

Learning Management Systems and Self-Regulated Learning among Postgraduate Teacher-Students in Open and Distance Learning in the Sri Lankan Context

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ABSTRACT

Learning Management Systems (LMS) have become vital tools in open and distance learning (ODL), playing a central role in supporting teaching and learning. However, their contribution to promoting self-regulated learning (SRL) among postgraduate teacher-students remains insufficiently examined in multilingual contexts. This study investigated LMS-supported SRL among postgraduate teacher-students enrolled in a Postgraduate Diploma in Education programme at a leading ODL university in Sri Lanka. Using a quantitative survey design, data were collected from 344 teacher-students selected through stratified sampling from a population of 2,849 teacher-students enrolled across the regional and study centres of the University. A structured questionnaire measuring seven SRL components; goal setting, environment structuring, task strategies, time management, help-seeking, self-evaluation, and motivation, was administered. Findings revealed moderate to high levels of LMS-supported SRL. Environment structuring and motivation received the highest ratings, while help-seeking and time management emerged as weaker areas. Multivariate analysis demonstrated that medium of instruction and registered centre significantly influenced multiple SRL components. Medium of instruction most strongly affected motivation and task strategies, whereas registered centre had the greatest influence on environment structuring and help-seeking. Gender and age showed no statistically significant differences. Assignments, lessons, and quizzes were the most widely available and pedagogically impactful LMS features. Students highlighted challenges including expired content links, inadequate bilingual support, poor content organisation, and connectivity limitations as barriers to SRL engagement. These findings underscore the need for linguistically responsive and pedagogically purposeful LMS design. The study offers actionable recommendations to enhance LMS effectiveness in supporting diverse postgraduate teacher-students across multilingual settings.

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1. Introduction

The rapid expansion of open and distance learning (ODL) has fundamentally transformed the delivery of higher education worldwide, offering learners unprecedented flexibility in time, place, and pace of study. ODL has increasingly been recognized as a powerful mechanism for widening access to education, particularly for adult

learners who navigate complex professional and personal responsibilities alongside their academic pursuits (Bordoloi, 2018). The terms open learning and distance education collectively denote approaches that remove the constraints of geography and time from educational participation, enabling diverse groups of learners to engage with formal learning on their own terms (UNESCO, 2002). Within this evolving landscape, Learning Management Systems (LMS) have emerged as the technological backbone of ODL, serving as integrated platforms for delivering course content, facilitating learner-instructor interaction, and monitoring academic progress (Bradley, 2020). By enabling both synchronous and asynchronous communication, LMS platforms simulate and, in many respects, extend the possibilities of face-to-face learning environments (De Oliveira et al., 2016), making them central to the quality and equity of distance education provision worldwide. In higher education specifically, 99% of colleges currently deploy an LMS, with 77% of faculty regarding it as vital to their teaching practice. At the platform level, Canvas held 39% of the North American higher education LMS market share in Fall 2024, followed by Blackboard at 19%, with Moodle and Brightspace each capturing 16% of the market (Hill, 2025), while globally, the e-learning platform market is projected to reach approximately 995.9 million users by 2029 (Statista, 2025).

A key expectation of LMS-mediated learning is that it supports the development of self-regulated learning (SRL), the capacity of learners to proactively manage their cognition, motivation, behaviour, and environment in pursuit of their academic goals (Zimmerman & Schunk, 2011). SRL is particularly critical in ODL contexts, where the absence of continuous instructor presence demands a higher degree of learner autonomy and self-direction (Kucuk & Karabey, 2022). According to Zimmerman's (2002) widely cited cyclical model, self-regulated learners engage in iterative cycles of forethought, performance, and self-reflection, continuously refining their learning strategies through goal setting, time management, help-seeking, and self-evaluation to optimize learning outcomes. LMS platforms, with features such as assignment trackers, quiz tools, discussion forums, and progress dashboards, are theoretically well-positioned to scaffold these SRL processes (Araka et al., 2021). However, the extent to which LMS environments effectively promote SRL in practice, particularly among postgraduate teacher-students who simultaneously manage teaching responsibilities and distance study, remains an underexplored area in the empirical literature.

While existing studies have examined LMS-supported SRL among undergraduate populations (Araka et al., 2021; Çakiroğlu et al., 2024), the unique circumstances of postgraduate teacher-students in ODL settings have received comparatively limited attention (Odekeye et al., 2023). These learners occupy a distinctive position: they are simultaneously practitioners in professional educational roles and students navigating the demands of postgraduate distance study. Their engagement with LMS tools for self-regulated learning is therefore shaped not only by technological factors but also by contextual variables, including gender, age, regional location, and critically, the medium of instruction. In multilingual ODL contexts, where higher educational institutions serve diverse linguistic communities, the influence of the medium of instruction on SRL practices within LMS platforms remains largely unexplored. Thus, this study directly addresses this research gap by investigating how the medium of instruction impacts postgraduate teacher-students' LMS-supported SRL in ODL environments.

Sri Lanka represents a particularly instructive multilingual ODL context, where a single open university delivers postgraduate teacher education simultaneously across three language mediums, Sinhala, Tamil, and English, to thousands of in-service teachers distributed across diverse regional and study centres. However, there is little quantitative evidence on how postgraduate teacher-students perceive LMS support for their SRL practices, or whether demographic and linguistic factors shape these perceptions. Closing this gap is vital for improving postgraduate teacher education in Sri Lanka and for generating insights relevant to multilingual ODL contexts in Asia and beyond.

This study examines LMS-supported SRL among postgraduate teacher-students in a Postgraduate Diploma in Education programme at a leading open university in Sri Lanka. The study has four direct objectives: first, to assess how teacher-students perceive LMS support for their SRL development across seven key SRL components; second, to determine whether significant differences in LMS-supported SRL perceptions exist by gender, age, medium of instruction, and registered centres; third, to identify which LMS features most effectively facilitate SRL practices; and fourth, to examine the challenges in LMS use that hinder SRL. These objectives provide a comprehensive, evidence-based account of LMS-supported SRL in a multilingual postgraduate ODL context, informing LMS design, institutional policy, and teacher education practice. The novelty of this study lies in the intersection of three underexplored

dimensions: it simultaneously examines three language mediums within a single ODL institution, focuses on postgraduate teacher-students as a professionally distinct learner population whose dual roles as educators and distance learners create unique self-regulatory demands, and investigates registered centre as a geographical and infrastructural variable alongside medium of instruction, a combination that has not been examined together in prior LMS-supported SRL research. This tripartite focus positions the study as a contextually rich and methodologically distinctive contribution to the international literature on LMS-supported SRL in multilingual postgraduate ODL settings.

2. Literature Review

2.1 Self-Regulated Learning in Open and Distance Learning

Self-regulated learning (SRL) refers to the active process through which learners manage their cognition, motivation, behaviour, and environment to achieve personally defined academic goals (Zimmerman & Schunk, 2011). Theoretically grounded in Zimmerman's (2002) cyclical model, SRL encompasses three iterative phases, forethought, performance, and self-reflection, through which learners plan, execute, and evaluate their learning strategies. Within this framework, specific SRL components including goal setting, time management, help-seeking, self-evaluation, environment structuring, task strategies, and motivation operate as interdependent mechanisms that collectively determine the quality of a learner's self-directed engagement (Çakiroğlu et al., 2024). Pintrich (as cited in Zimmerman & Schunk, 2011) further elaborated these phases across cognitive, motivational, behavioural, and contextual dimensions, reinforcing the view that SRL is not a single skill but a multidimensional, context-sensitive process.

In ODL contexts, SRL assumes heightened significance. Distance learners are required to exercise considerably greater autonomy than their campus-based counterparts, as the absence of continuous face-to-face instruction places the primary responsibility for learning management with the student (Kucuk & Karabey, 2022). ODL has long been recognized as a vehicle for widening access to education by removing constraints of time and place (Ghosh et al., 2012), yet this very flexibility demands that learners possess robust self-regulatory capacities to navigate asynchronous learning environments effectively. For postgraduate teacher-students in particular, this challenge is compounded by the dual burden of managing professional teaching responsibilities alongside the demands of advanced academic study (Odekeye et al., 2023). Edisherashvili et al. (2022), in a systematic review of SRL interventions in distance learning at the higher education level, confirmed that SRL strategies, such as goal setting and time management, vary significantly across learners, underscoring the importance of examining SRL in relation to contextual and demographic variables. Despite this recognition, empirical studies specifically targeting postgraduate teacher-students in multilingual ODL settings remain sparse, representing a notable gap in the existing knowledge base. Understanding how LMS platforms are designed and deployed to scaffold these SRL processes in ODL contexts is therefore central to addressing the learning needs of postgraduate teacher-students, and it is to this relationship that the following section turns.

2.2 Learning Management Systems and SRL Practices

Learning Management Systems are software platforms that integrate tools for course delivery, learner-instructor communication, assessment, and progress monitoring within a unified digital environment (Bradley, 2020). In ODL, LMS platforms serve as the primary interface for students, linking content access, assessment submission, and engagement with academic communities (De Oliveira et al., 2016). LMSs' capacity to support SRL stems from how specific features promote self-regulatory strategies: structured course interfaces facilitate environment structuring, assignment and quiz tools support goal setting and self-evaluation, and discussion forums and chat functions enable help-seeking and collaborative engagement (Araka et al., 2021).

Empirical evidence broadly supports that purposefully designed LMS platforms can enhance SRL. Araka et al. (2021) found that LMS tools such as quizzes, assignments, and discussion forums foster environments that promote time management and self-monitoring among university students. Çakiroğlu et al. (2024) profiled online learners based

on LMS interactions, identifying three types: actively engaged, assessment-oriented, and passively engaged. They found goal setting and self-evaluation linked to assessment-oriented interactions, while environment structuring and task strategies characterized actively engaged learners. Similarly, Steindal et al. (2021) found that well-organized course structures and clear student responsibilities in LMS environments were key to positive postgraduate experiences. Simon et al. (2024) identified content delivery, communication, assessment, and collaborative tools as the main LMS dimensions supporting SRL in higher education. Beyond these foundational capabilities, the future of LMS in higher education is increasingly shaped by the integration of emerging technologies. The integration of artificial intelligence (AI) into LMS platforms is revolutionising higher education by enabling personalised learning, adaptive assessments, and data-driven decision-making, with key applications including AI-powered conversational agents, learning analytics, and individualised feedback mechanisms that hold considerable potential for strengthening self-regulatory practices among distance learners (Alotaibi, 2024).

However, the literature consistently highlights barriers to effective SRL supported by LMSs. Some students face technical difficulties, such as connectivity failures, expired content links, or navigation issues, which disrupt self-directed study (Araka et al., 2021). In addition, limited feedback and underused collaborative tools constrain LMS platforms' ability to support the reflective and interactive dimensions of SRL (Steindal et al., 2021). Complexity further increases in multilingual ODL contexts when course content and interfaces do not match learners' preferred languages; this misalignment may heighten cognitive load and reduce engagement, especially for those studying in a second or third language (Nawastheen et al., 2024). While the foregoing evidence establishes that LMS platforms can support SRL when purposefully designed, the extent to which these affordances are experienced equitably across learners with different demographic and linguistic backgrounds remains a critical and underexplored question, which the following section addresses.

2.3 Demographic Variables and LMS-Supported SRL

Beyond the general relationship between LMS use and SRL, research shows that gender and age both shape learners' self-regulatory behaviours in digital environments. For gender, studies found that female students engage more with LMS resources and achieve stronger academic outcomes than males in e-learning contexts, possibly due to the flexible and interactive nature of online environments (Cuadrado-García et al., 2010; Bruestle et al., 2009). Furthermore, Liu et al. (2021) highlight the need to strengthen male students' SRL skills. Regarding age, older adults demonstrate stronger motivation and more effective time management in online environments than younger postgraduate students, with this age-related difference especially evident in distance learning (Xu et al., 2022; Edisherashvili et al., 2022).

Despite these contributions, the literature reveals a significant gap in research examining how gender, age, medium of instruction, and registered centre together influence LMS-supported SRL among postgraduate teacher-students. Taken together, the evidence reviewed across these three thematic areas reveals a significant and persistent gap. Most existing studies focus on undergraduate populations in monolingual settings, overlooking how in-service teacher-students' experiences with multiple languages in ODL contexts affect their SRL. This study addresses this gap by specifically analyzing the relationships between these demographic and linguistic factors and LMS-supported SRL within a multilingual postgraduate ODL programme in Sri Lanka, providing evidence that is both contextually grounded and transferable to similar ODL settings internationally.

3. Methodology

3.1 Research Design

This study employed a quantitative survey design to systematically evaluate how LMS platforms support self-regulated learning among postgraduate teacher-students in an open and distance learning context. A quantitative approach was deemed appropriate given the study's aim to measure and compare SRL perceptions across a large, geographically dispersed population and to identify statistically significant differences across demographic and

linguistic subgroups (Gambo & Shakir, 2021). While the study is primarily quantitative, a small number of open-ended questions were included in the data collection instrument to capture qualitative nuances in students' experiences with LMS use. These open-ended responses were analysed thematically and used to contextualize and enrich the interpretation of the quantitative findings, lending the study a degree of methodological complementarity that strengthens the overall validity of the conclusions drawn.

3.2 Population and Sample

The target population comprised 2,849 postgraduate teacher-students enrolled in the Postgraduate Diploma in Education (PGDE) programme during the 2024/2025 academic year at a leading open university in Sri Lanka. These students were distributed across nine regional centres and seventeen study centres, representing a linguistically and geographically diverse learner population. A stratified sampling technique was employed to ensure proportional representation across the key demographic strata of gender, medium of instruction, and registered study centre. This approach was selected to minimize sampling bias and to enable meaningful subgroup comparisons in the subsequent analysis.

The final sample comprised 344 participants: 230 in the Sinhala medium (49 male, 181 female), 95 in the Tamil medium (22 male, 73 female), and 19 in the English medium (3 male, 16 female). This distribution mirrors the overall PGDE demographic profile and supports the comparative analyses in this study.

3.3 Data Collection Instrument

Data were collected using a structured questionnaire in all three mediums of instructions (Sinhala/English/Tamil) consisting of two sections. The first section gathered demographic information, including gender, age group, medium of instruction, and registered study centre. The second section assessed self-regulated learning (SRL) practices through items aligned with seven theoretically grounded components: goal setting, environment structuring (organizing learning spaces or conditions), task strategies, time management, help-seeking (seeking assistance from peers or instructors), self-evaluation, and motivation. These components are consistent with the SRL framework articulated by Zimmerman (2002) and operationalized in prior LMS-SRL research (Çakiroğlu et al., 2024). Each item was rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire was initially developed in English and later adapted into Sinhala and Tamil by bilingual subject experts who were proficient in both languages. Rather than focusing on word-for-word translation, the adaptation process aimed to preserve the original meaning of the items and ensure their cultural relevance across all three language versions. In addition, a back-translation process was employed to further ensure the accuracy and consistency of the translated versions. The expert review and back-translation procedures together helped establish content validity, supported by the reviewers' familiarity with both the languages and the PGDE learner context.

3.4 Validity and Reliability

Prior to full-scale administration, the questionnaire was pilot-tested with 30 PGDE students using the English version to assess the clarity, comprehensibility, and appropriateness of the items. Based on the pilot study feedback, minor revisions were made to the wording of several items before the questionnaire was translated and adapted into Sinhala and Tamil by bilingual subject experts. Pilot participants were excluded from the main study sample to avoid data contamination. Internal consistency reliability, a measure of whether items on each scale produce similar results, was assessed using Cronbach's alpha, a statistical coefficient, for each of the seven SRL subscales. Cronbach's alpha coefficients demonstrated acceptable to excellent internal consistency across all seven subscales: Goal Setting ($\alpha = .792$, 6 items), Environment Structuring ($\alpha = .884$, 4 items), Task Strategies ($\alpha = .831$, 4 items), Time Management ($\alpha = .747$, 5 items), Help Seeking ($\alpha = .754$, 4 items), Self-Evaluation ($\alpha = .831$, 4 items), and Motivation ($\alpha = .899$, 4 items), all exceeding the conventionally accepted threshold of .70 (Nunnally, 1978).

3.5 Data Analysis

Data analysis was conducted using SPSS. Descriptive statistics, including means and standard deviations, were computed to summarize participants' SRL perceptions across all seven SRL components. Independent-samples t-tests were conducted to examine gender differences, while a multivariate analysis of variance (MANOVA) using the General Linear Model (GLM) was employed to assess the combined influence of gender, age, medium of instruction, and registered centre on SRL components. Statistical significance was evaluated at the .05 level, and partial eta-squared (η^2) was calculated to assess the practical significance of observed effects. Qualitative responses to the open-ended questions were analysed using a general inductive approach. This approach allowed key ideas and patterns to emerge directly from the data without using a predefined coding framework. The responses were reviewed several times, and meaningful statements were grouped into categories based on common themes. Through this process, four main themes were identified: the most useful LMS features, the impact of LMS use on achieving academic goals, suggestions for improvement, and challenges experienced by students. These themes were mainly used to support and provide additional understanding of the quantitative findings rather than to produce separate qualitative conclusions.

3.6 Ethical Considerations

Ethical principles were maintained throughout the study. The research was conducted within the researchers' own institution and involved postgraduate teacher-students enrolled in an existing academic programme. As the study involved a non-invasive educational survey with minimal risk to participants and no collection of sensitive personal data, it was conducted in accordance with institutional procedures applicable to educational research within the programme context. Administrative approval was obtained through the relevant academic authorities prior to data collection. Before accessing the questionnaire, participants were provided with a digital informed consent statement explaining the purpose of the study, the voluntary nature of participation, and their right to withdraw at any time without any consequences. Only participants who provided explicit digital consent were permitted to proceed with the questionnaire. Confidentiality and anonymity were maintained throughout the study, as no personally identifiable information was collected and responses were used solely for research purposes. Appropriate measures were taken to protect participants' privacy, and their rights and dignity were respected in accordance with accepted ethical standards in educational research.

4. Findings

4.1 Objective 1: Teacher-Students' Perceptions of LMS Support for SRL Practices

Descriptive statistics across the seven SRL components assessed how PGDE teacher-students perceived LMS support for self-regulated learning. Figure 1 presents the means and standard deviations for each component based on responses from 344 participants.

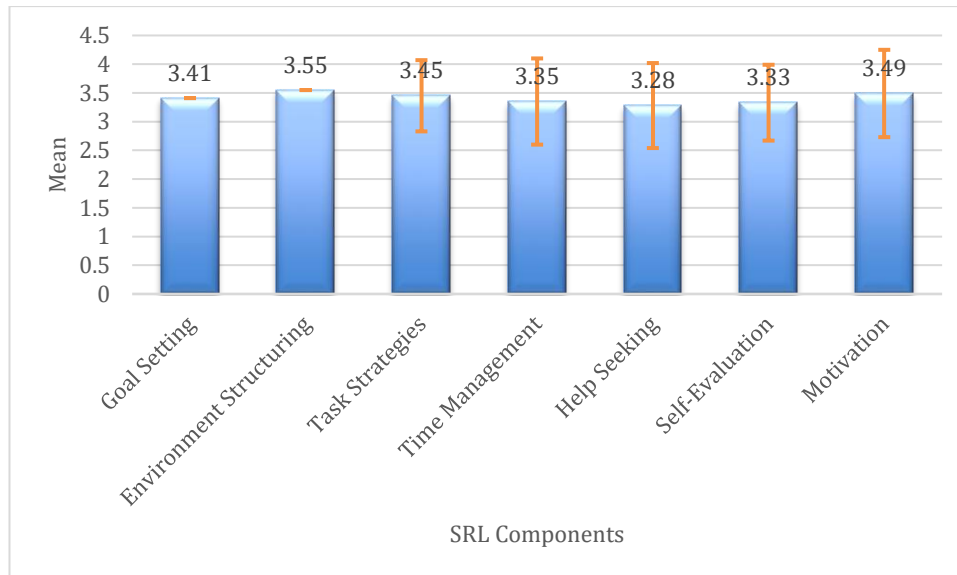


Figure 1: Mean and Standard Deviation for LMS-Supported SRL Components

As shown in Figure 1, environment structuring ($M = 3.55$, $SD = 0.75$) and motivation ($M = 3.49$, $SD = 0.81$) recorded the highest mean scores among the LMS-supported SRL components. These findings suggest that the LMS is particularly effective in helping students organize their learning environments and maintain motivation for learning. In contrast, help-seeking ($M = 3.28$, $SD = 0.76$) and time management ($M = 3.35$, $SD = 0.66$) yielded the lowest mean scores, indicating that students perceived relatively less support from the LMS in these areas. Nevertheless, all seven SRL components were rated within the moderate to moderately high range, reflecting an overall positive contribution of the LMS to students' self-regulated learning practices.

These quantitative patterns were supported by students' open-ended responses. Participants consistently identified centralized access to learning resources as among the most beneficial aspects of the LMS, noting that the availability of lecture notes, assignments, and supplementary materials in a single location streamlined their independent study. One participant noted that lecture notes and important materials could be conveniently followed through the LMS, highlighting the platform's organisational value. Assignment submission portals and quiz features were also frequently cited as tools that supported goal monitoring and motivated continuous self-assessment.

4.2 Objective 2: Group Differences in LMS-Supported SRL by Gender, Age, Medium of Instruction, and Centre

An independent-samples t-test was conducted to examine gender differences across the seven SRL components. As shown in Table 1, no statistically significant differences were found for any component ($p > .05$), indicating that male and female teacher-students perceived LMS support for SRL comparably.

Table 1. Independent Samples t-Test Results: Gender Differences in LMS-Supported SRL ($N = 344$)

SRL Component	t	p-value	Significance
Goal Setting	0.741	.767	Not significant
Environment Structuring	0.041	.544	Not significant
Task Strategies	0.018	.173	Not significant
Time Management	0.337	.651	Not significant
Help Seeking	-0.147	.945	Not significant
Self-Evaluation	-0.378	.377	Not significant
Motivation	0.023	.770	Not significant

A multivariate analysis of variance (MANOVA) using the General Linear Model was subsequently conducted to assess the combined influence of gender, age, medium of instruction, and registered centre on SRL components. MANOVA was selected instead of conducting multiple separate ANOVAs for two main reasons. First, it helps reduce the risk of Type I errors that may occur when several related dependent variables are tested separately. Second, it allows the combined effect of each independent variable on all SRL components to be examined simultaneously, providing a more comprehensive and statistically reliable assessment of group differences. Follow-up univariate ANOVAs were carried out only when a significant multivariate effect was found, following standard analytical practice. Results confirmed that gender (Wilks' $\Lambda = .932$, $p = .393$) and age (Wilks' $\Lambda = .912$, $p = .185$) were not statistically significant multivariate factors. However, medium of instruction produced a statistically significant multivariate effect (Wilks' $\Lambda = .672$, $F(14, 670) = 4.52$, $p < .001$, partial $\eta^2 = .078$). Follow-up univariate ANOVAs revealed significant differences across all SRL components except time management, as detailed in Table 2.

Table 2. Univariate ANOVA Results: Medium of Instruction on SRL Components

SRL Component	F	df	p-value	Partial η^2	Significance
Goal Setting	8.384	(2, 340)	.000	.047	Significant
Environment Structuring	14.834	(2, 340)	.000	.080	Significant
Task Strategies	15.731	(2, 340)	.000	.085	Significant
Time Management	1.114	(2, 340)	.331	.007	Not significant
Help Seeking	12.632	(2, 340)	.000	.069	Significant
Self-Evaluation	11.519	(2, 340)	.000	.063	Significant
Motivation	21.659	(2, 340)	.000	.113	Highly significant

Motivation recorded the largest effect size ($\eta^2 = .113$), indicating that the medium of instruction most substantially shaped students' motivational engagement with LMS-supported learning. Task strategies also recorded a notable effect size ($\eta^2 = .085$), suggesting meaningful differences in how students across linguistic groups approached LMS-facilitated academic tasks.

Post-Hoc Analysis: Medium of Instruction

To identify specific group differences, Games-Howell post-hoc tests were conducted given the unequal group sizes across the three language mediums. The results are presented in Table 3.

Table 3. Post-Hoc Comparisons (Games-Howell) for Medium of Instruction on SRL Components

SRL Component	Comparison	Mean Difference	Sig.	Significant?
Goal Setting	Tamil > Sinhala	.292	.001	Yes
	English vs Sinhala	.260	.180	No
	English vs Tamil	-.032	.977	No
Environment Structuring	Tamil > Sinhala	.374	.000	Yes
	English > Sinhala	.682	.001	Yes
	English vs Tamil	.308	.202	No
Task Strategies	Tamil > Sinhala	.446	.000	Yes
	English > Sinhala	.488	.023	Yes
	English vs Tamil	-.042	.972	No
Time Management	All comparisons	—	>.05	No
Help Seeking	Tamil > Sinhala	.408	.000	Yes
	English > Sinhala	.479	.018	Yes
	English vs Tamil	.071	.916	No
Self-Evaluation	Tamil > Sinhala	.384	.000	Yes
	English vs Sinhala	.418	.095	No
	English vs Tamil	-.034	.984	No
Motivation	Tamil > Sinhala	.523	.000	Yes
	English > Sinhala	.789	.000	Yes

English vs Tamil	.266	.341	No
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Note: Mean differences are reported as absolute values. Positive direction indicates higher scores for the first-named group.

Results, summarised in Table 3, revealed a consistent pattern: Sinhala medium students scored significantly lower than Tamil medium students on six SRL components — goal setting (MD = .292, $p = .001$), environment structuring (MD = .374, $p < .001$), task strategies (MD = .446, $p < .001$), help-seeking (MD = .408, $p < .001$), self-evaluation (MD = .384, $p < .001$), and motivation (MD = .523, $p < .001$). Similarly, Sinhala medium students scored significantly lower than English medium students on four components: environment structuring (MD = .682, $p = .001$), task strategies (MD = .488, $p = .023$), help-seeking (MD = .479, $p = .018$), and motivation (MD = .789, $p < .001$). Notably, no statistically significant differences were found between Tamil and English medium students on any SRL component, suggesting these two groups share comparable LMS-supported SRL perceptions. Time management showed no significant pairwise differences across any medium group, consistent with the earlier univariate findings.

The MANOVA revealed a statistically significant multivariate effect of registered centre on the combined SRL components (Wilks' $\Lambda = .450$, $F(175, 2122.419) = 1.521$, $p < .001$, partial $\eta^2 = .108$). Follow-up univariate ANOVAs were subsequently conducted to examine centre-based differences in individual SRL components. The results are presented in Table 4.

Table 4. Univariate ANOVA Results: Registered Centre on SRL Components

SRL Component	F	df	p-value	Partial η^2	Significance
Goal Setting	1.785	(25, 318)	.013	.123	Significant
Environment Structuring	1.918	(25, 318)	.006	.131	Significant
Task Strategies	1.713	(25, 318)	.020	.119	Significant
Time Management	1.416	(25, 318)	.093	.100	Not significant
Help Seeking	1.827	(25, 318)	.010	.126	Significant
Self-Evaluation	1.226	(25, 318)	.214	.088	Not significant
Motivation	1.790	(25, 318)	.013	.123	Significant

As shown in Table 4, significant centre-based differences were observed in five of the seven SRL components. Specifically, goal setting ($F(25, 318) = 1.785$, $p = .013$, $\eta^2 = .123$), environment structuring ($F(25, 318) = 1.918$, $p = .006$, $\eta^2 = .131$), task strategies ($F(25, 318) = 1.713$, $p = .020$, $\eta^2 = .119$), help-seeking ($F(25, 318) = 1.827$, $p = .010$, $\eta^2 = .126$), and motivation ($F(25, 318) = 1.790$, $p = .013$, $\eta^2 = .123$) showed statistically significant differences across registered centres. In contrast, time management and self-evaluation did not differ significantly by centre.

Although pairwise post-hoc comparisons could not be conducted due to insufficient sample sizes in several centres, particularly Mullaitivu ($n = 1$), Vavuniya ($n = 3$), Kilinochchi ($n = 3$), and Mannar ($n = 3$), the findings nevertheless suggest that registered centre may influence several dimensions of LMS-supported self-regulated learning. These results indicate that contextual differences across regional centres may contribute to variations in students' SRL experiences and perceptions.

4.3 Objective 3: LMS Features Most Effectively Facilitating SRL Practices

Participants were asked to indicate which LMS activities were available in their online courses. Table 5 summarises the percentage of participants who confirmed the availability of each feature.

Table 5. Availability of LMS Activities as Reported by Participants (N = 344)

Availability Level	Activity	% "Yes" Responses
Most Commonly Available	Assignment	95.9%
	Lesson	93.0%
	Quiz	93.6%

Moderately Available	Questionnaire	83.9%
	Feedback	77.2%
	Database	75.7%
	Forum	75.4%
	Scheduler	74.9%
	Chat	73.4%
	Checklist	71.6%
	Journal	68.7%
Less Commonly Available	Interactive Content	62.6%
	Zoom Meeting	51.2%
	Workshop	51.2%
	Glossary	45.9%
	Wiki	45.9%
	SCORM Package	36.3%
	H5P	33.0%
	Kanban Board	31.9%

Assignments (95.9%), Quizzes (93.6%), and Lessons (93.0%) were the most widely available features, reflecting their status as core tools in the LMS environment. Sinhala and Tamil medium students reported high engagement with Lessons for task strategy development, recording engagement rates of 36.08% and 40.11% respectively, while assignments supported goal-setting behaviours particularly among Sinhala medium students (32.55%). English medium students, though the smallest cohort, reported notably high use of Quizzes for self-evaluation (45.95%) and the Chat feature for help-seeking (51.35%).

Qualitative responses from the open-ended items reinforced quantitative patterns. Participants identified the assignment submission portal as particularly valuable for deadline monitoring and self-accountability, while quizzes were praised for providing immediate performance feedback that encouraged deeper engagement with the content. One participant noted that quiz scores served as a continuous motivational indicator, helping them gauge their current standing in the course. Forums and collaborative tools received mixed responses, with some students appreciating the opportunity for peer learning while others noted inconsistent participation and language barriers as limiting factors, particularly in English-medium cohorts.

4.4 Objective 4: Challenges in LMS Usage Hindering SRL Maintenance

The most frequently reported concern was technical difficulties, including login failures, expired content links, and platform navigation issues, especially among first-time LMS users. For example, one participant described an initial period of difficulty navigating the platform, noting that familiarity improved over time, underscoring the need for structured onboarding support. Connectivity and device-related limitations constituted a second major barrier, with many students, especially those accessing the platform via mobile devices, reporting that signal instability and data constraints disrupted their ability to engage consistently with course materials. Content organisation emerged as a third concern, with students calling for better consolidation of learning materials, more logical content sequencing, and the elimination of inactive or outdated links that disrupted their self-directed study flow. Finally, inadequate bilingual support was identified as a significant impediment, particularly among Tamil-medium students, who reported relying on external translation tools in the absence of adequately localized content within the LMS. The desire for interactive features, including lesson-embedded mini quizzes and progress-tracking dashboards, was a recurring theme in students' suggestions for improvement.

5. Discussion

5.1 LMS-Supported SRL: Strengths and Weaknesses in Postgraduate ODL

The findings reveal a moderate to moderately high level of LMS-supported SRL among postgraduate teacher-students, with environment structuring and motivation emerging as the most favourably perceived components. These results align with Araka et al. (2021), who demonstrated that well-structured LMS environments effectively scaffold learners' organisational behaviour and sustain academic engagement. Within Zimmerman's (2002) cyclical SRL framework, environment structuring corresponds to the forethought phase, where learners prepare and organize conditions conducive to effective study. The relatively strong ratings in this domain suggest that the LMS successfully supports the preparatory dimensions of self-regulation, providing students with organized access to course content and structured learning pathways.

However, the comparatively weaker scores for help-seeking and time management warrant particular attention. In an ODL context where learners manage concurrent professional and academic responsibilities, the inability to effectively leverage LMS communication tools or structure their study schedules represent a meaningful pedagogical challenge (Kucuk & Karabey, 2022). The lower help-seeking scores may reflect cultural hesitancy to seek academic support in virtual environments, or, alternatively, the inadequacy of the LMS's interactive tools to facilitate timely, accessible instructor-student communication. Similarly, time management challenges align with broader findings in the ODL literature, which indicate that asynchronous learning demands a degree of self-imposed scheduling discipline that many learners find difficult to sustain without adequate institutional scaffolding (Edisherashvili et al., 2022). These findings collectively suggest that while the LMS performs well as a content delivery and organisational platform, its capacity to support the more interactive and self-monitoring dimensions of SRL remains underdeveloped.

5.2 The Significance of the Medium of Instruction

Among the demographic variables examined, medium of instruction emerged as the most influential statistically significant factor, affecting six of the seven SRL components and recording the largest effect size in the domain of motivation ($\eta^2 = .113$), followed by registered centre which significantly differentiated students across five SRL components. This finding carries both theoretical and practical significance. Theoretically, it reinforces the view that SRL is not a context-neutral process but is fundamentally shaped by the linguistic conditions under which learners engage with educational content (Nawastheen et al., 2024). When students interact with LMS content in a language that does not fully align with their dominant linguistic repertoire, the resulting cognitive demands may diminish motivational engagement and constrain the deployment of effective task strategies, both of which are central to Zimmerman's (2002) performance phase of self-regulation. Post-hoc comparisons confirmed that these differences were primarily driven by Sinhala medium students scoring significantly lower than both Tamil and English medium peers across most SRL components, while Tamil and English medium students performed comparably — suggesting that the challenge may relate specifically to how Sinhala medium content and interface design supports self-regulatory engagement rather than being a general multilingual issue.

This finding highlights the urgent need for linguistically responsive LMS design in multilingual ODL contexts. Inadequately localized content, as seen in Tamil-medium students' reliance on translation tools, creates structural inequity and directly hinders SRL development for many learners. In teacher education programmes, this inequity not only limits students' learning but may also affect the pedagogical methods they implement in their future classrooms (Du Plessis, 2023).

5.3 Gender, Age, and Centre as Differentiating Variables

In contrast to some prior studies (Cuadrado-García et al., 2010; Liu et al., 2021), neither gender nor age produced statistically significant differences in LMS-supported SRL perceptions in this study. This finding suggests that, within the specific context of a structured ODL programme, the LMS may serve as an equalizing platform, providing

comparable learning affordances across demographic groups. Equal access to course materials, assessment tools, and communication features within a standardized LMS environment may mitigate the gender and age-related variations in online learning behaviour reported in studies conducted in other institutional contexts (Xu et al., 2022). This finding is encouraging from an educational equity perspective and suggests that well-designed ODL systems can serve diverse learner populations without systematically disadvantaging demographic groups.

In contrast, the registered centre emerged as a significant differentiating factor across five SRL components, with environment structuring recording the largest effect size ($\eta^2 = .131$). This finding suggests that regional location and the infrastructural, connectivity, and support conditions associated with it meaningfully shape how postgraduate teacher-students engage with LMS-supported SRL strategies. Students in more urban or well-resourced centres, such as Jaffna and Mannar, reported higher SRL engagement, while those in more geographically peripheral centres demonstrated comparatively lower scores, particularly in help-seeking and motivation. These disparities point to the role of regional infrastructure and localized academic support in mediating LMS effectiveness, an area that warrants targeted institutional attention.

5.4 LMS Features, Barriers, and Implications for Design

The near-universal availability of assignments, quizzes, and lessons across the LMS environment confirms the centrality of these tools in supporting core SRL strategies, including goal setting, task management, and self-evaluation (Araka et al., 2021; Çakiroğlu et al., 2024). The finding that English medium students disproportionately relied on the Chat feature for help-seeking further highlights the differential ways in which smaller, potentially more isolated linguistic cohorts leverage interactive LMS tools to compensate for reduced peer and instructor presence. This pattern resonates with Simon et al.'s (2024) emphasis on communication tools as critical LMS features supporting SRL, particularly in contexts where learners lack localized support structures.

The barriers identified, expired content links, poor content organisation, connectivity limitations, and inadequate bilingual support, demonstrate that systemic issues in LMS implementation extend beyond individual learner deficiencies. Critically, these institutional and infrastructural constraints, if unaddressed, may undermine self-regulated learning (SRL) gains supported by the platform. This highlights the key implication: the effectiveness of LMS platforms in promoting SRL depends not only on their instructional features but also on sustained institutional investment in content currency, robust maintenance, and multilingual accessibility. Steindal et al. (2021) similarly emphasize the interconnectedness of content organisation and learner responsibility. Therefore, addressing these barriers through targeted institutional action, such as content audits, mobile optimization, and multilingual support, is essential to realizing the intended benefits of LMS platforms for postgraduate teacher-students in ODL contexts. When these findings are considered alongside international literature, both similarities and context-specific differences can be observed. The moderate to high levels of LMS-supported self-regulated learning (SRL) found in this study are generally consistent with findings from university contexts in Kenya (Araka et al., 2021) and Norway (Steindal et al., 2021). These studies also reported that structured LMS environments supported organisational and motivational aspects of SRL, while help-seeking and collaborative engagement remained relatively weaker areas.

However, the significant influence of the medium of instruction found in the present study highlights an important context-specific finding within the Sri Lankan setting. Unlike studies conducted in more monolingual contexts, such as research involving university students in Turkey (Kucuk & Karabey, 2022) and distance learners in Georgia (Edisherashvili et al., 2022), where factors such as age and gender showed greater influence, this study identified language context as the key factor differentiating students' SRL experiences. This finding suggests that in multilingual open and distance learning (ODL) systems serving linguistically diverse populations—particularly in regions such as South Asia, Sub-Saharan Africa, and Southeast Asia, the medium of instruction should be considered an important structural factor in LMS design and evaluation rather than merely an administrative characteristic.

6. Recommendations

The findings of this study offer several recommendations for institutional administrators, LMS designers, teacher educators, and policymakers involved in postgraduate ODL. Since help-seeking and time management emerged as the weakest SRL components, institutions should provide structured LMS orientation programmes at the beginning of each academic year. These programmes should train students to effectively use key LMS features such as discussion forums, communication tools, and scheduling functions that support self-regulated learning. Early guidance is particularly important for first-time LMS users who may require time to adjust to digital learning environments. The significant influence of the medium of instruction on SRL, particularly motivation and task strategies, highlights the need for stronger linguistic responsiveness in multilingual ODL systems. Institutions should ensure that course materials are fully available in students' preferred languages and reduce dependence on external translation tools. Linguistic inclusivity should be considered a core element of educational equity rather than an optional enhancement. Further, the qualitative findings also suggest the need for improvements in LMS design and administration. Regular content audits should be conducted to remove expired links and outdated materials. Course content should be logically organised, accessible, and compatible with mobile devices to support students facing technological and connectivity constraints. In addition, interactive features such as progress-tracking tools and lesson-based mini quizzes may further strengthen students' self-monitoring and motivation.

7. Conclusion

This study examined the role of the LMS in promoting self-regulated learning (SRL) among postgraduate teacher-students enrolled in a Postgraduate Diploma in Education programme at a leading ODL university in Sri Lanka. The investigation addressed four interconnected objectives: assessing SRL perceptions, examining demographic and linguistic differences, identifying effective LMS features, and exploring barriers to maintaining SRL. Together, these objectives provided a comprehensive understanding of how LMS platforms support self-regulatory practices in a multilingual postgraduate ODL context. The findings showed that LMS platforms effectively supported some aspects of SRL. Environment structuring and motivation emerged as the strongest dimensions. In contrast, help-seeking and time management appeared comparatively weaker. These areas are particularly important for postgraduate teacher-students who balance academic responsibilities alongside professional commitments. The results also highlighted the importance of linguistic context. Medium of instruction emerged as a statistically significant factor across several SRL dimensions and showed its strongest influence on motivation. This finding makes both a theoretical and practical contribution. It suggests that language is not a peripheral issue in LMS-supported learning. Rather, it plays a central role in shaping how postgraduate teacher-students engage with self-regulatory strategies in ODL environments. Similarly, registered centre emerged as a significant variable across five SRL components. Environment structuring recorded the largest effect size ($\eta^2 = .131$). This finding highlights the influence of regional infrastructure and local academic support on LMS effectiveness. By contrast, gender and age did not produce significant differences. This suggests that well-designed ODL systems can create equitable learning opportunities across diverse learner groups. Such findings are encouraging for institutions committed to inclusive postgraduate teacher education. The study also has several limitations. First, the findings relied on self-reported data, which may introduce response bias. Second, the study focused on a single institutional setting. Therefore, caution is needed when generalising the findings to other ODL contexts. In addition, participant distribution across the 26 registered centres was highly uneven. Several centres had fewer than five participants. As a result, pairwise post-hoc comparisons for centre-based differences could not be performed. Future studies should address these limitations through longitudinal or experimental designs that examine SRL development over time. Such approaches may provide stronger evidence about causal relationships between LMS engagement and SRL outcomes. Mixed-method studies combining surveys with interviews or focus group discussions across language groups could also provide richer insights. Such approaches may better explain how medium of instruction shapes SRL engagement. Comparative studies across ODL institutions in South and Southeast Asia would further strengthen the transferability of these findings, particularly in linguistically diverse contexts. More balanced representation across regional centres would also enable deeper analysis of centre-based differences. Overall, this study contributes to the growing international literature on LMS-supported SRL in multilingual postgraduate ODL environments. The findings demonstrate that linguistic and geographical factors are

not secondary influences. Instead, they are central factors shaping students' self-regulatory practices in digital learning environments. As ODL continues to expand across diverse societies, there is an increasing need to design LMS platforms that are both technologically effective and linguistically inclusive. Institutions that respond to this need will be better positioned to develop postgraduate teacher-graduates who are academically capable, reflective, autonomous, and self-regulated professionals.

Declarations

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Competing Interests: None

Ethical Approval

This study involved a survey of participants; therefore, formal ethical approval was not required as it posed minimal risk to participants. Administrative approval to conduct the study and collect data was obtained from the Head of the Department and the Programme Coordinators of the respective programmes prior to data collection. The research was classified as low-risk and carried out in accordance with the ethical research guidelines of the Open University of Sri Lanka.

Author's Contribution

Author ¹ (F.M.Nawastheen): Conceptualisation, Supervision, Data curation, Formal analysis, Writing : original draft.

Author ² (N.G.L.S.J.Liyanage): Joint Conceptualisation, Investigation. Review of literature, Methodology, Writing: review and editing

Author ³ (K.S.P.Sisindra): Joint Conceptualisation, Investigation, Review of literature, Methodology, Data Collection and analysis, Writing: review and editing.

Author ⁴ (W.M.A.P.S.Fernando): Joint Conceptualisation, Review of Literature, data collection, Validation, Visualisation.

Author ⁵ (K.A.D.Sandamali): Data collection, Project administration, Writing: review and editing

Data availability

The data generated and analysed during the current study are not publicly available due to confidentiality agreements with participants and institutional restrictions. However, the dataset supporting the findings of this study is securely stored by the authors and can be made available from the corresponding author upon reasonable request.

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