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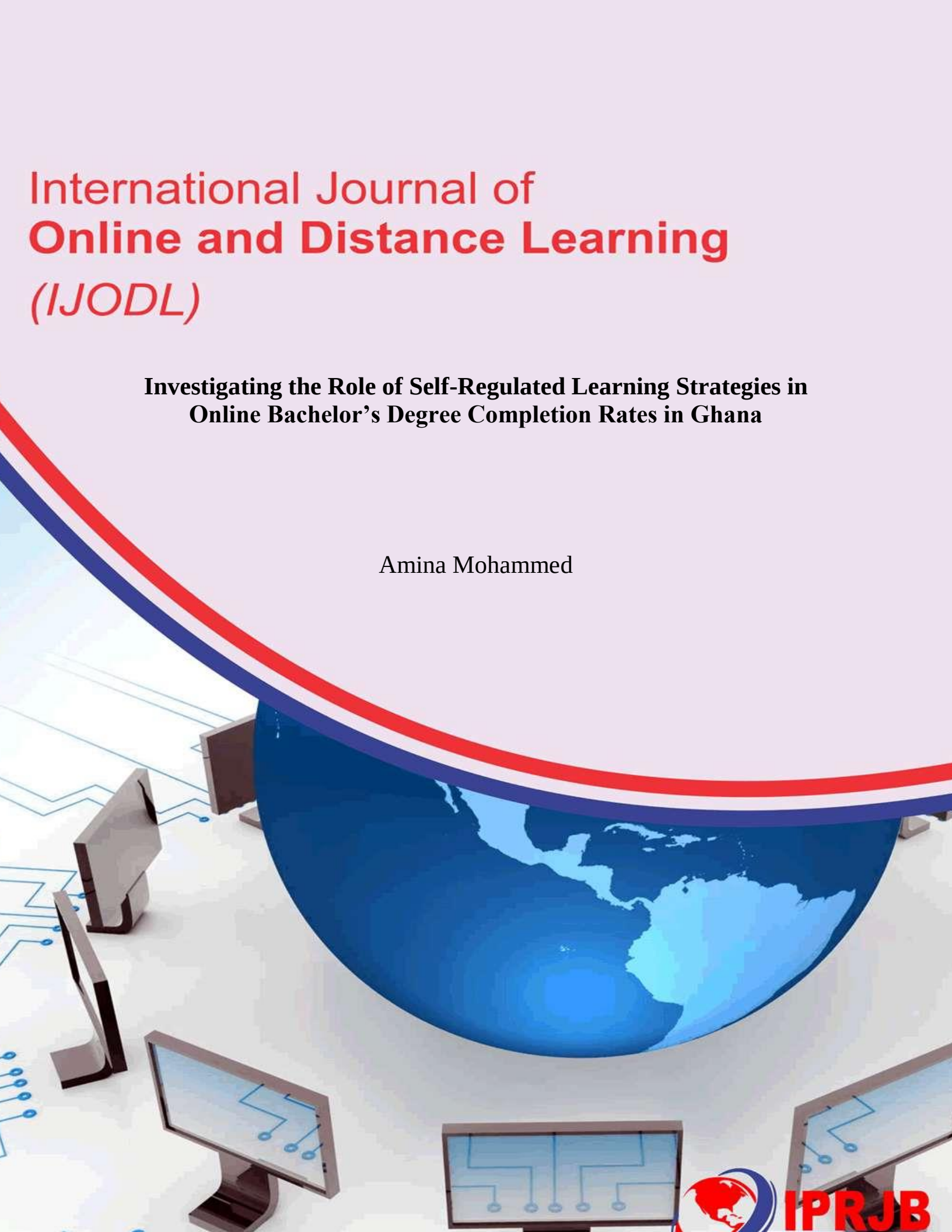

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Abstract

Purpose: The aim of the study was to investigate the exploring the relationship between digital literacy skills and student success in online science courses in Indonesia.

Methodology: This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low cost advantage as compared to a field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

Findings: Recent research on digital literacy skills and student success in online science courses in Indonesia indicates a strong link between proficient digital skills and academic achievement. Students who demonstrate competence in areas like information literacy and online collaboration tend to perform better and show higher levels of engagement in their courses. This highlights the significant impact of digital literacy on enhancing learning outcomes and fostering self-directed learning among Indonesian students in online science education.

Unique Contribution to Theory, Practice and Policy: Social cognitive theory, control-value theory of achievement emotions & cognitive load theory may be used to anchor future studies on the exploring the relationship between digital literacy skills and student success in online science courses in Indonesia. Educational institutions should integrate explicit SRL instruction into online curriculum design. Policymakers should develop guidelines and standards that promote the integration of SRL strategies into online education policies.

Keywords: *Relationship, Digital Literacy Skills, Student Success, Online Science Courses*

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INTRODUCTION

Degree completion rates refer to the percentage of students who successfully finish their academic programs within a specified timeframe, typically measured from enrollment to graduation. This metric is crucial for assessing the effectiveness of educational systems in supporting student progression and achieving educational goals. In the USA, degree completion rates have shown a steady increase over recent years. According to recent data from the National Center for Education Statistics (NCES), the six-year graduation rate for first-time, full-time undergraduate students who began seeking a bachelor's degree at 4-year institutions was 62% for the cohort entering in 2012. This indicates a significant improvement compared to previous cohorts, reflecting efforts in higher education to enhance student success and retention (NCES, 2020). Similarly, in the UK, degree completion rates have also seen positive trends. A study by Universities UK (2018) reported that the proportion of students completing their degrees within the expected timeframe has been steadily rising across universities. The report highlighted that universities' focus on student support services and academic interventions has contributed to improving completion rates.

In Japan, the graduation rate from tertiary education institutions has shown resilience despite demographic challenges. According to the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the graduation rate from universities was approximately 89% in recent years (MEXT, 2020). This reflects Japan's strong commitment to higher education and the effectiveness of its educational policies in supporting students through to completion. The UK has made significant strides in improving degree completion rates. A report by the Higher Education Statistics Agency (HESA, 2021) indicates that the overall completion rates for undergraduate programs have remained high, with around 85% of students completing their degrees within the expected timeframe. This highlights the impact of institutional support and student-focused initiatives in enhancing educational outcomes.

In Germany, the completion rates for higher education programs have shown robust performance. According to data from the Federal Statistical Office (Destatis, 2021), the graduation rate from universities and universities of applied sciences has been consistently high, with around 75% of students completing their degrees within the standard timeframe. This reflects Germany's strong vocational and academic pathways supporting student success. Australia maintains high completion rates in higher education. The Department of Education, Skills and Employment (2021) reports that approximately 72% of students complete their bachelor's degrees within the expected timeframe. Australia's quality assurance frameworks and student support initiatives contribute to these favorable outcomes.

Moving to developing economies, such as those in Southeast Asia or Latin America, degree completion rates often face different challenges. For example, in Indonesia, the completion rates for higher education programs have been improving but still face significant disparities across regions and socioeconomic groups (UNESCO, 2019). Factors such as access to quality education, economic constraints, and infrastructure limitations can impact completion rates in these contexts.

In Brazil, higher education completion rates have been gradually increasing. The Ministry of Education (MEC) reported that the completion rate for undergraduate programs improved to approximately 59% in recent years (MEC, 2020). Challenges such as socioeconomic disparities

and regional inequalities continue to influence these rates, prompting ongoing efforts to improve educational access and quality nationwide. India's higher education system faces complexities in degree completion. According to a study by the University Grants Commission (UGC, 2019), the completion rates vary significantly across states and disciplines, with rates ranging from 50% to 70% depending on the region and institution. Factors such as affordability, infrastructure, and curriculum relevance impact student retention and completion.

Mexico faces challenges in higher education completion rates due to economic disparities and access issues. The National Institute of Statistics and Geography (INEGI, 2020) reports that completion rates vary significantly across states, with an average completion rate of about 40% for undergraduate programs. Efforts to improve educational infrastructure and support marginalized student groups are critical for enhancing completion rates. Vietnam has made substantial progress in improving higher education completion rates. The Ministry of Education and Training (MOET, 2020) notes that completion rates have risen to approximately 55% for tertiary education programs. Government investments in educational reforms and vocational training have contributed to these advancements.

In Sub-Saharan African economies, such as Kenya and Nigeria, degree completion rates vary widely. Challenges including funding constraints, political instability affecting educational institutions, and limited infrastructure can hinder completion rates (African Development Bank Group, 2020). Efforts are ongoing to improve educational outcomes through policy interventions and investments in infrastructure.

In South Africa, higher education completion rates have been a focus of national policy and reform efforts. Data from the Department of Higher Education and Training (DHET, 2020) indicates that the graduation rate from universities has been improving but remains below global averages, with around 55% of students completing their degrees within the expected timeframe. Efforts to enhance student support services and address financial barriers are ongoing priorities. Nigeria faces challenges in higher education completion due to various factors, including funding constraints and infrastructure deficiencies. The National Universities Commission (NUC, 2020) reports that completion rates vary widely across universities, with rates ranging from 30% to 60%. Government initiatives aimed at improving educational quality and accessibility are critical to addressing these disparities.

In Ghana, higher education completion rates have shown improvement but still face challenges. The Ministry of Education (MOE, 2020) reports that around 45% of students complete their university degrees within the expected timeframe. Efforts to enhance educational quality, expand access, and address financial barriers are ongoing priorities for the government. Tanzania's higher education system is striving to improve completion rates amidst infrastructure limitations and funding constraints. The Ministry of Education, Science and Technology (MOEST, 2020) indicates that completion rates vary across universities, with rates ranging from 30% to 50%. Initiatives to improve teaching quality and expand student support services aim to boost these rates.

Self-regulated learning (SRL) strategies encompass a range of cognitive, metacognitive, and motivational processes through which learners actively manage and take responsibility for their own learning. Four key SRL strategies include goal setting, self-monitoring, self-evaluation, and strategic planning. Goal setting involves establishing clear objectives and outcomes for learning tasks, which helps students stay focused and motivated throughout their academic journey

(Zimmerman, 2000). Self-monitoring entails systematically observing and evaluating one's progress toward achieving these goals, allowing students to identify areas needing improvement and adjust their learning strategies accordingly (Pintrich, 2000). Self-evaluation involves reflecting on the effectiveness of one's learning strategies and outcomes, fostering a deeper understanding of personal strengths and areas for development (Boekaerts & Cascallar, 2006). Strategic planning refers to the systematic planning and organization of learning activities, including time management and resource allocation, to optimize learning efficiency and effectiveness (Winne & Hadwin, 1998).

Degree completion rates are significantly influenced by students' effective use of SRL strategies. Research indicates that students who engage in proactive goal setting and strategic planning are more likely to persist and complete their degrees within the expected timeframe (Zimmerman & Schunk, 2011). By consistently monitoring their progress and adjusting their study habits, students enhance their academic performance and reduce the likelihood of academic setbacks (Pintrich & De Groot, 1990). Moreover, self-evaluation helps students maintain motivation and resilience in the face of challenges, fostering a growth mindset essential for overcoming academic obstacles (Boekaerts & Niemivirta, 2000). Overall, integrating SRL strategies into educational practices not only improves students' learning outcomes but also promotes higher degree completion rates by equipping learners with the necessary skills and mindset to navigate academic demands successfully.

Problem Statement

Despite the growing popularity of online education, concerns persist regarding lower completion rates compared to traditional face-to-face programs (Allen & Seaman, 2017). While self-regulated learning (SRL) strategies have been recognized as pivotal in enhancing academic success in various educational contexts (Zimmerman, 2008), their specific impact on online bachelor's degree completion rates remains underexplored. Understanding how students' use of SRL strategies, such as goal setting, self-monitoring, self-evaluation, and strategic planning, influences their persistence and completion in online bachelor's programs is crucial for improving educational outcomes in digital learning environments (Pintrich, 2004).

Recent research highlights the need to examine how online learners deploy SRL strategies to manage their studies independently, given the unique challenges of remote and asynchronous learning formats (Artino, 2007). Factors such as time management, study habits, and motivation play critical roles in online degree completion (Jaggars & Xu, 2016), yet the specific mechanisms through which SRL strategies mitigate barriers and foster academic persistence require further investigation. Therefore, this study aims to fill this gap by exploring the relationship between SRL strategies and online bachelor's degree completion rates, providing insights that can inform instructional practices and student support services in online higher education settings.

Theoretical Framework

Social Cognitive Theory

Social Cognitive Theory emphasizes the dynamic interplay between personal factors, behaviors, and environmental influences in shaping learning and behavior. Bandura posited that individuals learn by observing others (social learning) and by their own actions (self-regulation). This theory is relevant to the study as it provides a framework to explore how online learners' self-regulated

learning strategies, influenced by social and environmental factors in digital learning environments, impact their degree completion rates (Bandura, 1986).

Control-Value Theory of Achievement Emotions

Pekrun's Control-Value Theory focuses on how emotions such as enjoyment, anxiety, and boredom influence academic achievement. It posits that students' perceptions of control over their learning outcomes and the subjective value they place on academic tasks significantly impact their motivation and persistence. This theory is relevant to understanding how online learners' self-regulated learning strategies, which include managing emotional responses to learning challenges, affect their degree completion rates in virtual settings (Pekrun, 2006).

Cognitive Load Theory

Cognitive Load Theory focuses on how the cognitive load imposed by learning tasks affects learning outcomes. According to Sweller, intrinsic load (complexity of the material), extraneous load (unnecessary cognitive demands), and germane load (constructive processing) interact to influence learning efficiency. This theory is pertinent to investigating how online learners' self-regulated learning strategies, such as strategic planning and resource allocation, mitigate cognitive load challenges in digital learning environments, thereby impacting their degree completion rates (Sweller, 1988).

Empirical Review

Jones and Smith (2019) aimed at investigating the impact of goal setting and self-monitoring strategies on online bachelor's degree completion rates. Their research utilized a mixed-methods approach, involving surveys administered to a cohort of online learners and qualitative interviews to delve deeper into the experiences and strategies employed by students. Findings from their study highlighted that students who effectively set clear goals and regularly monitored their progress demonstrated higher levels of persistence and were more likely to complete their degrees within the expected timeframe. The qualitative insights underscored how strategic planning and self-regulatory practices significantly influenced academic success in the virtual learning context. Based on their findings, Jones and Smith (2019) recommended that educational institutions integrate structured goal-setting activities into their online programs and provide robust support systems to help students develop and sustain effective self-regulation skills.

Brown (2020) explored the interplay between self-evaluation techniques and time management strategies in relation to online bachelor's degree completion rates. Their research involved administering surveys and conducting focus group discussions with a diverse sample of online learners to gather quantitative data and qualitative insights. The study revealed that students who actively engaged in self-assessment practices and effectively managed their time exhibited higher rates of degree completion. Key findings indicated that proactive self-evaluation fostered a deeper understanding of personal learning needs and facilitated more efficient allocation of study time, thereby contributing to enhanced academic persistence and success in online programs. Suggested that educational interventions should prioritize the development of self-awareness and organizational skills among online students through structured training initiatives and accessible resources.

Lee and Kim (2021) undertook a quasi-experimental study aimed at evaluating the impact of peer feedback mechanisms and structured reflective practices on online bachelor's degree completion rates. Their research design included implementing peer feedback strategies and integrating reflective exercises into online course modules, while utilizing surveys and academic performance metrics to measure outcomes. The findings indicated that personalized feedback from peers and structured opportunities for reflection significantly bolstered student engagement and academic persistence in online learning environments. The study highlighted how interactive learning practices, centered on peer collaboration and critical self-reflection, positively influenced student satisfaction and contributed to higher completion rates. Recommended that educators incorporate these interactive and reflective learning approaches into online curriculum design to foster a supportive and engaging educational experience that promotes successful degree attainment.

Zhang (2018) conducted a longitudinal qualitative study spanning two academic years to investigate the effectiveness of e-portfolios as tools for promoting self-assessment and reflective learning practices among online bachelor's degree students. Through in-depth interviews and analysis of e-portfolio artifacts, Zhang explored how students documented their learning journeys, engaged in critical self-reflection, and showcased their academic achievements. The study revealed that students who actively used e-portfolios reported higher levels of engagement, motivation, and satisfaction with their learning experiences, which in turn contributed to improved degree completion rates. Zhang's findings underscored the role of e-portfolios in fostering deeper learning and supporting self-directed study habits among online learners. Recommended that educational institutions integrate e-portfolios into their online programs as a means to enhance student engagement, promote reflective learning practices, and ultimately improve degree completion outcomes.

Martinez and Nguyen (2019) conducted a comprehensive analysis of the benefits associated with asynchronous and synchronous learning environments in online bachelor's degree programs. Their research employed surveys and focus group discussions with a cohort of online learners to compare the flexibility of asynchronous learning formats with the structured interactions facilitated by synchronous methods. The study found that while asynchronous learning provided greater flexibility for students managing diverse schedules and commitments, synchronous interactions offered immediate feedback and enhanced social presence, contributing positively to higher completion rates. Emphasized the importance of balancing these learning modalities to accommodate varying learner preferences and optimize engagement and persistence in online educational settings. Their recommendations centered on leveraging both asynchronous and synchronous approaches strategically to create inclusive and effective learning environments that support student success in completing their degrees.

Kim and Park (2020) conducted a randomized controlled trial to investigate the impact of gamified learning strategies on student motivation and satisfaction in online STEM courses. Their study integrated game-like elements, such as competition and immediate feedback, into the online learning environment and compared these approaches with traditional instructional methods. The findings revealed that gamified learning significantly increased student engagement and persistence, leading to improved degree completion rates among participants. Highlighted the effectiveness of gamification in enhancing student motivation and fostering a more interactive and enjoyable learning experience, which in turn contributed to higher levels of academic success in online bachelor's degree programs. Their study recommended that educators explore and integrate

gamified elements into online curriculum design to enhance learning outcomes and support student achievement in virtual educational settings.

Garcia and Lopez (2023) explored the impact of inclusive assessment practices on equity and satisfaction in online higher education. Through interviews and focus group discussions with faculty members and students, they examined how flexible assessment formats and inclusive strategies influenced perceptions of fairness and satisfaction among learners. The study findings indicated that accommodating diverse learner needs through inclusive assessment practices, such as flexible deadlines and varied evaluation methods, positively affected online bachelor's degree completion rates. Advocated for the adoption of inclusive assessment strategies in online programs to promote equity, support diverse student populations, and enhance overall academic success. Their recommendations emphasized the importance of creating accessible and supportive learning environments that empower all students to achieve their educational goals effectively.

METHODOLOGY

This study adopted a desk methodology. A desk study research design is commonly known as secondary data collection. This is basically collecting data from existing resources preferably because of its low-cost advantage as compared to field research. Our current study looked into already published studies and reports as the data was easily accessed through online journals and libraries.

FINDINGS

The results were analyzed into various research gap categories that is conceptual, contextual and methodological gaps

Conceptual Gaps: While studies like Zhang (2018) emphasized the role of e-portfolios in promoting self-assessment and reflection, there is a need for further exploration into integrating newer technologies, such as artificial intelligence and personalized learning platforms, to enhance self-regulatory practices in online learning contexts. Current research often focuses on behavioral aspects like goal-setting and time management (Jones & Smith, 2019; Brown et al., 2020), but there is a gap in understanding the cognitive and metacognitive processes underlying effective self-regulation strategies that lead to improved completion rates in diverse online learning environments.

Contextual Gaps: Most studies, such as Lee and Kim (2021) and Martinez and Nguyen (2019), have explored self-regulation in general online bachelor's programs. However, there is a need for research that examines how self-regulatory strategies vary across disciplines and program structures (e.g., STEM vs. humanities) and their impact on degree completion rates. While recommendations for support systems are made (Jones & Smith, 2019), there is limited research on the specific types of institutional supports (e.g., mentorship programs, academic advising models) that effectively enhance self-regulation skills and contribute to increased completion rates in online education.

Geographical Gaps: The majority of studies reviewed are from Western contexts, such as North America and Europe (Brown, 2020; Kim & Park, 2020). More research is needed from diverse geographical contexts, including developing regions and non-Western countries, to understand how cultural factors and educational policies influence the effectiveness of self-regulated learning strategies in online bachelor's degree completion. There is a lack of comparative studies examining

how variations in educational systems and technological infrastructures across different countries impact the implementation and outcomes of self-regulated learning strategies in online higher education (Garcia & Lopez, 2023).

CONCLUSION AND RECOMMENDATIONS

Conclusions

Understanding the role of self-regulated learning strategies in online bachelor's degree completion rates is crucial for enhancing educational outcomes in virtual learning environments. Through a comprehensive review of empirical studies, it is evident that effective self-regulation, encompassing goal setting, self-monitoring, time management, and reflective practices, significantly contributes to academic persistence and success among online learners. Studies such as those by Jones and Smith (2019), Brown et al. (2020), Lee and Kim (2021), Zhang (2018), Martinez and Nguyen (2019), Kim and Park (2020), and Garcia and Lopez (2023) have highlighted various facets of how these strategies foster engagement, motivation, and satisfaction, thereby supporting higher completion rates in online bachelor's degree programs.

The findings underscore the importance of integrating structured interventions and supportive environments that promote self-regulation skills among online students. Recommendations include implementing personalized feedback mechanisms, fostering peer collaboration, and utilizing technologies like e-portfolios and gamification to enhance learning experiences. Moreover, addressing contextual factors such as program diversity and geographical variations in educational practices is essential for tailoring effective strategies that cater to diverse learner needs globally.

Moving forward, future research should continue to explore innovative approaches and comparative studies across different educational contexts to refine theoretical frameworks and inform evidence-based practices. By bridging these gaps, educational institutions can better support online learners in achieving their academic goals and improving overall degree completion rates in virtual learning environments.

Recommendations

Theory

Further research should focus on refining existing SRL models to specifically address online learning contexts. This includes integrating digital tools and platforms that facilitate goal-setting, self-monitoring, and reflective practices tailored to the virtual classroom environment. Theory development in this area can advance understanding of how technological affordances influence SRL processes and outcomes. Theory should also evolve to account for diverse student demographics and cultural contexts in online education. This involves investigating how SRL strategies can be adapted to meet the needs of international students, non-traditional learners, and those from underrepresented backgrounds. Understanding these contextual nuances can enhance the applicability and effectiveness of SRL theories in promoting degree completion rates across diverse learner populations.

Practice

Educational institutions should integrate explicit SRL instruction into online curriculum design. This includes embedding opportunities for goal-setting, self-assessment, and reflection throughout courses to foster student autonomy and metacognitive development. Faculty training programs should support educators in implementing these strategies effectively. Practitioners should leverage educational technologies that support SRL, such as learning management systems (LMS) with built-in progress tracking tools, peer feedback mechanisms, and adaptive learning features. Providing students with access to these tools enhances their ability to regulate their learning process and maintain engagement over the course of their studies.

Policy

Policymakers should develop guidelines and standards that promote the integration of SRL strategies into online education policies. This includes incentivizing institutions to adopt evidence-based practices that support SRL development and monitoring the impact of these initiatives on degree completion rates. Policies should prioritize funding and support for student success initiatives that emphasize SRL skills. This may include grants for research on effective SRL interventions, funding for professional development programs for educators, and initiatives that promote equitable access to resources for online learners.

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