

OPTIMIZING SELF REGULATED LEARNING THROUGH A GOOGLE SITES BASED ASYNCHRONOUS LEARNING MODEL FOR WORKING STUDENTS

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ABSTRACT

Working students frequently experience severe "time poverty" and cognitive fatigue. This study investigates optimizing SRL among working students by implementing a lightweight, user-friendly asynchronous learning model based on Google Sites. Utilizing a quasi-experimental pretest/posttest non-equivalent control group design, the study examined 120 working students enrolled in an employee class program. Participants were assigned to an experimental group utilizing the Google Sites intervention or a control group utilizing a standard institutional LMS. Data were collected using the Motivated Strategies for Learning Questionnaire (MSLQ) and analyzed via multivariate analysis of covariance (MANCOVA). The findings demonstrate that the experimental group exhibited statistically significant and robust improvements in both motivational beliefs (intrinsic goal orientation and task value) and self-regulated learning strategies (metacognitive self-regulation and time/study environment management) compared to the control group. The structured, linear, and cognitively accessible architectural design of Google Sites effectively scaffolded the forethought and self-reflection phases of Zimmerman's cyclical model of SRL. The study concludes that deploying lightweight digital platforms significantly reduces extraneous cognitive load, empowering time-poor working students to use effective self-regulatory strategies.

Keywords: *self regulated learning, working students, asynchronous learning, google sites, adult learners, time poverty, higher education.*

INTRODUCTION

The Evolving Demographic Landscape of Higher Education

The landscape of global higher education has undergone a profound and irreversible transformation over the past decade, a shift significantly accelerated by the post 2020 digital pivot. Historically, university infrastructures, pedagogical models, and student support systems were architected around the "traditional" student, an individual transitioning directly from secondary education, residing on or near campus, and dedicating their primary cognitive, temporal, and financial resources to academic endeavors. However, contemporary enrollment data indicates a fundamental demographic restructuring, characterized by a substantial influx of non-traditional adult learners. Among this growing demographic, a specific and highly vulnerable subpopulation has emerged: working students enrolled in specialized "employee class"

programs. These individuals pursue undergraduate or graduate credentials while maintaining full-time or significant part-time employment, navigating a complex matrix of professional, familial, and academic responsibilities (Lin, 2019; Tampubolon, J., Lie, D., & Edward, 2025).

The integration of working adults into higher education systems that remain structurally biased toward the traditional student model presents systemic pedagogical challenges. These adult learners possess distinct educational goals, often centered on immediate career advancement, upskilling, or professional pivot strategies, and they operate under severe schedule restrictions that render synchronous, face to face attendance nearly impossible. Consequently, institutions have increasingly relied on distance education and digital learning modalities to accommodate this demographic. Yet, simply shifting content delivery from the physical lecture hall to the digital ether does not inherently resolve the psychological and cognitive barriers faced by working students. The digital environment demands a high degree of autonomy, bringing the cognitive architecture of the learning platform and the self regulatory capacities of the student into sharp focus.

The Phenomenon of Time Poverty and Role Conflict

To effectively design educational interventions for working students, it is imperative to understand the specific psychological and environmental constraints under which they operate. The most pervasive constraint is "time poverty," a structural deficit of discretionary time that severely limits an individual's capacity to engage in prolonged, uninterrupted cognitive tasks. Unlike traditional students who manage their schedules around academic deadlines, working students must fit their academic obligations into the fragmented margins of their lives during commutes, late at night, or on weekends. This temporal constraint fundamentally alters their approach to learning; they require educational models that are highly flexible, easily accessible, and designed for intermittent engagement.

Compounding the issue of time poverty is the psychological phenomenon of role conflict. Working students frequently experience tension between their primary identity as an employee and their secondary identity as a student. After a demanding eight to ten hour workday, these individuals experience significant cognitive depletion. Executive functioning the set of mental skills that include working memory, flexible thinking, and self control is a finite resource that is heavily taxed by professional duties. When a cognitively exhausted working student transitions to their academic role in the evening, their capacity for sustained attention, complex problem solving, and effort regulation is naturally diminished. This state of cognitive fatigue makes the initiation of academic tasks profoundly difficult, increasing the likelihood of procrastination, surface-level learning, or total academic disengagement. Therefore, the pedagogical environments designed for these students must explicitly account for and mitigate this inherent cognitive depletion.

The Psychological Construct of Self Regulated Learning (SRL)

As higher education institutions increasingly adopt asynchronous digital learning environments to provide the temporal and geographical flexibility demanded by working students, a paradox emerges. Asynchronous learning removes the external regulatory mechanisms inherent in traditional physical classrooms such as fixed schedules,



immediate instructor monitoring, peer presence, and the physical transition into an academic space. In the absence of these external constraints, the entire burden of behavioral and cognitive regulation shifts to the autonomous learner. To succeed in an asynchronous environment, students must independently initiate study sessions, sustain focus amidst domestic or environmental distractions, monitor their own comprehension, and persist through challenging or frustrating material (Tucker, 2021).

This requisite skill set is encapsulated within the psychological construct of Self Regulated Learning (SRL). SRL is not a fixed trait or a singular cognitive ability; rather, it is a proactive, dynamic process whereby learners activate and sustain cognitions, affects, and behaviors that are systematically oriented toward the attainment of personal academic goals (Zimmerman, 2000). Effective self regulators are highly active participants in their own learning processes. They analyze task requirements, set productive and realistic goals, select appropriate cognitive strategies, and manage intrusive emotions or waning motivation (Paris, S. G., & Paris, 2001; Zimmerman, 2008).

For the working student, SRL is the critical determinant of academic survival. However, the paradox lies in the fact that the very individuals who most require asynchronous learning due to time poverty and occupational fatigue are simultaneously the most vulnerable to self regulatory failure. The cognitive bandwidth required to self regulate is exactly what is depleted during a full workday. When working students lack the cognitive resources to manage their learning autonomously, they require an environment that provides external scaffolding to support their internal regulatory processes.

Theoretical Foundations: Zimmerman's Cyclical Model

To systematically analyze and optimize the self regulatory capacities of working students, it is necessary to ground pedagogical interventions in robust psychological frameworks. Barry Zimmerman's Social Cognitive Model of Self Regulation provides a comprehensive architecture for understanding how autonomous learning occurs. (Zimmerman, 2000, 2002) conceptualizes SRL as an ongoing, cyclical process unfolding across three distinct but interdependent phases: forethought, performance, and self reflection: 1. The Forethought Phase precedes the actual learning effort and sets the stage for action. It involves task analysis (goal setting and strategic planning) and self motivation beliefs (self efficacy, outcome expectations, and intrinsic interest). For working students, the forethought phase is frequently impaired by time poverty and fatigue. The urgency to complete impending assignments often supersedes the necessary planning and goal setting required for deep learning. Instead of strategically approaching a task, fatigued learners often rush directly into execution without a plan; 2. The Performance Phase occurs during the learning activity and involves self-control (the deployment of specific task strategies, time management, and environmental structuring) and self-observation (metacognitive monitoring of one's progress and comprehension). Fatigued adult learners often struggle significantly in this phase. The cognitive effort required to monitor comprehension and adjust strategies is high; consequently, exhausted students often default to surface-level cognitive strategies (e.g., passive reading or rote memorization) rather than deep elaboration, leading to poor knowledge retention; 3. The Self-Reflection Phase follows the learning effort and involves self-judgment (evaluating performance against goals) and self-reaction (cognitive and affective responses that

influence future forethought phases). If a working student performs poorly due to a lack of planning (failed forethought) and poor monitoring (failed performance), their self-reflection often results in negative self-reactions, such as diminished self-efficacy and increased anxiety. This negative affect feeds back into the subsequent forethought phase, creating a downward spiral of declining motivation and eventual dropout.

Theoretical Foundations: Pintrich's Motivational Framework

Complementing Zimmerman's process-oriented approach, Paul Pintrich's Conceptual Framework for Motivation and Self-Regulated Learning emphasizes the intricate, bidirectional interplay between motivational orientations and the selection of self-regulatory strategies (Pintrich, 2004). Pintrich posits that motivational drives whether intrinsic (learning for personal mastery and curiosity) or extrinsic (learning to secure a promotion or pass an exam) serve as the energetic antecedents that dictate the quality, intensity, and persistence of cognitive engagement.

Meta-analytic evidence consistently demonstrates that intrinsic motivation correlates strongly with the deployment of deep learning strategies and high metacognitive regulation, whereas extrinsic motivation is frequently associated with surface-level processing and a higher vulnerability to academic burnout (Howard, J. L., Bureau, J., Guay, F., Chong, J. X., & Ryan, 2021). For adult learners, self-efficacy (the belief in one's capability to organize and execute the courses of action required to manage prospective situations) and task value (perceiving the immediate professional or personal relevance of the academic material) are critical mechanisms for overcoming the inertia generated by workplace fatigue. According to (Pintrich, 2004), a student will not engage in the cognitively taxing processes of self-regulation (such as planning, monitoring, and reflecting) unless they value the task and believe they have the capability to succeed. Therefore, an optimized asynchronous learning environment must not only deliver academic content but must actively and continuously trigger intrinsic task value and bolster self-efficacy.

The Limitations of Traditional Learning Management Systems (LMS)

The global shift toward digital learning has solidified the Learning Management System (LMS) platforms such as Moodle, Canvas, or Blackboard as the central infrastructure of higher education. While these systems are highly robust and offer myriad administrative tools, extensive file repositories, integrated third-party applications, and complex navigation hierarchies, empirical observations indicate that they frequently fail to meet the specific psychological and cognitive needs of working students (Prayogi, R. D., Estriyanto, Y., & Suharno, 2022).

The primary pedagogical flaw of traditional LMS platforms, when applied to time-poor adult learners, is the imposition of a high "extraneous cognitive load." Cognitive Load Theory, established by John Sweller, differentiates between intrinsic cognitive load (the inherent difficulty of the subject matter), germane cognitive load (the mental effort directed toward integrating new information into existing schemas), and extraneous cognitive load (the mental effort wasted on navigating poorly designed instructional materials or interfaces).

When a working student logs into a complex LMS after a grueling workday, a significant portion of their already depleted cognitive bandwidth is expended merely navigating the platform. They must locate syllabi buried in folders, decipher nonlinear module



structures, toggle between separate tabs for instructional videos and reading materials, and search for disparate assignment portals. This navigational friction fundamentally disrupts the forethought phase of SRL. Instead of strategically planning their learning approach (metacognitive regulation), the student's cognitive resources are consumed by interface management. Without clear, linear scaffolding, learners experience heightened frustration and decreased motivation. This often leads to maladaptive coping mechanisms, such as "cramming" or binge-learning immediately prior to deadlines, which bypasses deep cognitive processing entirely and severely compromises long-term retention.

The Pedagogical Affordances of Google Sites as an Asynchronous Scaffold

To resolve the profound tension between the absolute necessity for asynchronous flexibility and the cognitive vulnerability of working students, educational technologists must design learning environments that are lightweight, highly structured, visually intuitive, and cognitively accessible. Google Sites emerges as a highly potent platform for this specific purpose. Unlike traditional, monolithic LMS platforms characterized by deep, fragmented navigational trees, Google Sites functions as an interactive, web-based digital portfolio and instructional module builder that champions architectural simplicity.

The integration of Google Sites into higher education pedagogy offers several distinct and powerful advantages for fostering SRL in working adults: 1. Linearity and the Reduction of Extraneous Cognitive Load: Google Sites allows instructional designers to create strictly linear, distraction-free learning pathways. By embedding multimodal content (e.g., instructional YouTube videos, concise textual summaries, interactive Google Forms quizzes, and slide decks) directly into a single, continuous scrolling interface, the platform eliminates the need for students to download external files or navigate away from the primary instructional space (Ebener, 2017). This architectural consolidation drastically reduces extraneous cognitive load, preserving the student's fragile mental energy for intrinsic task engagement and active metacognitive monitoring; 2. Explicit Scaffolding of Zimmerman's SRL Phases: The flexibility of Google Sites facilitates the explicit visual and structural scaffolding of the self-regulatory process. Instructors can design modules that are clearly demarcated into distinct sections: "Before Learning" (providing Forethought cues, learning objectives, and time estimates), "During Learning" (delivering Performance content alongside embedded self-check questions), and "After Learning" (featuring Self-Reflection portals and summary evaluations). This structural clarity serves as an external regulatory mechanism, gently guiding the autonomous learner through the necessary steps of self-regulation that they might otherwise skip due to fatigue or time constraints; 3. Enhancement of Motivational Beliefs: Recent studies in educational technology demonstrate that the aesthetic, minimalist, and user-friendly nature of Google Sites significantly enhances student motivation and engagement (Putri, S. A., Sujana, A., & Ali, 2024). By removing technological barriers and presenting information in a visually appealing, easily digestible format, the platform supports Pintrich's motivational framework. Students are more likely to perceive the task as valuable and achievable (high self-efficacy) when the delivery mechanism is intuitive rather than antagonistic.

Gap Analysis and Research Objectives

Despite the strong theoretical alignment between lightweight digital architectures and the unique cognitive needs of working adults, there remains a critical and substantial gap in the empirical literature. Current research predominantly focuses on the application of complex LMS platforms for traditional undergraduate populations, analyzing how these students interact with dense digital environments. When Google Sites is discussed in the academic literature, it is most frequently examined as a tool for student portfolio creation or collaborative project management, rather than as a primary, structured asynchronous delivery vehicle (Quick, D., & Choo, 2014). There is a distinct scarcity of rigorous, quasi-experimental research investigating the efficacy of Google Sites as a foundational asynchronous learning environment specifically engineered to optimize the self-regulated learning capacities of time-poor, employee-class university students.

To address this significant empirical lacuna, this study aims to systematically investigate the optimization of Self-Regulated Learning through a Google Sites-based asynchronous learning model among working students. The research posits that by aligning the digital architecture with the cognitive limitations and regulatory needs of fatigued adult learners, educational outcomes can be substantially improved.

The primary objectives of this comprehensive research are to: 1. Examine the impact of a Google Sites-based asynchronous learning model on the motivational beliefs (specifically intrinsic goal orientation, task value, and self-efficacy) of working students, comparing outcomes against a traditional LMS environment; 2. Evaluate the effect of the lightweight Google Sites intervention on the cognitive and metacognitive learning strategies (specifically metacognitive self-regulation, time and study environment management, and effort regulation) deployed by working students facing severe time poverty; 3. Elucidate the underlying theoretical mechanisms through which linear digital architectures mitigate extraneous cognitive load and effectively scaffold Zimmerman's cyclical phases of self-regulation in adult learners.

By addressing these objectives, this research endeavors to provide a scalable, empirically validated, and highly practical pedagogical model that higher education institutions can leverage to support the unique academic and psychological needs of the rapidly expanding demographic of modern working students.

METHOD

Research Approach and Design

To systematically address the research objectives, this study employed a quantitative, quasi-experimental, pre-test/post-test non-equivalent control group design. In the context of authentic higher education settings, particularly within specialized employee class programs, true experimental designs requiring the randomized assignment of individual students to different instructional conditions are frequently logistically unfeasible and potentially disruptive to the institutional cohort structure. Therefore, intact class sections were purposively assigned to either the experimental or control conditions. The quasi-experimental approach was selected as it allows for the rigorous investigation of causal inferences regarding the pedagogical intervention while maintaining exceptionally high ecological validity within a naturalistic educational context.

Participants and Setting

The research was conducted at Universitas Pelita Bangsa, an institution strategically recognized for its commitment to accommodating non-traditional learners through dedicated "employee class" (kelas karyawan) programs. The target population consisted of undergraduate students enrolled in these specialized programs, a demographic inherently characterized by full-time employment status, high vulnerability to time poverty, and significant role conflict.

A total sample of 120 working students ($N = 120$) was recruited from four distinct, parallel sections of a foundational, mandatory undergraduate module during the academic semester. Two intact sections ($n = 60$) were assigned to the experimental group, which received the Google Sites-based asynchronous intervention. The remaining two sections ($n = 60$) were assigned to the control group, which utilized the institution's standard Learning Management System.

Strict inclusion criteria were established to ensure the sample accurately represented the target demographic: participants were required to be formally enrolled in the employee class program, maintain a minimum of 30 hours of external, formal employment per week, and possess reliable access to internet-enabled devices for asynchronous study. The demographic profile of the participants was carefully analyzed to ensure relative homogeneity across the experimental and control groups, thereby minimizing the influence of confounding variables. The overall sample comprised 54% males and 46% females. The mean age of the participants was 26.4 years ($SD = 3.8$), distinguishing them from traditional, direct-entry undergraduates. On average, participants reported working 38.5 hours per week alongside a demanding academic courseload of 12 credits, empirically confirming their status as a highly time-constrained and structurally fatigued demographic.

Instrumentation: The Motivated Strategies for Learning Questionnaire (MSLQ)

To rigorously operationalize and quantitatively measure the dependent variables motivational beliefs and self-regulated learning strategies the study utilized the Motivated Strategies for Learning Questionnaire (MSLQ). Originally developed by (Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie, 1991), the MSLQ is a globally recognized, widely validated self-report instrument designed to assess college students' motivational orientations and their utilization of diverse learning strategies. While the instrument was initially conceptualized for traditional physical classrooms, an extensive body of contemporary psychometric research has robustly validated its reliability and structural validity for evaluating adult learners in modern asynchronous and blended digital environments (Broadbent, J., & Poon, 2015).

The MSLQ utilizes a 7-point Likert scale, with responses ranging from 1 ("not at all true of me") to 7 ("very true of me"). To ensure extreme precision and relevance to the specific challenges of working students in asynchronous environments, particular subscales were purposefully selected for this study: 1. Motivational Beliefs Section: A. Intrinsic Goal Orientation (4 items): Measures the degree to which a student perceives their participation in a task for internal reasons such as challenge, curiosity, and mastery, as opposed to external rewards (e.g., "In a class like this, I prefer course material that really challenges

me so I can learn new things"); B. Task Value (6 items): Evaluates the student's perception of the course material in terms of interest, importance, and practical utility, a crucial metric for adult learners who demand high professional relevance (e.g., "I think I will be able to use what I learn in this course in other courses or in my career"); C. Self-Efficacy for Learning and Performance (8 items): Assesses the student's expectancy for success and self-appraisal of their capability to master the assigned tasks, which is vital for overcoming occupational fatigue (e.g., "I'm confident I can understand the most complex material presented by the instructor in this course"); 2. Self-Regulated Learning Strategies Section: A. Metacognitive Self-Regulation (12 items): Measures the deep cognitive control and self-regulation aspects of learning. This subscale maps directly to Zimmerman's forethought (planning activities), performance (monitoring comprehension), and self-reflection (regulating strategies) phases (e.g., "When I study for this class, I set goals for myself in order to direct my activities in each study period"); B. Time and Study Environment Management (8 items): Evaluates the student's capability to schedule, plan, and manage their study time and physical environment. This is the paramount metric for assessing the mitigation of "time poverty" (e.g., "I make sure that I keep up with the weekly readings and assignments for this course"); C. Effort Regulation (4 items): Assesses the learner's ability to control their attention and sustain effort in the face of distractions, fatigue, or uninteresting tasks (e.g., "Even when course materials are dull and uninteresting, I manage to keep working until I finish").

Prior to the main study, the instrument underwent a pilot test with a smaller, independent cohort of working students to ensure internal consistency within the specific Indonesian employee-class context. The Cronbach's alpha reliability coefficients for the selected subscales ranged from $\alpha = .78$ to $\alpha = .89$, indicating strong to excellent internal consistency and psychometric reliability.

Intervention Design and Procedure

The research intervention spanned an intensive eight-week academic term. It is critical to note that the instructional content, underlying curriculum, core learning objectives, and summative assessment mechanisms were rigorously controlled and identical across both the experimental and control groups. The sole manipulated independent variable was the architectural delivery mechanism of the asynchronous learning environment.

The Control Group (Standard LMS Environment):

The control group utilized the university's standard, institutional Learning Management System (a platform structurally similar to Moodle or Canvas). The architecture of this environment was fundamentally hierarchical and highly fragmented, representative of traditional higher education digital ecosystems. To complete a single weekly module, students were required to navigate multiple layers: clicking to open weekly folders, downloading external PDF documents to their local hard drives, navigating back to the main page to find separate links for instructional videos (often opening in new browser tabs), and finally accessing a distinct, hidden module portal for quiz submissions. While functionally robust, this design imposed a significant extraneous cognitive load, requiring substantial navigational effort before any actual learning could commence.

The Experimental Group (Google Sites-Based Asynchronous Model):

The experimental group accessed the identical curriculum through a custom-built, lightweight Google Sites platform, meticulously engineered by the researchers



specifically to scaffold Zimmerman's SRL phases and radically reduce extraneous cognitive load. The pedagogical architecture featured several critical design interventions: 1. Linearity and Total Consolidation: Each week's instructional content was presented on a single, continuous vertical scroll page. Instructional YouTube videos, concise textual summaries, infographic slide decks, and interactive quizzes were embedded directly into the site infrastructure. This eliminated the need to download files, navigate complex folder trees, or open external tabs, providing a frictionless user experience; 2. Explicit Forethought Scaffolding: The top header of each weekly page was designed to trigger Zimmerman's forethought phase. It featured clear, bulleted learning objectives, explicit estimated completion times for each section (e.g., "Video: 12 mins," "Reading: 15 mins" to aid the precise time management required by working adults), and brief prompts activating prior knowledge; 3. Performance Monitoring via Embedded Feedback: As students scrolled downward through the content, they encountered embedded self-check questions (constructed via Google Forms integration). These provided immediate, automated feedback upon submission, serving as active self-observation triggers that forced metacognitive monitoring without requiring synchronous instructor intervention; 4. Structured Self-Reflection Portals: The conclusion of each weekly scroll required students to complete a brief reflective entry. They were prompted to rate their comprehension of the week's material on a scale and identify specific concepts needing further review, thereby actualizing Zimmerman's self-reflection phase and establishing a feedback loop for the subsequent week.

Data Collection and Ethical Considerations

Data collection occurred at two distinct time points. The pre-test MSLQ was administered electronically to all participants in both groups during the first week of the academic term, prior to exposure to the respective digital platforms. This established the baseline metrics for motivational beliefs and SRL strategies. The post-test MSLQ was administered during the final week of the eight-week intervention period.

Strict ethical protocols were observed throughout the research process. All participants were provided with comprehensive informed consent forms detailing the purpose of the study, the voluntary nature of their participation, and guarantees of strict data anonymization and confidentiality. Participants were assured that their responses on the MSLQ would have no bearing on their formal academic grades.

Data Analysis Strategy

Quantitative data derived from the pre-test and post-test MSLQ administrations were meticulously organized and analyzed using the Statistical Package for the Social Sciences (SPSS).

Preliminary statistical analyses were conducted to verify the fundamental assumptions required for parametric testing. The assumption of normality was assessed using the Shapiro-Wilk test, and the homogeneity of variances was evaluated using Levene's test. To determine baseline equivalence between the experimental and control groups, independent samples t-tests were performed on all pre-test MSLQ subscale scores.

Following the confirmation of assumptions and baseline equivalence, a Multivariate Analysis of Covariance (MANCOVA) was executed to evaluate the efficacy of the intervention. The MANCOVA utilized the pre-test scores as covariates to statistically control for any minute initial differences between the groups, thereby precisely isolating the main effect of the Google Sites instructional condition on the combined post-test motivational and learning strategy variables. Where multivariate significance was detected, follow-up univariate analyses of covariance (ANCOVAs) were conducted to determine the specific subscales driving the differences. Effect sizes were calculated using partial eta squared (η^2_p) to determine the practical, real-world significance of the findings, interpreted based on Cohen's standard criteria.

RESULTS

Preliminary Analyses and Baseline Equivalence

Prior to evaluating the overarching efficacy of the Google Sites intervention, it was necessary to establish that both the experimental and control groups possessed comparable characteristics regarding their initial motivational orientations and self-regulatory capacities. Independent samples t-tests were conducted on the pre-test MSLQ scores. The results indicated that there were no statistically significant differences across any of the six targeted subscales prior to the intervention (all $p > .05$). This critical finding confirms that both groups of working students entered the study with similar baseline vulnerabilities to time poverty and equivalent capacities for self-regulated learning.

Furthermore, assumptions for MANCOVA were rigorously tested. The Shapiro-Wilk test indicated that the data for all dependent variables were normally distributed ($p > .05$ for all subscales). Levene's test for equality of error variances was non-significant across all variables ($p > .05$), confirming that the assumption of homogeneity of variances was not violated. Additionally, the assumption of homogeneity of regression slopes was met, justifying the robust use of MANCOVA to assess the intervention's impact.

Impact on Motivational Beliefs

The first core research objective aimed to evaluate the impact of the lightweight, Google Sites-based model on the motivational beliefs of working students, a concept deeply grounded in Pintrich's theoretical framework. Table 1 presents the detailed descriptive statistics and univariate MANCOVA results for the motivational subscales.

Table 1: Pre- and Post-test Means, Standard Deviations, and MANCOVA Results for Motivational Beliefs.

MSLQ Subscale	Group	Pre-test M (SD)	Post-test M (SD)	Adjusted Post-test M	F-value	p-value	η^2_p
Intrinsic Goal Orientation	Experimental	4.12 (0.85)	5.45 (0.72)	5.48	18.34	<.001	135
	Control	4.15 (0.81)	4.42 (0.88)	4.39			
Task Value	Experimental	4.30 (0.78)	5.60 (0.65)	5.62	22.45	<.001	161
	Control	4.34 (0.80)	4.65 (0.75)	4.63			
Self-Efficacy for Learning	Experimental	4.55 (0.90)	5.75 (0.80)	5.77	15.62	<.001	118
	Control	4.50 (0.88)	4.80 (0.92)	4.78			

Note. N = 120. Scale ranges from 1 to 7.

The overarching MANCOVA revealed a statistically significant main effect of the instructional condition on the combined motivational variables, controlling for pre-test scores, Wilks' $\lambda = 0.72$, $F(3, 113) = 14.65$, $p < .001$, $\eta^2_p = 0.28$. This indicates a large multivariate effect size.

Subsequent univariate analyses demonstrated that the experimental group utilizing the Google Sites intervention reported significantly higher post-test scores across all motivational domains. Specifically, Intrinsic Goal Orientation saw a marked increase ($F = 18.34$, $p < .001$, $\eta^2_p = 0.135$), suggesting students found the learning process inherently more satisfying. Task Value exhibited the most substantial motivational increase ($F = 22.45$, $p < .001$, $\eta^2_p = 0.161$), indicating that the experimental group perceived the academic material as significantly more important and useful than their peers navigating the standard LMS. Finally, Self-Efficacy for Learning and Performance was notably elevated ($F = 15.62$, $p < .001$, $\eta^2_p = 0.118$), demonstrating higher confidence in mastering complex concepts despite occupational fatigue.

Impact on Self-Regulated Learning Strategies

The second objective focused on the behavioral and cognitive manifestations of SRL specifically, how effectively working students actively regulated their time, physical environment, and deep metacognitive processes when operating in differing digital architectures. Table 2 outlines the findings for the learning strategy subscales.

Table 2: Pre- and Post-test Means, Standard Deviations, and MANCOVA Results for SRL Strategies

MSLQ Subscale	Group	Pre-test M (SD)	Post-test M (SD)	Adjusted Post-test M	F-value	p-value	η^2_p
Metacognitive Self-Regulation	Experimental	3.95 (0.92)	5.30 (0.85)	5.32	26.78	<.001	187
	Control	4.02 (0.88)	4.25 (0.95)	4.23			
Time/Study Environment	Experimental	3.75 (1.05)	5.55 (0.78)	5.58	32.14	<.001	218
	Control	3.80 (0.98)	4.05 (1.02)	04.02			
Effort Regulation	Experimental	4.10 (0.95)	5.25 (0.82)	5.28	12.45	<.001	98
	Control	4.05 (1.00)	4.35 (1.10)	4.32			

Note. N = 120. Scale ranges from 1 to 7.

The multivariate analysis revealed a highly significant and robust effect of the Google Sites intervention on the combined self-regulated learning strategies, Wilks' $\lambda = 0.65$, $F(3, 113) = 20.35$, $p < .001$, $\eta^2_p = 0.35$.

The univariate analyses highlight profound behavioral shifts. The most dramatic improvement across the entire study was observed in Time and Study Environment Management ($F = 32.14$, $p < .001$, $\eta^2_p = 0.218$), indicating that the intervention severely altered how students organized their limited discretionary time. Metacognitive Self-

Regulation also saw a highly significant increase ($F = 26.78$, $p < .001$, $\eta^2_p = 0.187$), demonstrating enhanced planning, monitoring, and regulating behaviors. Effort Regulation, while yielding the smallest effect size among the variables, still demonstrated a statistically significant improvement ($F = 12.45$, $p < .001$, $\eta^2_p = 0.098$), suggesting that the experimental group possessed higher resilience when facing academic distractions or post-work lethargy.

DISCUSSION

Theoretical Synthesis: Mitigating Cognitive Overload to Enable Metacognition

The empirical findings of this study provide robust, quantitative evidence that the architectural design of an asynchronous learning platform fundamentally dictates a working student's capacity to self-regulate. By transitioning from a fragmented, navigation-heavy LMS to a consolidated, linear Google Sites environment, adult learners exhibited dramatic improvements in their deployment of advanced cognitive strategies.

The most critical mechanism driving these results relates directly to the interplay between Cognitive Load Theory and Zimmerman's cyclical model of SRL (Prayogi, R. D., Estriyanto, Y., & Suharno, 2022; Zimmerman, 2000). Traditional LMS platforms impose a massive extraneous cognitive load. When working students who are already operating with severely depleted cognitive resources due to occupational fatigue attempt to engage with these platforms, their executive functioning is rapidly consumed by logistical navigation rather than academic comprehension. Consequently, the forethought phase of SRL is entirely bypassed. Students do not plan their learning or set goals because the sheer friction of accessing the material forces them into a reactive, panicked task-completion mode.

Conversely, the Google Sites intervention consolidated all pedagogical materials into a single, continuous vertical scroll. This architectural simplicity virtually eliminated navigational friction. By removing the extraneous cognitive load, the platform liberated the students' finite mental bandwidth. This liberated bandwidth was subsequently reallocated toward deep Metacognitive Self-Regulation, which saw a robust increase in the experimental group ($\eta^2_p = 0.187$). Students finally possessed the cognitive energy to enact Zimmerman's performance phase: they could monitor their comprehension in real-time, pause instructional videos to take strategic notes, and actively engage with the embedded self-check quizzes without feeling overwhelmed by the platform itself. The platform ceased to be an obstacle and instead became an invisible conduit for learning.

Alleviating Time Poverty Through Architectural Clarity

The profound increase in Time and Study Environment Management scores ($\eta^2_p = 0.218$) directly addresses the systemic issue of time poverty that defines the adult learner demographic (Lin, 2019). In a traditional, fragmented LMS, estimating the time required to complete a module is nearly impossible, as resources are hidden behind multiple clicks and nested folders. This uncertainty breeds anxiety and procrastination, as a working



student cannot accurately determine if they have enough time to complete a task before their next occupational shift.

The Google Sites model, through explicit structural scaffolding, eradicated this temporal ambiguity. By presenting clear expectations, explicit estimated duration markers at the top of the page, and a strictly linear progression track, the platform provided total transparency. This transparency empowered working students to seamlessly integrate micro-study sessions into their highly restricted schedules, facilitating precise temporal planning a hallmark of effective SRL forethought. The ability to see exactly what a module entails with a single glance reduces the psychological intimidation of initiating a study session after a long workday. This structural predictability is the primary driver behind the significant improvement in Effort Regulation ($\eta^2_p = 0.098$); students are far more likely to sustain effort when the finish line is clearly visible and the path is unimpeded by technological hurdles.

Elevating Motivational Resilience in Fatigued Learners

Analyzing the results through the lens of Pintrich's motivational framework provides profound insight into the psychological state of the working student (Pintrich, 2004). The data indicated a significant surge in Intrinsic Goal Orientation ($\eta^2_p = 0.135$) and Task Value ($\eta^2_p = 0.161$) for the experimental group. This suggests a direct causal relationship between structural digital clarity and intrinsic academic motivation.

When adult learners are not constantly frustrated by technological barriers, they possess the mental clarity required to recognize the inherent value and professional relevance of the academic content. The aesthetic, minimalist, and user-friendly nature of Google Sites, combined with seamlessly embedded multimedia, created an engaging environment that transformed the perception of coursework. It shifted the student's psychological framework from a burdensome, stressful obligation ("have-to" motivation, driven by fear of failure) into an intellectually stimulating endeavor ("want-to" motivation, driven by curiosity and mastery).

Furthermore, the embedded automated feedback loops within the Google Sites infrastructure acted as continuous, low-stakes reinforcement. When a student answered an embedded self-check question correctly, it provided an immediate psychological reward. This frequent, positive reinforcement is vital for building Self-Efficacy ($\eta^2_p = 0.118$), which is necessary to persist through complex academic challenges when physical and mental fatigue are at their peak.

Comparative Analysis with Contemporary Literature and Novelty

These findings provide a critical and necessary update to contemporary discourse on digital education, particularly concerning the post-2020 reliance on asynchronous environments. While recent studies have firmly established the paramount importance of SRL in online environments (Howard, J. L., Bureau, J., Guay, F., Chong, J. X., & Ryan, 2021; Tucker, 2021), much of the existing literature passively positions SRL as a

prerequisite trait that students must inherently possess to succeed. If a student fails, it is often attributed to a personal deficit in self-regulation.

This study aggressively challenges that paradigm. It demonstrates that SRL is not merely a static prerequisite but a highly malleable psychological state that is deeply contingent upon the architecture of the digital environment. By isolating working students as a unique demographic requiring highly specialized pedagogical scaffolding, this research proves that institutional platforms are not neutral vessels; they are active agents that can either paralyze or catalyze an adult learner's self regulatory capabilities.

The distinct novelty of this research lies in its reconceptualization of a ubiquitous, free tool (Google Sites). It elevates the platform from a simple website builder to an explicit, highly effective psychological intervention designed specifically to mitigate time poverty, reduce extraneous cognitive load, and artificially scaffold the self regulatory phases for adult learners who lack the biological energy to do so independently.

CONCLUSION

The continuous democratization of global higher education necessitates the development of pedagogical models that accurately reflect and accommodate the complex realities of the non traditional, working student. This research conclusively demonstrates that deploying a lightweight, Google Sites based asynchronous learning model significantly optimizes Self Regulated Learning among employee class students facing severe time poverty, role conflict, and occupational fatigue.

By simplifying the digital architecture, consolidating multimodal academic resources into strictly linear pathways, and explicitly embedding scaffolds that trigger Zimmerman's forethought, performance, and self reflection phases, instructional designers can dramatically reduce extraneous cognitive load. This reduction liberates the working student's finite cognitive bandwidth, resulting in profound, statistically significant enhancements in intrinsic motivation, perceived task value, time management, and deep metacognitive self regulation.

Practical Implications

The practical implications of this study for higher education institutions, particularly those expanding their adult education and employee class programs, are substantial. Universities aiming to ethically and effectively support adult learners must pivot away from the uncritical, blanket deployment of complex, highly fragmented Learning Management Systems. While heavy LMS platforms serve institutional administrative needs, they actively hinder the psychological needs of the fatigued learner.

Instructional designers and faculty should adopt lightweight, highly structured, and visually cohesive platforms like Google Sites as the primary delivery mechanism for asynchronous content. Course design must prioritize linearity, explicit time estimations, and embedded, low stakes self checks to externalize the regulatory burden. By doing so, institutions can transition from merely offering flexible schedules to offering genuinely accessible pedagogy that respects the cognitive limits of the working adult.

Limitations and Recommendations for Future Research

While the findings are robust, the study is not without limitations. The quasi experimental design, while ecologically valid, lacks the absolute control of a randomized controlled

trial. Additionally, the intervention was limited to an eight week duration within a single foundational undergraduate module.

Future research must longitudinally track the impact of lightweight digital architectures on actual academic achievement metrics, such as retention rates, degree completion times, and cumulative grade point averages across diverse academic disciplines (e.g., STEM vs. Humanities). Furthermore, investigating the integration of artificial intelligence within these linear, lightweight architectures such as AI driven, personalized self reflection prompts or adaptive scheduling assistants could offer the next significant frontier in optimizing Self Regulated Learning for time poor, non traditional demographics.

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