology-based learning platforms without integrating metacognitive and self-regulatory training for students. Additionally, Namukasa & Ssenkaaba (2020) highlight that female students face additional challenges in accessing and utilizing digital learning environments, often due to socioeconomic and cultural constraints, a reality also reflected in this study's findings.

Faculty training remains a critical gap in the full implementation of technology-enhanced SRL in Higher Education institutions. Educators often lack the pedagogical training necessary to guide students in self-regulated learning practices, a challenge echoed by Boekaerts & Corno (2005), who argue that the success of SRL initiatives depends on the institutional capacity to train educators in digital and metacognitive instructional techniques. Moreover, financial constraints further exacerbate disparities in access to SRL-enhancing technologies, particularly for students from low-income backgrounds. The findings revealed that while students recognise the benefits of using technology for SRL, economic hardships often limit their ability to afford reliable internet access and digital devices, reinforcing observations by Wamala & Seruwagi (2021) regarding digital inequalities in Ugandan higher education.

7.5 Recommendations

To enhance Self-Regulated Learning (SRL) through technology in higher education institutions, particularly, a structured and strategic approach is necessary. First, the university should integrate formal SRL training into the curriculum, equipping students with goal-setting, time management, and self-assessment skills. Zimmerman (2000) emphasizes that SRL competencies must be explicitly taught rather than assumed, a principle that should guide institutional policies.

Furthermore, faculty members should undergo structured training in digital pedagogy and self-regulation strategies. The findings reveal that many lecturers lack knowledge of how to integrate SRL-enhancing technologies into their teaching methodologies, which limits student engagement. Boekaerts (2011) suggests that educator training is a critical determinant of successful SRL implementation, making it imperative for Kampala University to develop professional development programs that equip faculty with the necessary skills to support student autonomy in learning.

Institutional policies should also promote gender-sensitive digital learning initiatives, ensuring that female students, who often face additional socio-cultural and economic challenges, have equal opportunities to utilize SRL-enhancing technologies. Research by Namukasa & Ssenkaaba (2020) emphasizes the need for gender-responsive interventions that address disparities in digital education access. Kampala University should implement mentorship and digital literacy programs specifically targeted at female students, providing them with the necessary support to fully participate in Self-Regulated Learning environments.

To further strengthen the integration of technology into SRL, Universities should establish a centralized mentorship and advisory program that guides students in optimizing digital tools for self-regulation. Mugisha (2018) highlights that mentorship plays a crucial role in enhancing student's ability to set learning goals, manage academic workloads, and develop resilience in digital learning environments. By implementing structured peer mentorship programs, students can receive continuous guidance on self-regulation strategies, improving their overall academic engagement and performance.

Finally, institutional collaboration with government agencies, policymakers, and international organizations is essential in fostering SRL adoption in Ugandan higher education. Agencies/Organizations like UNESCO, the World Bank, and the Global Partnership for Education (2020) emphasize the role of multi-stakeholder partnerships in advancing digital education initiatives. Universities should actively engage in public-private partnerships to secure funding, infrastructure, and expertise for SRL-focused technological advancements.

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