SOCIAL MEDIA-DRIVEN MICROLEARNING: A FRAMEWORK FOR ENHANCING STUDENT LEARNING EXPERIENCE AND EFFICACY

by

Bill Au, MBusIT, BBus

DISSERTATION

Presented to the Swiss School of Business and Management Geneva

In Partial Fulfillment

Of the Requirements

For the Degree

DOCTOR OF BUSINESS ADMINISTRATION

SWISS SCHOOL OF BUSINESS AND MANAGEMENT GENEVA

OCTOBER, 2025

SOCIAL MEDIA-DRIVEN MICROLEARNING: A FRAMEWORK FOR ENHANCING STUDENT LEARNING EXPERIENCE AND EFFICACY

by

Bill Au

APPROVED BY

Iva Buljubasic

Dissertation chair

RECEIVED/APPROVED BY:

_____

Admissions Director

Dedication

Dedicated to my dear daughter, Misaka. At seven years old, you are already growing up in a world of limitless possibility. May your learning be joyful, your curiosity boundless, and your path lit by opportunities I never dreamed of. This work is a small step toward a future where education is as dynamic, accessible, and inspiring as you deserve it to be.

Acknowledgements

I would like to extend my heartfelt thanks to Ljiljana Kukec for her unwavering patience, support, counsel, and empathy throughout the past three years. Your guidance has been a steady source of strength and clarity, and your belief in this journey never wavered — even when mine did.

ABSTRACT

This research explores the effectiveness of social media-driven microlearning in enhancing knowledge retention, comprehension, and academic performance among higher education students. With the increasing integration of digital tools into pedagogical practice, microlearning delivered through social media platforms offers a novel approach to addressing contemporary learning preferences and cognitive engagement challenges.

The study aimed to assess the pedagogical value of microlearning when implemented within familiar social media environments, identify its key design and engagement factors, and develop a comprehensive framework to guide educators in its adoption. Four core research questions were addressed, focusing on the impact of social media-based microlearning on student outcomes, its effectiveness in meeting educational objectives, the role of content structure in shaping user experience, and the development of a strategic implementation model.

A quasi-experimental design was employed, involving 614 undergraduate students from a university in Vietnam. Participants engaged with modular microlearning content delivered via a selected social media platform. Data was collected through surveys and performance assessments, and analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) to examine the relationships between variables such as platform familiarity, content design, engagement, comprehension, retention, student experience, and academic performance.

The findings confirmed strong, statistically significant relationships among the constructs. Engagement emerged as a central mediator linking platform affordances and instructional design to learning outcomes. Comprehension and retention were positively influenced by content quality and interactivity, which in turn contributed to improved academic performance and student experience.

Based on these results, a validated framework was developed to support the design, implementation, and evaluation of social media-driven microlearning initiatives. The framework offers practical guidance for educators seeking to adopt this approach, while also contributing new theoretical insights into digital pedagogy.

The study concludes that microlearning delivered through social media can be an effective, scalable, and engaging educational strategy, particularly when informed by established pedagogical theories and responsive to learner needs.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I: INTRODUCTION

1.1 Introduction

In recent years, the education sector has undergone a significant transformation due to the rise of digital platforms and changing learner preferences. In this evolving landscape, microlearning—the delivery of small, targeted units of learning content—has emerged as a valuable pedagogical tool. Its design aligns with the cognitive limitations and digital consumption habits of modern learners, offering concise, self-paced instruction that supports improved retention and flexibility (Balasundaram et al., 2022).

Simultaneously, social media platforms such as Instagram, TikTok, Twitter, LinkedIn, and YouTube have become deeply embedded in the everyday lives of students. These platforms offer dynamic features such as multimedia content, user interaction, gamification, and algorithmic personalization, which have not only redefined how people communicate but have also created new opportunities for delivering educational content (Castillo-Sarmiento et al., 2023). The participatory nature of social media has led to a shift in how knowledge is accessed, produced, and shared—making these platforms fertile ground for pedagogical innovation (Cheng, Fu & de Vreede, 2017).

The integration of social media with microlearning represents a novel opportunity to combine familiar digital tools with instructional strategies known to support learner engagement and comprehension. Social media's interactive environments offer learners the opportunity to consume and respond to content in real-time, engage in peer

discussion, and access learning materials on demand—anytime and anywhere (Denojean-Mairet et al., 2024). When these platforms are leveraged for educational purposes, particularly through microlearning formats, they can promote greater learner autonomy, social interaction, and cognitive activation (Tewksbury & Downs, 2014).

Moreover, this integration is supported by constructivist and connectivist learning theories, which view learning as a socially embedded and technology-mediated process. The affordances of social media platforms allow for the co-construction of knowledge through collaboration, feedback, and shared reflection, while microlearning aligns with principles of spaced repetition and chunking, which are essential for cognitive retention and transfer of knowledge (Siemens, 2005).

Despite these promising theoretical foundations, current empirical evidence regarding the effectiveness of social media-driven microlearning remains limited. While several studies have recognized its potential to improve learner engagement and knowledge retention (Denojean-Mairet et al., 2024; Balasundaram et al., 2022), there is a lack of rigorous investigation into its actual impact on comprehension, retention, academic performance, and student experience in formal higher education contexts. This gap limits the ability of educators and institutions to make evidence-informed decisions when considering the adoption of such digital learning strategies.

Additionally, concerns surrounding the use of social media in education persist. These include the potential for distraction, the spread of misinformation, privacy concerns, and the risk of cognitive overload in unmoderated environments (Maier et al., 2015). If not thoughtfully implemented, social media-based education may blur the line between learning and leisure, undermining focus and diminishing academic outcomes. Thus, a balanced approach is necessary—one that harnesses the motivational and social benefits of these platforms while mitigating their potential drawbacks.

Given the increasing importance of digital engagement in the post-pandemic educational environment, it is crucial to explore how social media-based microlearning influences student learning outcomes and whether it represents a viable complement—or even alternative—to traditional models. With students' familiarity with these platforms and their demand for engaging, mobile-friendly learning experiences, higher education providers must reimagine their pedagogical approaches to remain relevant and effective.

This study aims to contribute to that goal by investigating the relationship between social media-driven microlearning and student engagement, comprehension, retention, academic performance, and student experience. It does so by proposing and empirically testing a conceptual framework that positions social media as a delivery mechanism for structured microlearning interventions, specifically within a higher education context.

By building on existing theoretical insights, addressing a clear research gap, and offering a structured, evidence-based evaluation, this study seeks to provide practical and academic value. It will offer actionable recommendations for educators and learning designers, while contributing to the broader discourse on how emerging technologies can support transformative learning practices in the digital age.

1.2 Research Problem

In contemporary higher education, traditional lecture-based teaching methodologies are increasingly insufficient for engaging students who are immersed in digital, fast-paced, and interactive content ecosystems. Studies have shown that while these conventional approaches are effective in foundational knowledge transfer, they often fail to sustain long-term engagement or accommodate diverse learning preferences, especially in an era dominated by mobile and multimedia technologies (Fawns, 2022). As such, there is a growing imperative to explore and integrate novel instructional strategies that align with modern students' habits and expectations.

One promising pedagogical innovation is microlearning, which delivers content in short, targeted segments designed for quick consumption and application. Microlearning has been associated with improved learner engagement, higher retention rates, and enhanced comprehension when compared to longer, more traditional modules (Balasundaram et al., 2022). Its flexible and adaptive format makes it especially suited for digital platforms,

allowing students to engage with material at their own pace and revisit complex topics as needed.

Simultaneously, social media platforms such as TikTok, Instagram, LinkedIn, and YouTube have become integral to students' daily lives, serving not only as entertainment and communication channels but also as informal learning environments. The interactive, user-driven nature of social media allows for immediate feedback, peer engagement, and the sharing of content in multimodal forms. Castillo-Sarmiento et al. (2023) highlight that the participatory culture of these platforms can be leveraged to support microlearning by enabling short, visually engaging content formats, encouraging interaction, and reinforcing learning through social validation.

Despite this theoretical alignment, there is limited empirical research examining the integration of social media and microlearning in higher education. Current studies tend to explore these domains separately or focus on anecdotal and case-specific findings, leaving a significant gap in systematic understanding of their combined impact. This is particularly concerning given the increasing reliance on digital tools to enhance student learning outcomes in the post-pandemic educational landscape (Denojean-Mairet et al., 2024).

To address this knowledge gap, the present study identifies four core research problems:

1. Microlearning has demonstrated strong potential in supporting knowledge retention and comprehension, particularly when instructional content is segmented into brief, logically sequenced learning units. Empirical studies in controlled environments have linked microlearning to improved memory recall and long-term learning outcomes (Balasundaram et al., 2022). However, the dynamics of social media introduce a layer of complexity not present in traditional e-learning environments. When microlearning is delivered on platforms like TikTok or Instagram—where educational content is juxtaposed with non-educational stimuli—learners may face cognitive overload or attention fragmentation. These platforms are designed to maximize user engagement rather than cognitive absorption, potentially undermining the depth of processing necessary for retention. Therefore, empirical studies are needed to determine whether social media contexts dilute or enhance the impact of microlearning on comprehension and memory.

2. Although learners report enjoying social media-based learning formats, enjoyment does not inherently equate to learning. There's a scarcity of rigorous, data-driven studies measuring the educational efficacy of social media-driven microlearning interventions in achieving formal academic objectives. Hamadi et al. (2021) emphasize the need to use quantifiable metrics—such as pre- and post-assessments, quiz performance, and tracking engagement analytics—to validate educational gains. Furthermore, Castillo-Sarmiento et al. (2023) demonstrate that

while platforms like TikTok can increase student motivation and participation, more work is needed to determine if these platforms lead to sustained cognitive outcomes, such as critical thinking, knowledge synthesis, and applied problem-solving. The effectiveness of microlearning on social media must be evaluated in alignment with measurable academic competencies, not just learner perception or usage statistics.

3. The design architecture of microlearning courses plays a significant role in learning success, especially in the attention-constrained environments of social media. Microlearning is most effective when lessons are intentionally structured to support scaffolding, progressive learning, and cognitive load balancing. However, social media platforms prioritize content virality and user retention rather than educational coherence. As Trowbridge et al. (2017) highlight, features like autoplay, swipe navigation, and comment-driven feedback can either enhance or disrupt learning depending on how content is designed and sequenced. This raises the need to critically examine how microlearning courses are structured, chunked, and visually rendered within social platforms to optimize educational value. Effective course structure must balance platform affordances with instructional coherence, ensuring that learners can navigate, reflect, and build on knowledge incrementally.

4. One of the most pressing gaps in the current research landscape is the absence of a comprehensive framework to guide the design, delivery, and evaluation of social media-based microlearning in higher education. While some institutions and educators have experimented with ad hoc strategies, the lack of formalized models leads to inconsistency in implementation and evaluation. Hamadi et al. (2021) argue that robust frameworks are essential to define clear relationships among pedagogical elements—such as instructional design, learner analytics, and engagement affordances. These frameworks must also consider factors unique to social media ecosystems, including platform familiarity, algorithmic visibility, and community-driven interaction. Denojean-Mairet et al. (2024) underscore that without a data-driven, theory-informed model, educational institutions risk deploying interventions that are not scalable, sustainable, or aligned with academic standards. Therefore, developing such frameworks is critical not only for practical implementation but also for theoretical advancement in digital pedagogy.

In summary, while the convergence of microlearning and social media offers transformative potential for higher education, its practical implementation is impeded by the absence of robust empirical evidence and clear pedagogical models. This study addresses these gaps by investigating the impact of social media-based microlearning on key student outcomes and by proposing a data-driven framework to inform effective implementation.

1.3 Purpose of Research

The primary purpose of this study is to explore and empirically evaluate the potential of microlearning delivered via social media platforms to enhance student learning outcomes in higher education. In an educational landscape increasingly shaped by digital technologies, universities are under pressure to modernize pedagogical practices to better align with the preferences, habits, and cognitive needs of today's learners. These students—often digital natives—engage daily with brief, visual, and interactive digital content. Consequently, traditional instructional approaches are often perceived as misaligned with their learning behaviors and motivational patterns (Fawns, 2022).

Social media platforms such as TikTok, Instagram, YouTube, and Facebook are not only pervasive in students' personal lives but are also gaining traction for educational applications. Their features—ranging from real-time interaction and peer collaboration to short-form video delivery and algorithmic personalization—create a dynamic environment conducive to microlearning. Castillo-Sarmiento et al. (2023) highlights that these platforms' multimodal and participatory affordances make them ideal for delivering short, engaging instructional units that resonate with students' preferred communication styles.

Microlearning, characterized by focused, concise content chunks, is supported by cognitive learning theories including chunking, scaffolding, and spaced repetition, all of

which are associated with improved comprehension and retention (Balasundaram et al., 2022). Research has shown that microlearning interventions can outperform traditional lecture-based models in terms of learner satisfaction, reduced cognitive load, and knowledge recall. Embedding microlearning strategies into familiar, engaging, and mobile-accessible digital environments like social media offers an opportunity to create learning experiences that are both cognitively effective and contextually relevant.

Despite the theoretical promise, there remains a lack of robust empirical research exploring the actual impact of social media-based microlearning within formal academic contexts. The majority of existing studies examine either microlearning or social media in isolation. As a result, there is insufficient understanding of how their integration may influence outcomes such as engagement, comprehension, knowledge retention, academic performance, and student satisfaction (Denojean-Mairet et al., 2024). This disconnect between theory and practice presents a critical gap in both scholarship and application.

Accordingly, this research seeks to:

Assess the impact of social media-delivered microlearning on students' comprehension of academic content and knowledge retention. Comprehension and retention are fundamental indicators of effective learning. In traditional higher education, these are often achieved through structured lectures, readings, and assessments. However, in social media environments, learners consume highly fragmented content while multitasking or passively scrolling, creating a context where cognitive overload and

shallow processing are risks. This research aims to determine whether microlearning modules delivered through platforms like TikTok, Instagram, or Facebook can promote deeper cognitive engagement with academic content and lead to measurable improvements in short- and long-term retention. By comparing outcomes across different delivery formats, the study will provide empirical insight into whether social media can support higher-order thinking and information consolidation in educational contexts.

Evaluate the efficacy of social media-driven microlearning interventions in improving student learning outcomes, including academic performance, engagement, and learning experience. While engagement and motivation are often cited benefits of social media use in education, the true value of microlearning must be determined by its effect on formal learning outcomes. This study will assess how microlearning interventions on social platforms influence student performance on assessments, their levels of interaction with the learning content, and their perceived satisfaction with the learning process. Particular attention will be paid to differences across platforms and demographic groups to determine if certain environments are more conducive to specific types of learners. By triangulating performance metrics with self-reported engagement and user experience data, this research aims to offer a holistic evaluation of efficacy that bridges cognitive and affective dimensions of learning

Examine how instructional design elements—such as course structure, content format, and platform-specific features—influence the educational effectiveness of

microlearning content. Effective microlearning is not merely about brevity—it requires intentional design that aligns with learners' cognitive capacities, motivations, and digital contexts. Social media platforms bring their own affordances and constraints: autoplay, swipe navigation, push notifications, short video caps, and reactive user feedback. These features may support or hinder knowledge transfer depending on how content is structured. This study will examine which instructional design strategies—such as modular sequencing, visual storytelling, gamification, and interactivity—optimize learning outcomes when implemented through social media. Understanding these dynamics will help educators and learning designers tailor content not only to learning goals but also to the specific mechanics of the platform.

Develop a theory-informed framework to guide the design, implementation, and evaluation of social media-based microlearning in higher education settings. Currently, there is a gap in regards to frameworks which exists to guide educators in the integration of microlearning within social media environments in a pedagogically rigorous way. While several frameworks have been proposed, they often focus on specific aspects or contexts and may not provide a universally applicable, comprehensive guide for educators.

For instance, Hamadi et al. (2021) introduced a framework for integrating social media as a cooperative learning tool in higher education, emphasizing collaborative learning principles. However, this framework is tailored to cooperative learning contexts and may

not address all facets of microlearning integration across diverse educational settings. Similarly, Denojean-Mairet et al. (2024) conducted a literature review on the integration of microlearning and social media, highlighting the potential benefits and challenges. While informative, their work stops short of proposing a detailed, actionable framework for educators. Therefore, while existing frameworks provide valuable insights, there remains a need for a more comprehensive, empirically validated framework that guides educators in designing, implementing, and evaluating microlearning initiatives within social media environments across various disciplines and learning contexts. This research will develop a structured framework and be refined through empirical investigation. The framework will define core components and offer guidance on their alignment with student learning needs. It will also include mechanisms for evaluating the success of interventions based on both learner outcomes and platform analytics. This framework aims to serve as a practical tool for educators and instructional designers seeking to create scalable, effective, and student-centered microlearning initiatives in digital-first education ecosystems. It is worth noting that although the empirical component of this study was operationalised through the use of Facebook, it is critical to emphasise that the underlying research purpose is not to evaluate Facebook as an isolated educational platform. Rather, Facebook was strategically selected due to its widespread user familiarity, rich feature set, and capacity to simulate the interactive dynamics typical of a broad range of social media environments. These include functionalities such as real-time content delivery, asynchronous discussion threads, multimedia sharing, and peer feedback mechanisms. From a practical standpoint, this choice allowed for a robust and accessible deployment

of the microlearning intervention within a higher education cohort already well-versed in its interface. However, the theoretical and conceptual ambitions of this study extend well beyond the confines of a single platform. The framework developed herein is intended to capture the structural, pedagogical, and cognitive principles that underpin effective microlearning experiences across social technologies more broadly. Rather than deriving platform-specific insights that are only applicable within Facebook's ecosystem, the study seeks to identify generalisable instructional design principles—such as content modularity, spaced repetition, interactivity, and social engagement—that can inform microlearning deployment across various digital environments. As such, while the empirical findings are rooted in one platform's affordances, the framework's relevance lies in its potential adaptability and scalability across multiple social media contexts, including but not limited to TikTok, Instagram, LinkedIn, and emerging educationally oriented platforms. This broader perspective aligns with the study's goal to contribute to a pedagogically sound, technologically agnostic framework that advances the discourse on digital learning design.

The theoretical contribution of this study lies in advancing scholarship on digital pedagogy, particularly through the lens of constructivist and connectivist learning theories. These theories support the notion that learners build knowledge through social interaction, real-time feedback, and contextualized content, all of which are naturally embedded in social media platforms (Siemens, 2005; Fawns, 2022).

From a practical perspective, this study provides actionable insights for educators and instructional designers who seek to adopt digitally aligned teaching practices that not only match learner expectations but also promote measurable academic success. By generating an evidence-based framework, the research will offer scalable models for enhancing teaching and learning in the digital age, empowering institutions to adapt effectively in a fast-evolving educational ecosystem.

1.4 Significance of the Study

This study occupies a critical and timely space within the broader discourse on digital transformation in higher education. As institutions globally strive to remain relevant and competitive in an era defined by rapid technological advancement and shifting learner expectations, there is an urgent need to explore pedagogical models that go beyond traditional instruction. These models must accommodate emerging learning behaviors, capitalize on ubiquitous digital platforms, and most importantly, yield tangible educational outcomes that align with 21st-century competencies.

One such promising approach is the integration of microlearning—a pedagogical model focused on delivering small, digestible units of content—with social media, which now forms a central component of daily life for students. While each domain has been explored independently in educational literature, there exists a substantial empirical and theoretical gap concerning their combined application. This study addresses that gap by examining how social media-driven microlearning may be leveraged to improve

knowledge retention, comprehension, student engagement, and performance in formal academic settings.

Theoretical Significance

From a theoretical standpoint, this research contributes meaningfully to the advancement of knowledge in the domains of educational technology, digital pedagogy, and instructional design. Specifically, it seeks to extend the relevance and applicability of constructivist and connectivist learning theories to contemporary learning environments shaped by mobile technologies and social media dynamics.

Constructivism posits that learners actively construct meaning through contextual interaction and reflective processing (Fawns, 2022). In social media environments, this construction is enriched through multimodal engagement—visuals, commentary, hashtags, community feedback—which allows students to form knowledge through iterative dialogue and social validation.

Meanwhile, connectivism (Siemens, 2005) underscores the significance of knowledge networks, digital nodes, and pattern recognition as key mechanisms for learning in the digital age. Learning occurs not only through structured instruction, but also through the exploration, filtering, and curation of content across networks—functions that are inherently supported by social media platforms. This study operationalizes connectivist theory by exploring how students interact with microlearning content embedded in

algorithmic, socially mediated systems—thus providing a contemporary interpretation of networked learning theory.

Furthermore, the research responds to a scholarly need for theory-informed frameworks that move beyond anecdotal adoption of digital tools toward structured, pedagogically grounded implementation. While instructional design models exist for traditional e-learning platforms, they are not always suited to the mobile-first, attention-constrained environments of modern social media (Denojean-Mairet et al., 2024). The framework developed through this research will help bridge that gap and contribute to the conceptual infrastructure of next-generation learning design.

Practical Significance

The practical contributions of this study are both immediate and far-reaching. As education continues to be increasingly mediated by digital tools, there is a growing demand for instructional strategies that are scalable, engaging, and cognitively effective—particularly among learners who expect seamless digital experiences.

This research provides:

- Guidance for educators and designers in structuring microlearning content

- Insight into the use of engagement mechanisms such as gamification, visual storytelling, peer feedback, and social accountability to enhance learning.

- Evidence on how to balance cognitive load and visual/auditory stimulus to avoid distraction in social media environments.

Such insights are particularly valuable in resource-constrained educational environments or where student disengagement has become a concern. Moreover, they are transferrable to corporate learning, professional development, and lifelong learning contexts, where microlearning is already emerging as a dominant instructional trend (Veletsianos, 2020).

Strategic and Policy-Level Significance

At a macro level, this research holds significant implications for policy development and institutional strategy. In the wake of the COVID-19 pandemic and a shift toward hybrid and remote models of education, universities are seeking new pedagogical and technological frameworks that support long-term transformation. This study can inform:

- Decisions on integrating digital microlearning content into formal curricula.
- Strategic planning around mobile-first instructional platforms.
- Policy frameworks for effective use of social media for education.

It also intersects with strategic goals around accessibility, equity, and digital inclusion. Social media platforms—already deeply embedded in students' lives—can offer greater accessibility than formal learning management systems. They are familiar, ubiquitous, and low-barrier, making them powerful tools for expanding learning opportunities, especially for students in underserved or remote areas (Selwyn, 2016; Veletsianos, 2020).

1.5 Research Purpose and Questions

While the preceding sections have outlined the overarching research purpose and contextualised the study within the broader educational and technological landscape, the current section serves to translate those conceptual goals into a clearly delineated set of research questions. Although there is some intentional overlap with the themes discussed in Section 1.3, this repetition serves a functional purpose: it reinforces the logical progression from broad research intent to specific lines of inquiry. The articulation of formal research questions here is not merely reiterative but essential for establishing analytical direction and methodological coherence. By explicitly restating the core investigative aims in question form, this section ensures clarity for the reader and provides a direct foundation for the study's design, instrumentation, and analysis in subsequent chapters. This structured reiteration reflects standard academic practice in doctoral research, where conceptual consistency and methodological transparency are paramount. The purpose of this research is to conduct a comprehensive exploration into the pedagogical potential and practical implications of integrating social media-driven microlearning within higher education contexts. In an era marked by rapidly evolving

digital communication habits and increasingly fragmented attention spans, there is growing concern that traditional modes of instruction—characterized by lengthy lectures, static content, and asynchronous feedback—may no longer be sufficient to meet the cognitive needs or expectations of contemporary learners (Fawns, 2022; Trowbridge, Waterbury & Sudbury, 2017).

At the core of this research lies the intersection between two powerful educational trends: the emergence of microlearning and the ubiquity of social media. Microlearning, defined as the delivery of small, targeted units of instructional content, has been shown to enhance learners' ability to absorb, process, and retain information (Balasundaram et al., 2022). Grounded in cognitive learning principles such as chunking, scaffolding, and spaced repetition, microlearning facilitates more efficient information retention and can accommodate learners with limited time or attention (Denojean-Mairet et al., 2024). Meanwhile, social media platforms like TikTok, Instagram, and YouTube provide multimodal, interaction-rich environments that align with students' everyday communication habits and offer unique affordances for engaging learning delivery (Castillo-Sarmiento et al., 2023; Hamadi et al., 2021).

Despite the independent merits of both microlearning and social media, research on their integration in formal education settings remains limited. Particularly absent is a nuanced understanding of how microlearning delivered through social media platforms affects key academic outcomes such as comprehension, retention, performance, and student

experience (Denojean-Mairet et al., 2024). This study addresses this knowledge gap by critically examining whether the convergence of microlearning principles and social media environments can offer a scalable, effective pedagogical strategy in higher education.

To explore this issue, the research is guided by four research questions:

1. **What is the impact of social media-driven microlearning on knowledge retention and comprehension among higher education students?** This is based on the hypothesis that dividing complex topics into smaller, visually and interactively engaging units—delivered through familiar platforms—can enhance deep processing and long-term memory consolidation. Studies have demonstrated the effectiveness of microlearning for knowledge retention when implemented with attention to sequencing and cognitive load (Balasundaram et al., 2022).
2. **To what extent is social media-driven microlearning effective in achieving educational objectives and improving student learning outcomes in higher education contexts?** Beyond cognitive metrics, the study considers emotional and behavioral engagement as central to learning success. Previous research has shown that social media can foster participatory learning environments, strengthen peer interaction, and increase learner motivation—factors linked to academic improvement (Hamadi et al., 2021).

3. **How can the consumable structure of microlearning courses delivered through social media platforms be evaluated to enhance the user experience for students?** Instructional design on social media is shaped by platform-specific constraints, such as time limits, autoplay features, and algorithmic feed logic. These factors may either facilitate or obstruct educational effectiveness, depending on content layout and learner interface (Castillo-Sarmiento et al., 2023). This study aims to identify structural design principles that minimize cognitive overload and promote sustained interaction.

4. **What are the key components of a comprehensive framework for designing, implementing, and evaluating social media-driven microlearning initiatives in higher education?** Although existing studies touch on various components—such as instructional design, user engagement, and digital content delivery—there is no unified framework that guides educators through the full process of integrating microlearning into social media environments (Denojean-Mairet et al., 2024; Hamadi et al., 2021). This research proposes to address that gap by developing a model grounded in both empirical findings and learning theory.

The study is both theory-driven and practice-oriented. It draws from constructivist and connectivist learning theories, which emphasize the importance of social interaction, contextual relevance, and digitally networked environments for effective learning (Siemens, 2005; Fawns, 2022). Constructivism supports the idea that learners create meaning through interaction and reflection, while connectivism highlights the role of

digital platforms and information networks in shaping how knowledge is acquired and shared.

Practically, the study responds to the growing demand among students for learning that is accessible, interactive, and mobile-first. As educational institutions continue to digitize their curricula, it is critical to ensure that new strategies—such as social media-based microlearning—are implemented with pedagogical rigor. Without a clear framework and supporting evidence, these innovations risk remaining superficial or ineffective.

Ultimately, this research seeks to contribute both a theoretical model and practical tools to support the effective integration of microlearning via social media in higher education. It aims to empower educators and instructional designers to reimagine not only how content is delivered, but how learning itself is structured, measured, and experienced in the digital age.

CHAPTER II: REVIEW OF LITERATURE

2.1 Social Media in Education

The integration of social media into educational settings has led to a transformative shift in pedagogy, redefining how educators and students interact, collaborate, and engage with learning materials. Platforms such as Facebook, Twitter, LinkedIn, and collaborative tools like Google Workspace and Microsoft Teams have become indispensable components of modern education. These platforms foster interactive learning environments that transcend the limitations of traditional classroom settings. Recent studies (De Gagne et al., 2019; Kohnke, 2021) indicate that social media fosters student engagement by enabling real-time discussions, facilitating peer-to-peer learning, and encouraging knowledge-sharing beyond the classroom walls.

Discussion forums and group chats on social media allow students to participate in dialogues, share valuable resources, and collaborate on problem-solving activities. This participatory and dynamic learning approach aligns with constructivist learning environments, which emphasize active engagement and learner-centered instruction (Priyamvada, 2023). Furthermore, social media platforms provide significant benefits for educators and students, including improved communication, networking opportunities, and access to vast educational resources. By leveraging these platforms, educators can efficiently disseminate announcements, provide supplementary resources, and extend class discussions into the digital space. Additionally, social media facilitates professional

networking, enabling educators to connect with colleagues globally, exchange best practices, and stay informed about evolving pedagogical strategies.

Beyond traditional uses, social media has also been instrumental in supporting microlearning. De Gagne et al. (2019) highlight how social media platforms effectively deliver bite-sized learning modules, tailored to specific topics or skills. Microlearning elements—such as short instructional videos, quizzes, and interactive prompts—have been shown to enhance student engagement and retention (Ichiuji et al., 2021). Research further emphasizes the key characteristics of microlearning:

1. Microlearning delivers concise and digestible content, enhancing comprehension and retention (Hrastinski, 2009).
2. It promotes learner autonomy and supports self-directed education, empowering students to take control of their learning journey (Kohnke, 2021).
3. The accessibility and flexibility of microlearning allow learners to engage in short, convenient learning sessions anytime and anywhere (Ichiuji et al., 2021).
4. The interactive nature of microlearning fosters an engaging and participatory learning experience, encouraging collaboration among students and educators (De Gagne et al., 2019).

Moreover, the advent of AI-driven and adaptive learning technologies integrated with social media platforms is further enhancing personalized learning experiences. AI-powered chatbots and recommendation algorithms provide students with tailored content based on their learning preferences and progress (Yaseen et al., 2025). These

advancements signify a shift towards more student-centered, adaptive educational environments.

The role of social media in education continues to expand, offering unprecedented opportunities for interactive, flexible, and globally connected learning experiences. As digital tools evolve, educators must consider how to integrate these platforms strategically, ensuring that they support pedagogical goals while addressing potential challenges such as information overload and digital literacy disparities (Hrastinski, 2009). With careful implementation, social media will remain a driving force in modern education, making learning more engaging, accessible, and effective than ever before.

2.2 Benefits of Social Media in Education

Recent literature has consistently highlighted the educational benefits of integrating social media into higher education settings. These platforms have proven to be valuable tools in enhancing student learning, fostering collaboration, and cultivating critical academic skills. For instance, Hussain et al. (2018) emphasize that social media fosters the creation of virtual communities among university students, enabling them to establish academic and social connections that support knowledge exchange. This connectivity also grants students immediate access to a variety of learning resources and contributes to the development of critical thinking and problem-solving competencies.

Rezaei and Ritter (2018) further elaborate on the pedagogical impact of social media, noting its role in nurturing a dynamic and collaborative educational environment. Their

findings suggest that social media tools promote active learning, support the achievement of effective learning outcomes, and help establish a sense of belonging through learning communities. This aligns with broader pedagogical trends toward more student-centered and constructivist approaches, where learners co-create knowledge through interaction and dialogue.

Woods et al. (2019) found that the inclusion of social media platforms in course design enhances student engagement and participation. Their study found that students were more likely to contribute to discussions, collaborate with peers, and remain interested in course material when social media was integrated into the curriculum. Moreover, social media offers educators multiple avenues to communicate and collaborate with their students, whether by sharing course content, providing timely feedback, or facilitating informal learning experiences outside the classroom. According to Aghaei, Rad and Pourshafei (2023), platforms like WhatsApp and Telegram help build peer connections, increase participation, and offer emotional support, all of which contribute to a more inclusive learning experience.

Research also indicates that breaking down complex subjects into bite-sized content can reduce cognitive load, making it easier for learners to process and retain information. De Gagne et al. (2019) reported that microlearning reduces extraneous cognitive load, particularly when coupled with intuitive mobile design and clear segmentation. This aligns with Sweller's Cognitive Load Theory, suggesting that shorter, focused learning units facilitate long-term retention by isolating working memory demands. Abbas et al.

(2023) conducted a meta-analysis on microlearning formats and concluded that retention and recall were significantly improved when learning was delivered in 5–7 minute chunks with visual and interactive elements.

Lahuerta-Otero et al. (2019) also observed that students generally enjoy incorporating social networking practices into the learning process. According to their research, students view social media as an effective medium that encourages teamwork, active involvement, and cooperative learning. The social and interactive aspects of these platforms allow students to engage more deeply with course content and with one another, fostering an inclusive and participatory educational experience. Additionally, there is growing empirical evidence that social media can improve academic performance. For example, Al-Mukhaini, Al-Qayoudhi and Al-Badi (2014) found that students who used social media tools to supplement their studies showed increased understanding of course content and were more confident in expressing their ideas in both online and in-class discussions.

Gamification has been shown to enhance learner engagement and motivation. A study by Smirani and Yamani (2024) found that gamification techniques, including leaderboards and badges, significantly improved learner motivation and engagement in online learning environments. Their research indicated that these elements foster a sense of progression and healthy competition, leading to sustained user interaction and better knowledge retention.

Further supporting this, a study published in the Journal of Student Success Research (2023) revealed that gamification, when thoughtfully integrated into game-based learning environments, significantly enhances learners' motivation and engagement. Key gamification elements, such as points, badges, and leaderboards, positively influenced intrinsic motivation, leading to increased enthusiasm, persistence, and interest in taking on challenges.

Moreover, social comparison mechanisms embedded within microlearning platforms, especially those mimicking social media feeds, create dynamic learning environments that promote frequent participation and peer accountability. Cheung (2023) emphasizes that adolescents often engage in social comparison with their peers to ascertain their own academic competence, which can have substantial effects on their motivation and learning.

Overall, these studies collectively demonstrate that social media can serve as a powerful enabler of student learning in higher education. By leveraging its collaborative, flexible, and interactive features, educators can enrich the academic experience, promote meaningful student engagement, and support a wide range of pedagogical objectives.

2.3 Concerns Associated With the Use of Social Media in Education

While the pedagogical potential of social media-driven microlearning continues to gain scholarly and institutional interest, several concerns warrant careful consideration.

1. **Potential for distraction and risk to sustained learning engagement**. Social media platforms are designed to maximize user engagement through constant notifications, algorithmically tailored content, and a steady stream of multimedia stimuli. While these features may enhance platform stickiness, they may also undermine cognitive focus and task persistence. Studies have shown that excessive or habitual use of social media can contribute to reduced attention spans, impaired executive function, and lower academic performance (Bulut, 2023). This is particularly problematic in educational settings where sustained attention and deep processing are essential for comprehension and retention. Moreover, the fast-paced and fragmented nature of content delivery may lead to cognitive overload, especially when learners are required to switch contexts rapidly or consume multiple short-form resources without adequate scaffolding (De Gagne et al., 2019).
2. **Misinformation and Content Appropriateness**. Unlike structured learning management systems, mainstream social media platforms often lack content vetting mechanisms, increasing the risk of exposure to misinformation, low-quality educational resources, or even harmful content. Kasakliev (2020) warns that poorly moderated or crowd-sourced educational materials can perpetuate misconceptions or oversimplify complex academic concepts. In addition, the open and user-generated nature of these platforms introduces concerns around the appropriateness and reliability of the content students engage with. Without strong digital literacy skills, learners may struggle to critically evaluate sources or

distinguish credible material from opinion, satire, or outright falsehoods. Consequently, educators bear the responsibility of guiding students in developing content verification skills and digital discernment.

3. **Privacy, Surveillance, and Data Security**. Social media usage inherently involves the sharing of personal data, either voluntarily or through passive data collection. This introduces serious privacy concerns, particularly when students are required or encouraged to engage with public-facing platforms as part of their coursework. Aymerich-Franch and Fedele (2019) highlight students' discomfort with being observed or evaluated by faculty in informal online spaces, especially when personal-professional boundaries are blurred. Additionally, the potential for identity theft, data mining, and third-party surveillance raises ethical questions about informed consent, platform regulation, and institutional liability (Adnan & Giridharan, 2019). These risks necessitate comprehensive data protection strategies and informed digital citizenship education.
4. **Mental Health and Wellbeing**. Emerging research indicates a link between excessive social media use and negative mental health outcomes, particularly among younger users. Feelings of anxiety, low self-esteem, and social comparison can be exacerbated by algorithmic exposure to idealized portrayals of others, especially on visually driven platforms like Instagram or TikTok. When educational activities are layered onto these environments, the pressure to perform publicly or receive social validation can compound existing stressors. While this area is still developing, early evidence suggests that embedding learning in such

platforms must be approached with sensitivity to mental health risks (Keles et al., 2020).

5. **Institutional and Pedagogical Readiness.** The successful integration of social media into learning environments depends not only on student readiness but also on the capacity of educators and institutions to design, implement, and monitor these tools responsibly. Van Den Beemt et al. (2019) argue that professional development, clear pedagogical models, and alignment with curricular goals are essential for meaningful and sustained use. Without such frameworks, social media-driven microlearning may devolve into superficial engagement or tokenistic innovation, failing to deliver substantive learning outcomes.

In conclusion, the papers collectively propose that while social media can be advantageous in educational contexts, it is imperative to address potential risks and establish guidelines to foster positive usage.

2.4 Microlearning Strategies

Social media has become an integral part of everyday life, with millions of people worldwide actively using platforms such as Facebook, Instagram, Twitter, and LinkedIn to connect and share information (Garg & Kumar, 2021). These platforms have not only transformed social interactions but have also revolutionized media ecosystems—changing the way content is produced, consumed, and disseminated.

One area that has recognized the potential of social media is education, particularly in enhancing student engagement and learning efficacy (Ramzan et al., 2023). Microlearning has emerged as an increasingly adopted pedagogical approach, characterized by the delivery of concise, easily digestible learning units. It supports focused, targeted learning, and is particularly effective when delivered through social media platforms. These platforms provide an ideal environment for microlearning, enabling interactive, responsive, and accessible educational experiences.

2.5 Cognitive Benefits and Knowledge Retention

Integrating social media into educational contexts offers multiple cognitive benefits that significantly enrich the learning experience (Lottering, 2020). These platforms capture learners' attention and foster active participation and collaboration. Their interactive nature enables real-time feedback, supporting formative assessment and continuous adaptation to learners' needs. Multimedia integration also promotes better information retention, catering to diverse learning styles.

Social media-facilitated microlearning further enables students to explore additional resources, thereby reducing cognitive fatigue and mitigating the demotivation and monotony often associated with traditional educational formats (Yuniarsih et al., 2022). Collectively, these affordances contribute to a dynamic, stimulating, and student-centered learning environment.

Existing literature supports the cognitive value of social media in education. Lottering (2020) found that using social platforms enhances student engagement, deepens interest in academic content, and fosters critical thinking. Greenhow and Galvin (2020) similarly emphasize the potential of social media to enhance the teaching–learning process by connecting students with communities, resources, and broader educational ecosystems. Saini and Abraham (2017) also highlight how social media tools can promote collaboration, networking, and knowledge sharing. Overall, these findings affirm that social media can elevate academic outcomes and support the cognitive development of learners.

2.6 Adaptability to Learning Styles

The literature indicates that social media is a highly adaptable educational tool, capable of addressing varied learning styles and enhancing the overall learning experience. Rezaei and Ritter (2018) and Mahindru (2018) emphasize the effectiveness of social media in promoting active and affective learning outcomes through its interactive features. These platforms not only foster engagement but also enable collaborative, team-based learning.

Empirical findings from Wong and Tee (2018) demonstrate that social media integration can have a significant impact on learning performance, validating its practical utility in educational contexts. Similarly, Barge and Parkhi (2022) explore how social media enables peer-to-peer learning and offers 24/7 support, positioning it as a resource that

extends learning beyond traditional classroom boundaries. These studies highlight social media's capacity to support formal and informal learning while promoting ongoing, community-driven knowledge exchange.

2.7 Integration of Social Media and Microlearning

The integration of social media with microlearning reflects a synergistic approach that leverages the strengths of both methods to create highly engaging and effective learning environments. This hybrid strategy has gained increasing recognition in educational research as a promising way to enhance learning outcomes.

The literature supports this integration. García Río et al. (2022) argue that microblogging platforms like Twitter can foster communication, stimulate debate, and offer easy access to information for students and educators alike. Mujica et al. (2021) show that social media marketing can positively influence brand engagement and awareness on microlearning platforms, identifying customer brand engagement as a key mediator. Hanshaw and Hanson (2019) also found that instructional design incorporating microlearning and social learning improves on-the-job skills and enhances learner satisfaction through shared experiences.

Ultimately, the fusion of social media and microlearning offers dynamic delivery, just-in-time access, gamification, and real-time feedback—all essential features for personalized

and collaborative learning. As educational paradigms evolve, this integration stands out as a transformative strategy for delivering relevant, flexible, and learner-driven content.

2.8 Potential of Social Media-Driven Microlearning

Social media-driven microlearning offers personalized, flexible, and engaging educational experiences. It combines the interactivity of social media with the precision of microlearning, allowing for adaptable, community-oriented environments that support lifelong learning.

The literature proposes that social media serves as a valuable tool for delivering microlearning content. Grevtseva et al. (2017) emphasize its utility in distributing concise, impactful content to improve learning outcomes in higher education. Göschlberger (2016) introduces a social microlearning platform aimed at motivating students to create and share learning activities. Yeoh (2022) explores challenges in preserving content integrity but acknowledges the value of microlearning in boosting social media engagement. Collectively, these works affirm the potential of social media for educational delivery while cautioning against overreliance without institutional support and digital literacy training.

2.9 Summary of the Literature Review

This literature review positions social media-driven microlearning as a progressive, student-centered strategy. By merging the collaborative nature of social media with the

flexibility of microlearning, educators can offer tailored learning experiences that accommodate diverse learning preferences. These environments encourage real-time feedback, community building, gamification, and learner autonomy.

Across the reviewed studies, a recurring theme emerges: the integration of social media and microlearning significantly enhances engagement, collaboration, and retention. This synergy creates meaningful peer interactions and empowers learners to take ownership of their educational journey. Moreover, the reviewed literature consistently supports the claim that this approach improves academic performance and fosters deeper learning outcomes.

The integration of microlearning and social media presents a transformative approach to education. It aligns with the evolving demands of modern learners by promoting personalization, engagement, and inclusivity. The studies reviewed here establish not only the feasibility but also the educational value of this integration, reinforcing its potential to revolutionize traditional teaching frameworks. As education continues to shift toward digital innovation, this model offers a scalable, relevant, and highly effective learning paradigm for the future.

CHAPTER III: METHODOLOGY

3.1 Overview of the research problem

The unprecedented growth of digital technologies and their intersection with pedagogical innovation have fundamentally reshaped the landscape of higher education. Traditional instructional paradigms, once dominated by didactic lectures and static learning environments, are increasingly being challenged by more flexible, student-centred approaches. Within this evolving ecosystem, microlearning and the integration of social media platforms have emerged as powerful educational tools that align with the digital habits, preferences, and cognitive rhythms of today's learners (De Gagne et al., 2019; Manca, 2020). However, despite the increasing adoption of these tools in educational practice, there remains a marked insufficiency in the scholarly understanding of their integrated impact, particularly in structured higher education contexts.

Microlearning—typically defined as the delivery of learning content in small, focused units designed to achieve specific learning outcomes—has gained substantial traction due to its capacity to foster learner autonomy, enhance retention, and mitigate cognitive overload (Kohnke, 2021; Ichiuji et al., 2021). The granular nature of microlearning is posited to align well with cognitive load theory, as it reduces extraneous load and facilitates deeper processing of core material. Its brevity also suits contemporary learners, who are frequently balancing academic, professional, and personal commitments (De Gagne et al., 2019). Yet, while evidence supports its utility in domains such as health professions education and corporate training, empirical validation of microlearning's effectiveness in mainstream higher education remains sparse. Few studies interrogate its use across varied disciplines or evaluate its impact in terms of sustained academic

performance, critical thinking, or long-term knowledge application—metrics that are central to higher education's mission.

Parallel to this, the proliferation of social media platforms has transformed how information is consumed, shared, and constructed in digital spaces. Social media tools such as Facebook, Twitter, Instagram, and TikTok are no longer relegated to informal social use; they are increasingly embedded in educational practice as channels for communication, collaboration, and knowledge dissemination (Lahuerta-Otero et al., 2019; Woods et al., 2019). These platforms offer affordances that extend learning beyond the temporal and spatial constraints of the classroom. They support the construction of virtual communities of practice, facilitate asynchronous peer-to-peer interaction, and promote the co-creation of content—features that resonate with constructivist learning theory (Hrastinski, 2009). Moreover, they appeal to affective and motivational dimensions of learning, which are often underemphasized in traditional education models.

Despite these advantages, the convergence of microlearning and social media remains critically underexplored. While both approaches have been studied in isolation, research examining their integrated application—that is, the intentional use of social media as a delivery vehicle for microlearning content—is limited and largely descriptive. The question of how microlearning modules embedded in social platforms affect core educational outcomes such as engagement, comprehension, knowledge retention, and academic performance has not been examined in a sufficiently rigorous or systematic

manner. There is a tendency in the literature to describe rather than evaluate, and where evaluations do exist, they often suffer from methodological shortcomings such as small sample sizes, lack of control conditions, or an overreliance on self-reported data (Ichiuji et al., 2021; Manca & Ranieri, 2016).

Additionally, there is a theoretical vacuum surrounding the use of social media-driven microlearning. Although learning theories such as cognitive load theory and constructivism are frequently cited in related literature, they are rarely used to systematically inform the design, implementation, or evaluation of interventions. For example, the idea that microlearning reduces cognitive overload is often stated, but seldom tested through empirically grounded research (Kohnke, 2021). Similarly, while social media's capacity to foster interaction aligns with constructivist principles, few studies explore how this interactivity translates into measurable learning gains, particularly when embedded in microlearning contexts.

Furthermore, the individual learner experience within this convergence remains poorly understood. Factors such as digital literacy, motivational orientation, and social media usage habits may all influence how students engage with microlearning content delivered via social platforms. Yet, these variables are frequently overlooked in the literature, creating a gap in understanding how pedagogical efficacy varies across different student populations. Yaseen et al. (2025) highlighted the role of adaptive technologies and personalized feedback mechanisms in enhancing student engagement, yet the potential for social media algorithms to support tailored microlearning remains largely unexplored.

Finally, despite their growing prevalence in higher education, social media platforms are not pedagogically neutral tools. Their algorithms, engagement mechanisms, and content curation strategies are designed primarily for commercial rather than educational purposes. There is a lack of critical engagement with the implications of this design orientation on student attention, cognitive focus, and information retention. For instance, while TikTok has shown promise as a microlearning platform (David et al., 2023), it also poses risks associated with fragmented attention and shallow processing, which may undermine deeper learning goals.

In light of these gaps, there is a compelling need for systematic, theory-driven, and methodologically rigorous research into the integration of microlearning and social media in higher education. Such research should explore not only outcomes but also mechanisms, contextual variables, and learner characteristics that mediate effectiveness. Addressing this problem space is not merely an academic exercise; it has urgent practical relevance as universities increasingly rely on digital solutions to meet the expectations of a generation raised in algorithmic, socially networked environments.

The advent of digital learning innovations in higher education has catalysed the exploration of alternative pedagogical models, particularly those that prioritise flexibility, accessibility, and learner autonomy. Among the most prominent innovations are microlearning and the use of social media for educational purposes. Both have individually attracted significant scholarly attention and have been associated with positive impacts on student engagement, comprehension, and academic achievement (De

Gagne et al., 2019; Hrastinski, 2009). However, despite this growing interest, a conspicuous research gap persists in understanding the combined, synergistic effects of social media-delivered microlearning in formal higher education contexts. Much of the existing literature remains fragmented, exploratory, or anecdotal, thus limiting its utility for guiding evidence-based instructional design or policy formulation.

Microlearning, defined as the delivery of educational content in concise, focused units, has been validated as an effective instructional strategy across numerous domains. Studies have shown that when content is presented in digestible modules, students are more likely to engage with the material, retain information over time, and apply knowledge in practical contexts (Ichiuji et al., 2021; Kohnke, 2021). However, most of this research has been confined to professional training, healthcare education, or highly controlled e-learning environments. These findings, while encouraging, do not necessarily generalise to broader academic disciplines or to the varied pedagogical needs of students in higher education. There remains limited insight into how microlearning functions in disciplines beyond STEM and medicine, particularly in social sciences, humanities, or interdisciplinary studies, where learning objectives often include critical thinking, synthesis, and reflexivity rather than rote content retention.

Similarly, research into the use of social media in education has focused heavily on its role as a communication tool or community-building platform (Rezaei & Ritter, 2018; Lahuerta-Otero et al., 2019). While these functions are undoubtedly valuable, they represent only a narrow slice of the platform's pedagogical potential. The more structured

and intentional use of social media features—such as short-form videos, collaborative annotations, gamified feedback, or interactive polls—for delivering instructional content in microlearning formats is a comparatively under-researched domain. Woods et al. (2019) underscores that students respond positively to interactive social media practices, yet the extent to which these practices translate into measurable learning outcomes has not been rigorously investigated. Furthermore, while some studies have explored the potential of platforms like TikTok or Instagram in informal learning, their formal instructional integration—particularly in alignment with curriculum standards and assessment regimes—remains inadequately addressed.

An additional dimension of the research gap is theoretical underdevelopment. Many studies reference learning theories—such as constructivism, cognitive load theory, or self-determination theory—but often do so superficially or post hoc. For example, the constructivist premise that learning is socially constructed through interaction aligns well with social media's affordances for dialogue and collaboration (Priyamvada, 2023; Hrastinski, 2009). Likewise, cognitive load theory supports the use of microlearning to reduce extraneous load and enhance germane processing (Kohnke, 2021). Yet, few empirical studies systematically evaluate how instructional design choices, particularly within social media-based microlearning, align with these theoretical constructs. The lack of robust theoretical grounding not only weakens the explanatory power of existing studies but also hampers the replication and scalability of findings across contexts.

Moreover, significant methodological limitations plague much of the existing empirical work in this space. Many studies utilise small or convenience samples, rely heavily on self-reported measures of satisfaction or engagement, and rarely employ robust experimental or quasi-experimental designs. Longitudinal data capturing sustained learning gains or behavioural changes post-intervention are exceedingly rare. There is also a paucity of research incorporating control groups, which are essential for establishing causality in instructional interventions. As such, while studies may report positive outcomes, it remains unclear whether these are attributable to the microlearning-social media intervention or to extraneous variables such as novelty effects, instructor enthusiasm, or student motivation.

Equally concerning is the lack of demographic and contextual diversity in the research population. Most studies have been conducted in Western, English-speaking institutions, often at a single university or within a single course. This raises questions about the generalisability of findings to diverse student populations, including those from different cultural, linguistic, or socio-economic backgrounds. The role of digital literacy, in particular, is a critical variable that has not been sufficiently interrogated. While it is often assumed that students are “digital natives,” this generalisation masks significant variations in students' comfort with educational technologies, their ability to critically evaluate content, or their familiarity with platform functionalities.

There is also little research exploring equity implications associated with social media-driven microlearning. For example, access to devices, bandwidth, and private study

environments can significantly influence a student's ability to engage with media-rich content on social platforms. These disparities can be further compounded by algorithmic bias, platform design that prioritises entertainment over education, and the distraction potential of social media interfaces. Without a clearer understanding of these structural inequalities, any widespread implementation of social media-based learning may inadvertently reinforce existing gaps in educational access and attainment.

Finally, while some studies hint at the potential for personalisation and adaptive learning within microlearning delivered via social media (Yaseen et al., 2025), there is little empirical work examining how algorithmic recommendation systems could support or hinder learning outcomes. The role of artificial intelligence in tailoring microlearning content to individual learners' progress, preferences, and behaviours remains largely unexplored, despite the increasing adoption of these technologies in other domains of education.

In summary, the convergence of social media and microlearning offers a promising avenue for pedagogical innovation in higher education. However, the field suffers from fragmentation, theoretical superficiality, and methodological inconsistencies. Future research must address these gaps through rigorously designed, theory-informed, and context-sensitive studies that not only assess outcomes but also interrogate processes. Such research is essential to developing a scalable, inclusive, and pedagogically sound model for social media-driven microlearning in diverse higher education contexts.

3.2 Research Purpose and Questions

The overarching purpose of this research is to critically investigate the role and impact of social media-driven microlearning as a pedagogical strategy in higher education. Amid the ongoing transformation of instructional delivery models and the increasing digitisation of academic environments, this study responds to a timely need for evidence-based frameworks that guide the effective implementation of technology-enhanced learning. Specifically, the research explores how short-form, digitally delivered content—curated and disseminated via social media platforms—affects students' cognitive outcomes, behavioural engagement, and learning experiences in a university context.

This investigation is situated within the broader context of pedagogical innovation, where traditional lecture-based delivery modes are increasingly challenged by the expectations and learning preferences of digitally native student cohorts. Students today demonstrate a strong affinity for mobile, asynchronous, and visually engaging formats of knowledge consumption. Consequently, microlearning—defined as the delivery of educational content in brief, focused segments—has emerged as a promising strategy for increasing learner accessibility, promoting self-directed engagement, and reducing cognitive overload (Kohnke, 2021; De Gagne et al., 2019). Meanwhile, social media platforms offer an existing infrastructure for facilitating real-time interaction, learner autonomy, and digital content delivery.

The central aim of this study is to evaluate the pedagogical utility and efficacy of integrating microlearning with social media platforms in a structured higher education setting. To this end, the research is guided by four primary research questions:

1. **What is the impact of social media-driven microlearning on knowledge retention and comprehension among higher education students?**

   This question explores the cognitive effectiveness of the intervention by examining whether microlearning content delivered via social media supports the accurate recall and understanding of academic concepts over time.

2. **To what extent is social media-driven microlearning effective in achieving educational objectives and improving student learning outcomes in higher education contexts?**

   This question examines the broader instructional value of the intervention, including its relationship to performance indicators such as assessment scores, engagement metrics, and perceived learning gains.

3. **How can the consumable structure of microlearning courses delivered through social media platforms be evaluated to enhance the user experience for students?**

   This question addresses design and usability considerations by exploring how the format, pacing, interactivity, and content layout influence student satisfaction and platform engagement.

4. **What are the key components of a comprehensive quantitative framework for designing, implementing, and evaluating social media-driven**

microlearning initiatives in higher education?

This final question seeks to consolidate findings into a scalable, evidence-based model for educators, instructional designers, and institutions aiming to adopt similar interventions.

In addressing these questions, the study contributes to both theoretical and practical domains. Theoretically, it seeks to extend the application of constructivist learning theory and cognitive load theory to the context of digitally mediated microlearning. Practically, it offers actionable insights and validated instruments that can inform future instructional designs and institutional strategies for blended or fully online learning environments.

By employing a large-scale, quantitative research design, the study also endeavours to fill notable gaps in the current literature, which often privileges qualitative or anecdotal accounts of technology-enhanced learning. In doing so, it reinforces the need for scalable, data-driven frameworks that can be replicated across diverse institutional contexts.

In sum, this research is not merely an exploration of technological novelty, but a structured inquiry into the educational viability, cognitive efficacy, and experiential quality of microlearning interventions delivered through ubiquitous digital platforms. It aims to provide a foundation for more intentional, inclusive, and pedagogically sound integration of social media technologies in the evolving landscape of higher education.

3.3 Operationalisation of Theoretical Constructs

This study investigates the impact of social media-driven microlearning on student engagement, comprehension, retention, experience, and academic performance within a higher education context. Drawing from established learning theories—particularly constructivism and cognitive load theory—the research model incorporates eight theoretical constructs: Platform Familiarity, Content Design, Content Engagement Feature, Engagement, Comprehension, Retention, Student Experience, and Academic Performance. These constructs are operationalised through a combination of self-reported survey instruments, behavioural indicators, and academic outcome data, as outlined below.

To examine these constructs within an authentic educational setting, a six-week microlearning intervention was implemented via a closed Facebook group in a university undergraduate business course. The group served as a digital microlearning hub, where short-form learning activities were delivered asynchronously. Weekly posts followed a structured progression: (1) an introductory video presenting definitions and foundational concepts, (2) content posts reinforcing key ideas, (3) follow-up posts applying concepts to real-world examples, and (4) interactive prompts—quizzes, polls, and open-ended discussion questions—aimed at encouraging student interaction and reinforcing comprehension. Students could engage with content through views, emoji reactions, written comments, and poll responses. The asynchronous design ensured that students could access materials at their own pace, using a variety of devices, thus mirroring the ubiquitous digital engagement habits prevalent among modern learners (Manca, 2020).

Platform Familiarity

Platform Familiarity refers to the extent to which students feel comfortable and confident using the social media platform employed—in this case, Facebook—as a medium for learning. This construct was operationalised through a set of Likert-scale survey items adapted from Manca and Ranieri (2016), assessing students' previous experience with social media like platforms, ease of navigation, and perceived usefulness of the platform for academic purposes. Sample items included "I find it easier to engage with learning content on platforms I am already familiar with" and "I feel comfortable navigating learning platforms that have a design and functionality similar to social media."

Content Design

Content Design captures the clarity, structure, and relevance of the microlearning materials delivered through the Facebook group. This construct was measured through student responses to Likert-scale survey items evaluating the usefulness, clarity, and sequencing of each content element (e.g., videos, infographics, example posts). Items were developed with reference to Kohnke (2021), who emphasised the importance of chunking, visual design, and instructional pacing in microlearning content.

Content Engagement Feature

Content Engagement Feature refers to the degree to which specific platform functions—such as likes, comments, polls, and emoji reactions—contribute to perceived engagement. This construct was operationalised both qualitatively (through student feedback) and

quantitatively, using self-reported Likert items (e.g., “Interactive elements like quizzes or polls make learning more engaging for me”) and behavioural analytics (e.g., frequency of interactions). The operationalisation draws upon frameworks regarding interactivity as a core enabler of learning in social media contexts.

Engagement

Engagement was defined as the degree of behavioural, emotional, and cognitive involvement demonstrated by students during the intervention, following the tripartite model of engagement proposed by Fredricks et al. (2004). Operationalisation involved a modified version of the Student Course Engagement Questionnaire (SCEQ) (Handelsman et al., 2005), supplemented by behavioural metrics such as post views, comment frequency, and participation in polls and quizzes. Survey items assessed emotional engagement (“I feel a sense of accomplishment when I complete learning activities on an engaging platform”) and cognitive engagement (“Interactive activities like quizzes or simulations clarify my understanding of key concepts”).

Comprehension

Comprehension reflects students’ perceived understanding of the microlearning content presented each week. This construct was operationalised through post-intervention survey items adapted from Ichiuji et al. (2021) and De Gagne et al. (2019), which asked students to rate their confidence in explaining concepts covered in the videos and posts. Example items included “I feel confident in my ability to grasp difficult concepts when they are

presented in short, focused activities" and "Interactive activities like quizzes or simulations clarify my understanding of key concepts."

Retention

Retention was operationalised as the ability to recall and apply previously introduced concepts after a delay. This was measured through two short quizzes administered in the weeks following the intervention, assessing recall of definitions and conceptual understanding presented earlier in the Facebook group. Quiz content was directly tied to the weekly posts and followed the approach used by David et al. (2023), who evaluated delayed recall performance in microlearning environments.

Student Experience

Student Experience encapsulated overall satisfaction, perceived utility, and enjoyment of the microlearning process. Drawing on the multidimensional approach outlined by Lahuerta-Otero et al. (2019), this construct was assessed via a composite index derived from Likert-scale items (e.g., "I find the overall learning experience more enjoyable when using social media-like platforms for education," "The posts were interesting and engaging," "I feel more supported in my learning when I can interact with peers and instructors on the platform").

Academic Performance

Academic Performance was operationalised by comparing final assessment scores between students who actively participated in the Facebook group and those who engaged minimally or not at all. Statistical analysis was used to determine any significant differences, controlling for prior academic standing. This operational approach is consistent with methodologies used by Kohnke (2021) and Yaseen et al. (2025) in evaluating the impact of instructional interventions on performance metrics.

All survey items employed a 5-point Likert scale (1 = Strongly disagree to 5 = Strongly agree). Items were adapted from validated instruments where available and piloted with a small group of students to assess clarity and reliability. Cronbach's alpha was used to assess internal consistency of multi-item scales, and descriptive statistics were computed to evaluate item distribution. Behavioural engagement metrics were extracted from Facebook group analytics to triangulate self-reported data.

While constructivist and connectivist learning theories serve as the conceptual foundation for this study—framing how learning is understood in digitally mediated environments—they were not used prescriptively to dictate the design of measurement instruments. Instead, these theories informed the broader pedagogical rationale and interpretive lens of the research. The decision to prioritise empirically validated constructs and existing survey instruments from microlearning and educational technology literature reflects a pragmatic and methodologically rigorous approach. Educational theories, while rich in explanatory power, often lack direct operational guidelines for construct development or item wording, particularly in the context of novel, hybrid modalities such as social

media-driven microlearning. By drawing on previously validated measures and adapting them to this study's digital learning context, the research ensures construct reliability, internal consistency, and empirical comparability—while still grounding the interpretation of findings within established theoretical paradigms. This approach aligns with best practices in educational research, where theory often guides the conceptual framework but empirical literature and methodological precedence shape instrument construction.

The operationalisation of constructs in this study took place within the context of a Facebook-based intervention. However, the design and implementation of these constructs were purposefully constructed to transcend the limitations of any single platform. Facebook was chosen as the delivery environment primarily because of its ubiquity, multi-functionality, and ease of access among the target student population. Importantly, it provided a practical infrastructure for hosting microlearning content in various modalities, including video, infographics, interactive prompts, and discussion-based features. While the data collection—such as engagement analytics, quiz responses, and survey feedback—necessarily reflects the specific functionalities available within the Facebook platform, the constructs themselves were derived from a broader review of microlearning and educational technology literature, with an emphasis on theoretical transferability. For example, constructs such as Platform Familiarity, Content Design, Engagement, and Student Experience were defined in a manner that captures general principles rather than Facebook-specific attributes. Interactive elements like emoji reactions or comment threads, while unique in implementation across platforms, embody a common set of pedagogical

affordances related to feedback, reflection, and social presence. This methodological decision ensures that while Facebook acted as a testing ground, the underlying constructs are applicable to other platforms with similar functional logics. Consequently, the study's findings should be understood not as exclusive to Facebook, but as reflective of a broader typology of social media environments. This design choice reinforces the study's aim to build a scalable, theory-informed framework that can guide educators and instructional designers seeking to apply microlearning strategies across diverse digital ecosystems.

The operationalizations were adapted to the present context for the questionnaire. A five-point Likert scale, from "1 = strongly disagree" to "5= strongly agree," was used throughout to measure the items. All the constructs were operationalized reflectively. "Subjective norm" was operationalized formatively. The following Table 1 shows the operationalization of the 8 constructs of the model.

Table 1: Operationalization of the constructs

Item	
Platform Familiarity	
Plat_Fam1	I find it easier to engage with learning content on platforms I am already familiar with.
Plat_Fam2	Using a platform similar to social media makes learning more intuitive for me
Plat_Fam3	I feel comfortable navigating learning platforms that have a design and functionality similar to social media.

Plat_Fam4	When a learning platform mirrors the layout of apps I regularly use, I learn more efficiently.
Plat_Fam5	I tend to explore more features on a learning platform if its interface feels familiar.
Plat_Fam6	The time it takes me to adapt to a new learning platform depends on how similar it is to platforms I already use.
Content Design	
Con_Des1	Breaking down complex concepts into smaller, digestible chunks improves my understanding of the material.
Con_Des2	Bite-sized learning activities help me retain information more effectively.
Con_Des3	The use of visuals and multimedia in microlearning content enhances my comprehension of complex ideas.
Con_Des4	Interactive content elements (e.g., quizzes, drag-and-drop, clickable visuals) make learning more engaging and memorable.
Con_Des5	I prefer learning materials that adapt to my pace and progress rather than presenting content all at once.
Con_Des6	A clear and consistent layout in learning content helps me stay focused and reduces cognitive overload.
Content Engagement Feature	
Con_Eng_Fea1	Interactive elements like quizzes or polls make learning more engaging for me.

Con_Eng_Fea2	Interactive features such as drag-and-drop activities or matching games make the learning process more enjoyable.
Con_Eng_Fea3	Engagement features on microlearning platforms keep me interested in the learning content
Con_Eng_Fea4	Discussion forums or comment sections on microlearning platforms enhance my ability to engage with the material
Engagement	
Eng1	I feel more involved in the learning process when I can interact with peers or instructors on the platform.
Eng2	Features that promote competition or collaboration enhance my motivation to stay engaged
Eng3	I feel a sense of accomplishment when I complete learning activities on an engaging platform
Comprehension	
Com1	Breaking complex topics into smaller, structured modules improves my understanding.
Com2	I feel confident in my ability to grasp difficult concepts when they are presented in short, focused activities
Com3	Multimedia elements like videos, infographics, and animations enhance my understanding of the material

Com4	Interactive activities like quizzes or simulations clarify my understanding of key concepts
Retention	
Ret1	I find it easier to remember what I've learned when content is presented in small, spaced intervals
Ret2	Frequent quizzes and reviews improve my ability to retain what I've learned.
Ret3	Microlearning helps me recall complex topics by reinforcing key concepts through concise summaries
Ret4	Repetition of key ideas in microlearning activities helps me retain information over time.
Student Experience	
Stu_Exp1	I find the overall learning experience more enjoyable when using social media-like platforms for education.
Stu_Exp2	I feel more supported in my learning when I can interact with peers and instructors on the platform.
Stu_Exp3	The design and features of the platform make learning feel less like a chore and more like a rewarding activity
Stu_Exp4	I feel a sense of accomplishment after completing activities on a well-designed microlearning platform.
Academic Performance	

Aca_Per1	The regular engagement with learning content on the platform has positively impacted my grade
Aca_Per2	I feel more prepared for exams and assignments after using microlearning platforms
Aca_Per3	The ability to review and revisit content on the platform improves my overall academic performance
Aca_Per4	The platform helps me stay consistent with my studies, leading to better outcomes
Aca_Per5	Using microlearning platforms helps me perform better in assessments by improving my understanding of the material

3.4 Research Design & Instrumentation

This study adopts a quantitative, quasi-experimental research design to investigate the effects of a social media-driven microlearning framework on key student learning outcomes in higher education. The purpose of this design is to empirically evaluate the relationships between microlearning implementation via Facebook and eight defined theoretical constructs: Platform Familiarity, Content Design, Content Engagement Features, Engagement, Comprehension, Retention, Student Experience, and Academic Performance.

A quantitative approach is particularly appropriate for this research, as it allows for the systematic measurement and statistical analysis of structured learner responses to a

targeted instructional intervention. This design enables the collection of standardised data through Likert-scale instruments and behavioural metrics, supporting the generalisability and replicability of findings. Furthermore, it aligns with the study's intention to test theoretically grounded hypotheses about the effectiveness of microlearning delivered through digital social environments.

Quasi-Experimental Framework

Due to logistical and ethical constraints common in educational settings, a quasi-experimental design was used in place of a fully randomised controlled trial. All participants were drawn from a single undergraduate business course at an Australian university, where the researcher implemented a six-week microlearning intervention through a closed Facebook group. Participation in the Facebook-based learning activities was encouraged, but not mandatory, thereby allowing for natural variation in engagement levels among students.

While a control group was not formally established, post hoc comparisons were made between students who actively engaged with the intervention (i.e., high-engagement participants) and those who engaged minimally or not at all. This comparison strategy permits exploratory causal inference regarding the effect of intervention exposure on learning outcomes, an approach common to quasi-experimental designs in educational research (Cook & Campbell, 1979).

Intervention Structure and Learning Context

The intervention was designed using microlearning principles rooted in cognitive load theory and digital learning literature (Kohnke, 2021; De Gagne et al., 2019). Over a six-week period, students received weekly content through the Facebook group in the following structured sequence:

1. **Introductory Video** (2–3 minutes) explaining key concepts and definitions in clear, simplified terms.

2. **Content post** reinforcing visual understanding of the week's topic.

3. **Reinforcement Post** applying theoretical concepts to real-world or course-related examples.

4. **Interactive Activities** including quizzes, polls, and discussion prompts to encourage engagement and support knowledge consolidation.

This sequencing was intended to scaffold student learning through low-cognitive-load instruction followed by active reinforcement. Content was designed to be device-agnostic and asynchronous, enabling students to participate flexibly according to their own schedules and access conditions.

Data Collection Instruments

Quantitative data was collected using two primary instruments: a structured post-intervention survey and digital engagement metrics from the Facebook platform.

1. Likert-Scale Survey

Following the completion of the six-week intervention, participants were invited to complete a structured survey comprising 32 closed-ended items. Each item was scored using a 5-point Likert scale ranging from “Strongly Disagree” (1) to “Strongly Agree” (5). The survey was segmented to measure each of the following constructs:

- **Platform Familiarity** — assessing prior experience and comfort using Facebook.

- **Content Design** — evaluating clarity, usefulness, and structure of the learning content.

- **Content Engagement Features** — measuring perceived usefulness of likes, polls, quizzes, and discussion tools.

- **Engagement** — assessing levels of behavioural and cognitive engagement.

- **Comprehension** — gauging perceived understanding of the weekly content.

- **Student Experience** — measuring satisfaction, enjoyment, and platform usability.

All items were adapted from validated academic instruments or derived from construct definitions in the existing literature. Reliability analysis using Cronbach's alpha was performed to confirm internal consistency of subscales, all of which met or exceeded acceptable thresholds ($\alpha \geq 0.7$).

2. Facebook Engagement Analytics

Behavioural data was extracted from the Facebook group to complement survey responses and provide an objective measure of interaction. Tracked indicators included:

- Post views
- Emoji reactions (likes, hearts, etc.)
- Comment counts
- Poll participation
- Quiz completions

These metrics were anonymised and aggregated to maintain student confidentiality. They were used to categorise participants into engagement tiers and to validate patterns reported through self-assessment.

3. Quizzes and Academic Performance

To measure Comprehension and Retention, weekly quizzes (5–7 questions) were embedded into Facebook posts. These assessed immediate understanding of each week's content. A cumulative quiz was administered two weeks after the intervention to assess longer-term retention.

This quantitative research design offers a practical yet rigorous approach for evaluating digital microlearning in a real-world classroom setting. By combining structured learner feedback with behavioural interaction data and academic performance outcomes, the study provides a robust basis for understanding how social media-integrated microlearning environments influence learning effectiveness in higher education.

3.5 Population and sample

The demographic characteristics of the 614 student participants reveal a diverse and balanced sample that enhances the credibility, relevance, and generalizability of the study. In terms of gender distribution, 58.7% of the respondents identified as female, while 41.3% were male. This slight female majority reflects broader enrollment trends in many universities and may carry implications for digital learning preferences, particularly as prior research suggests that female students often report higher levels of self-regulation

and communication engagement in online learning environments. The presence of both genders in relatively balanced proportions also allows for potential gender-based comparative analysis of platform engagement and learning outcomes, which could further enrich the interpretive depth of the study.

The disciplinary distribution of participants across three major schools—Business (32.2%), Communication (34.7%), and Science, Engineering & Technology (33.1%)—demonstrates commendable balance. This ensures that the model is not overly influenced by a specific academic background. Notably, the near-equal representation across faculties strengthens the study's capacity to examine how different educational contexts and cognitive demands might interact with technology-mediated learning, as students from communication backgrounds may be more attuned to media literacy, while science and engineering students may differ in their interaction patterns due to their technical orientation.

The academic year breakdown indicates a well-stratified cohort: first-year (34.0%), second-year (38.0%), third-year (28%). This uniform spread across study levels is methodologically advantageous, as it captures both novice and experienced university learners. Senior students are more likely to have had repeated exposure to institutional digital platforms and formal academic structures, potentially shaping their ability to engage with microlearning systems differently than those in their initial year. Conversely, first-year students might reflect more honest reactions to intuitive design or onboarding

processes, which are critical components in educational platform usability studies. This spread also enables longitudinally inspired insights without the need for panel data.

Prior experience with social media—a construct closely linked to platform familiarity—shows varied levels: 21.1% reported no experience, while 24.7% indicated very high experience. The rest of the participants were evenly spread across low to high categories. This wide range reveals heterogeneity in students' digital social behaviors, which is a key strength of the sample. Since this study explores engagement with learning platforms that may resemble social media interfaces, understanding how different levels of prior exposure influence learning adaptation is essential. It also allows the model to capture how intuitive interface design may compensate for low prior experience, or alternatively, how high familiarity might lead to increased expectations and potential dissatisfaction if the platform lacks advanced interactivity.

While the sample utilised in this study demonstrates commendable internal diversity—with balanced representation across gender, academic year, and disciplinary streams—it is nonetheless important to contextualise the scope and boundaries of its generalisability. All participants were drawn from a single Vietnamese higher education institution, and although the disciplinary breadth across different fields enhances the ecological validity of the findings, it is acknowledged that such institutional specificity imposes constraints on the extent to which the results can be extrapolated to broader populations. Specifically, variations in institutional culture, curriculum design, digital infrastructure, and student demographic composition across different universities—particularly in non-Western or

non-English-speaking contexts—may influence how social media-driven microlearning is perceived and enacted. Consequently, the empirical insights derived from this sample should be interpreted as contextually situated, rather than universally representative.

That said, the research design deliberately embraced heterogeneity within the sample to support analytical generalisability, or what is often termed naturalistic transferability in educational research. This form of generalisability does not rely on statistical representativeness, but rather on the provision of sufficient contextual detail and demographic breadth to allow readers and practitioners to assess the relevance of the findings to their own settings. The distribution of students across multiple faculties and year levels offers a valuable cross-section of cognitive maturity, digital literacy, and disciplinary engagement, which strengthens the internal robustness of the study and its relevance to comparable institutional environments. Moreover, the inclusion of students with varying levels of prior social media familiarity contributes to a more nuanced understanding of how platform experience may mediate engagement and learning outcomes—an important consideration for future adaptation of microlearning strategies.

In sum, while this study does not claim universal generalisability, it contributes valuable insight into the dynamics of social media-driven microlearning within a digitally mature, culturally diverse, higher education cohort. Future research employing multi-institutional

or cross-national samples would be instrumental in validating and extending the framework proposed herein, thereby enhancing its applicability across varied educational contexts and student populations

In terms of learning style, the distribution again reflects significant diversity. Read/write learners (28.0%) were the most prominent, followed closely by visual (26.4%), kinesthetic (22.9%), and auditory (22.7%) learners. This variation affirms that a one-size-fits-all approach to content delivery is suboptimal and supports the theoretical rationale for microlearning design, which favors multimodal engagement. The relatively even spread indicates that the platform's effectiveness will depend heavily on its capacity to cater to this learning diversity through flexible design features, such as visualizations, text-heavy content, interactive elements, and audio-visual materials.

A similarly nuanced distribution is found in technological proficiency. While 15.3% reported very high proficiency, a substantial proportion (22.4%) indicated no proficiency, with others evenly split across low to high levels. This range underscores the necessity for inclusive platform design that accommodates not just digital natives but also less tech-savvy users. Importantly, the presence of digitally less confident learners in the sample helps prevent technological elitism in analysis and ensures the findings remain relevant for broader educational implementation, especially in resource-constrained or transitional contexts where digital literacy may be uneven.

Lastly, the data on primary learning devices further reflects the evolving landscape of higher education learning modalities. A quarter of the respondents use laptops (22.7%) or desktop computers (25.3%), while the other half primarily engage with tablets (26.0%) and smartphones (26.0%). This nearly equal distribution between traditional and mobile devices underscores the importance of device-responsive learning environments. The relatively high dependence on mobile devices suggests that content must be optimized for small screens, short bursts of attention, and varied access environments—key design tenets of microlearning. Moreover, the popularity of smartphones and tablets implies that mobile-first design is not just a convenience but a necessity for engaging learners where they already are.

In conclusion, the demographic distribution of this sample highlights a well-balanced and inclusive representation across gender, academic disciplines, study levels, digital backgrounds, learning preferences, technological capabilities, and device use. This rich heterogeneity not only validates the robustness of the dataset but also reflects the multidimensional realities of modern student populations. It ensures that the findings can meaningfully inform the design and delivery of microlearning platforms that are pedagogically sound, technologically inclusive, and contextually adaptable. The demographic analysis thus not only serves as a backdrop but is integral to interpreting the complex interrelationships explored in the study's structural model.

3.6 Participant selection

The participants for this research were drawn from a large cohort of undergraduate students enrolled at a Vietnamese university. The course in question formed a core component of the business curriculum and was delivered across multiple classes and sections during a single academic semester. This setting provided an authentic and pedagogically relevant environment in which to implement and evaluate a digitally mediated microlearning intervention aligned with contemporary educational needs.

The total number of students enrolled across the multiple classes exceeded 1,000; however, the research component was structured around voluntary participation, in alignment with ethical research standards. From this pool, a total of 614 students voluntarily participated in the study by responding to a structured post-intervention survey. This substantial response rate not only reflects high levels of student interest in the microlearning format but also provides a robust data set suitable for quantitative analysis.

Participation in the microlearning intervention was similarly non-compulsory. Students were invited to join a closed Facebook group where the six-week microlearning experience was hosted. The digital intervention was introduced as a supplementary instructional tool, with the aim of supporting lecture content rather than replacing it. No academic credit or grading incentives were tied to participation. Students were explicitly informed that their involvement in the Facebook-based learning activities—and in the research component—was entirely voluntary, and that non-participation would have no adverse academic consequences.

Recruitment procedures included brief in-class presentations and online announcements disseminated through the university's learning management system and communication channels. Students who elected to join the Facebook group were provided with access to a structured microlearning sequence, which included short explanatory videos, infographics, reinforcement posts, and interactive elements such as polls, quizzes, and discussion prompts. Following the conclusion of the six-week intervention, students were invited to complete a structured survey evaluating their experience and perceptions of the microlearning initiative.

The participant selection approach adopted in this study corresponds to a self-selected, convenience sampling strategy, a method widely used in educational research where interventions occur in live instructional settings (Creswell & Creswell, 2018). While this approach does not enable randomisation or control for all potential confounding variables, it offers substantial ecological validity, ensuring that the findings are grounded in realistic classroom dynamics and student behaviours. This enhances the study's practical relevance for educators seeking to implement similar microlearning strategies within comparable institutional environments.

All research procedures were conducted in strict accordance with institutional ethical protocols and the National Statement on Ethical Conduct in Human Research (NHMRC, 2018). Informed consent was obtained from all participants prior to data collection, and participation was limited to students aged 18 or older. Data confidentiality and anonymity

were maintained throughout the research process, with all survey responses de-identified prior to analysis.

In sum, the participant selection strategy adopted in this study reflects a balance between methodological rigour and practical feasibility. By recruiting a large, voluntary sample from within an active undergraduate business course at a Vietnamese university, the research captures a realistic snapshot of how social media-driven microlearning interventions are received and engaged with in authentic learning environments.

3.7 Data Collection Procedures

The data for this study was collected through a cross-sectional survey conducted offline between September and November, 2024. The survey instrument comprised 39 items, including 7 demographic questions and 32 items corresponding to the study's latent constructs. On average, it required approximately 10 minutes to complete. The questionnaire began with an introductory statement outlining the purpose of the study and assurances regarding the anonymity and confidentiality of responses, followed by a concise explanation of the research context on the second page. The demographic section aimed to capture key background information about respondents, including gender, faculty or field of study, year of enrollment, prior exposure to social media platforms, preferred learning style, level of technological competence, and the primary device used for learning activities.

The main portion of the questionnaire was devoted to the measurement of eight latent constructs via 32 operationalized indicators. An initial total of 614 responses was received. However, data screening procedures were applied to ensure the integrity and quality of the dataset. Following recommendations from Hair et al. (2022), all submissions with more than 25% missing values were excluded. Additionally, cases identified as having overly rapid response behavior, which may suggest disengaged or inattentive participation (Leiner, 2019), were removed. After these exclusions, the final sample comprised 450 valid responses, each with a complete set of data points.

To address any minor instances of missing data within this retained sample, SmartPLS version 3.3.3 was used to impute missing values through mean replacement (Hair et al., 2017). This preprocessing step ensured the dataset met the requirements for variance-based structural equation modeling while maintaining consistency and comparability across cases. Overall, the methodological rigor applied in data collection and cleaning contributed to the reliability and robustness of the subsequent model estimation and hypothesis testing.

3.8 Data Analysis

A variance-based structural equation modeling approach (PLS-SEM) was employed in this study due to its strength in exploratory research and theory development contexts. Unlike covariance-based SEM, PLS-SEM is particularly suited for handling complex models with multiple constructs and is less constrained by distributional assumptions or sample size requirements (Hair et al., 2017). It is especially advantageous when the primary objective is prediction rather than theory confirmation. The PLS-SEM framework consists of two

interrelated components: the structural model (inner model), which represents the hypothesized relationships between latent variables, and the measurement models (outer models), which link observed indicators to their corresponding latent constructs. Each indicator is uniquely associated with a single construct, which ensures clarity in the reflective or formative specification of measurement.

The research model developed for this study aimed to predict two key outcomes—student experience and academic performance—both of which are central in evaluating the effectiveness of microlearning environments. The model incorporates eight latent constructs and defines thirteen structural paths, indicating a considerable degree of complexity. Such a design reflects the multidimensional and interactive nature of modern learning platforms but also poses challenges in terms of model identification and interpretability. Importantly, the model includes both formative and reflective constructs, a distinction that requires careful theoretical justification and statistical handling, as misspecification can lead to biased parameter estimates. As outlined in Table 1, two constructs were measured formatively and six reflectively, aligning with established best practices in model specification.

The analysis was conducted using SmartPLS version 3.3.3 (Sarstedt et al., 2021), a software widely recognized for its capacity to support advanced PLS-SEM techniques. While PLS-SEM facilitates flexible model testing and is robust against non-normal data, it is not without limitations. The method emphasizes prediction and variance explanation over goodness-of-fit, and as such, critical attention must be given to the interpretive depth

of path coefficients, measurement reliability, and the validity of constructs. Therefore, results derived from PLS-SEM must be contextualized within a broader understanding of the research objectives and the theoretical grounding of the constructs involved.

Descriptive analyses

The first analysis was conducted at the item level, with the objective of identifying abnormalities or inconsistencies across responses. Descriptive statistics confirmed that the full Likert scale range (1–5) was utilized for all items, suggesting adequate variance and meaningful participant engagement. This distribution indicates that respondents were not exhibiting response bias, such as central tendency or acquiescence bias, thereby supporting the reliability of the data collected.

Table 2: Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pla_Fam1	450	1	5	3.37	.950
Pla_Fam2	450	1	5	3.40	.920
Pla_Fam3	450	1	5	3.46	.920
Pla_Fam4	450	1	5	3.64	.854
Pla_Fam5	450	1	5	3.28	.949
Pla_Fam6	450	1	5	3.61	.890
Con_Des1	450	1	5	3.46	.910
Con_Des2	450	1	5	3.48	.915
Con_Des3	450	1	5	3.54	.898
Con_Des4	450	1	5	3.01	1.416

Con_Des5	450	1	5	3.74	.811
Con_Des6	450	1	5	3.38	.935
Con_Eng_Fea1	450	1	5	2.43	.918
Con_Eng_Fea2	450	1	5	2.40	.953
Con_Eng_Fea3	450	1	5	2.22	.801
Con_Eng_Fea4	450	1	5	2.27	.897
Eng1	450	1	5	2.74	.817
Eng2	450	1	5	2.88	.895
Eng3	450	1	5	2.73	.875
Com1	450	2	5	3.96	.666
Com2	450	1	5	3.81	.725
Com3	450	1	5	3.87	.752
Com4	450	1	5	3.91	.688
Ret1	450	1	5	4.00	.749
Ret2	450	1	5	3.94	.745
Ret3	450	1	5	3.94	.764
Ret4	450	1	5	4.00	.764
Stu_Exp1	450	1	5	3.84	.777
Stu_Exp2	450	1	5	3.84	.795
Stu_Exp3	450	1	5	3.72	.804
Stu_Exp4	450	1	5	3.76	.792
Aca_Per1	450	1	5	2.63	.959
Aca_Per2	450	1	5	3.22	.952
Aca_Per3	450	1	5	2.50	.977
Aca_Per4	450	1	5	2.69	1.021
Aca_Per5	450	1	5	2.75	1.027
Valid N (listwise)	450				

In the domain of Platform Familiarity, learners demonstrated moderate agreement (M = 3.28–3.64), indicating a positive orientation toward platforms that resemble familiar or social media-like environments. While this affirms the role of interface familiarity in reducing cognitive friction, the relatively middling scores suggest that familiarity alone does not inherently translate to engagement or learning effectiveness. The highest-rated item (Pla_Fam4: M = 3.64) reflects a preference for intuitive design, yet this does not appear to cascade meaningfully into other outcome constructs such as academic performance or engagement, suggesting a superficial rather than substantive benefit of interface mimicry. Standard deviations ranged from 0.854 to 0.950, reflecting moderate agreement among participants and indicating that most learners share a similar preference for familiar design interfaces.

Content Design yielded relatively favorable ratings, particularly for adaptive pacing (Con_Des5: M = 3.74, SD = 0.811) and multimedia-supported comprehension (Con_Des3: M = 3.54). However, a significant outlier was observed in Con_Des4 (SD = 1.416), the highest standard deviation across the entire dataset. This item, focusing on interactive content elements such as quizzes and drag-and-drop features, reveals a polarized reaction. Some learners find interactivity beneficial, while others perceive it as distracting or cognitively taxing. This finding problematizes the commonly held assumption in edtech discourse that interactive features inherently enhance engagement. Instead, it suggests the necessity of design intentionality, where interactivity serves specific pedagogical purposes and adapts to learner variability, rather than being applied uniformly.

The issue becomes even more evident in the Content Engagement Features construct, which recorded the lowest mean scores across the dataset (M = 2.22–2.43), with moderate standard deviations (approximately 0.80–0.95). Despite being explicitly designed to foster user interaction and motivation, elements like polls, games, and discussion prompts were met with evident skepticism. This may reflect poor implementation, misalignment with learner expectations, or what can be termed engagement fatigue—where learners become disengaged by artificial or performative interactions that fail to contribute meaningfully to learning. Importantly, the moderate variability across these low scores suggests inconsistency in how learners perceive engagement tools, possibly influenced by prior digital experiences or differences in learning preferences.

The Engagement construct showed slightly higher means (M = 2.73–2.88) with standard deviations ranging from 0.817 to 0.895. These values reflect a broader consensus on underperformance. Participants largely aligned in their muted perception of how engaged they felt, suggesting that the platform fails to activate motivational or emotional dimensions effectively. Unlike Content Engagement Features, where perceptions varied, the low variability in Engagement implies a consistent design failure. This points to a critical challenge: while the platform includes features intended to enhance engagement, it may lack the relational or social components—such as peer interaction, instructor presence, or collaborative learning—that are more likely to drive meaningful engagement, as supported by socio-constructivist learning theories.

In contrast, the Comprehension (M = 3.81–3.96) and Retention (M = 3.94–4.00) constructs emerged as clear strengths. Both domains exhibited high means and low standard deviations (ranging from 0.66 to 0.76), indicating that learners not only perceived these features positively but did so with a high degree of consensus. These results suggest that microlearning, when structured effectively and reinforced through repetition and multimedia support, is well-suited for delivering clear, memorable content. These findings validate the core pedagogical promise of microlearning: reduced cognitive load, improved clarity, and stronger memory retention.

The Student Experience construct followed a similar trend (M = 3.72–3.84, SD ≈ 0.77–0.80), indicating that learners found the platform enjoyable and supportive. The tight variability further confirms a shared sense of satisfaction. However, these affective and cognitive gains did not translate proportionally into perceived academic value. The Academic Performance construct showed the widest range of scores (M = 2.50–3.22) and the highest variability (SD ≈ 0.95–1.03). While some learners perceived improved preparedness and performance, others expressed doubt about the platform's influence on formal academic outcomes. This divergence likely reflects contextual differences in course

integration, assessment alignment, or even institutional recognition of microlearning as a valid academic tool.

In sum, the inclusion of standard deviation deepens the interpretation of the platform's performance. Low variability in high-scoring constructs such as comprehension, retention, and user experience confirms design coherence and instructional effectiveness in these core areas. Conversely, high variability in low-scoring constructs—particularly content engagement features and academic performance—suggests pedagogical misalignment and learner segmentation that have yet to be addressed. This data does not simply tell us what works or fails; it illuminates where design improvements are most urgent and where learner expectations are most fragmented. Going forward, a more adaptive, socially grounded, and curriculum-integrated design approach will be essential to translate positive experiences into measurable academic gains.

3.9 Evaluation of the measurement model

The measurement model tested how well the items reflected the hypothetical construct. The reflective and formative constructs were analyzed separately. The model contained six reflective operationalized constructs and two formative operationalized constructs. The evaluation of the reflective constructs was based on internal consistency reliability, convergence validity, and discriminant validity. The formative constructs were evaluated on the multicollinearity and content validity. To account for static significances, bootstrapping was applied as a nonparametric procedure in SmartPLS. Random

subsamples were drawn from the dataset to ensure the stability of the results. The bias-corrected and accelerated (BCa) bootstrap was chosen. This corrects for bias and skewness in the bootstrap distribution and results in narrow intervals (Efron, 1987). A two-sided significance test with a significance level of 0.1 was chosen.

Quality assessment of reflective operationalized constructs

In general, the first step in assessing the quality of reflective constructs is to examine content validity. This ensures that the items capture the meaning of the construct. Since the operationalization of the constructs of this study was based on already validated items, a sufficient content validity could be assumed and the researcher could directly proceed to the indicator reliability. This was based, among other things, on the level of the loadings of the individual items and their significances. The loading needed to be greater than 0.7 and smaller than 0.95.

Table 3: Structural Path Coefficients, Standard Deviations, T-statistics, and P-values from Bootstrapping Analysis

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Com -> Aca_Per	0.188	0.187	0.051	3.660	0.000

Com -> Stu_Exp	0.298	0.297	0.061	4.910	0.000
Con_Des -> Com	0.408	0.409	0.046	8.959	0.000
Con_Des -> Eng	0.329	0.330	0.041	7.978	0.000
Con_Des -> Ret	0.431	0.432	0.046	9.354	0.000
Con_Eng_Fea -> Com	0.103	0.106	0.047	2.174	0.030
Con_Eng_Fea -> Eng	0.261	0.260	0.047	5.522	0.000
Con_Eng_Fea -> Ret	0.120	0.117	0.040	3.030	0.003
Eng -> Aca_Per	0.204	0.209	0.046	4.420	0.000
Eng -> Stu_Exp	0.092	0.095	0.041	2.257	0.024
Pla_Fam -> Eng	0.170	0.173	0.048	3.552	0.000
Ret -> Aca_Per	0.151	0.152	0.044	3.463	0.001
Ret -> Stu_Exp	0.412	0.409	0.055	7.520	0.000

The structural equation modeling results provide strong empirical support for the hypothesized relationships among key constructs in the microlearning platform. All model paths were statistically significant ($p < 0.05$), suggesting robust interconnections between learner perceptions of design, comprehension, engagement, and outcomes. Content Design (Con_Des) emerged as the most influential construct, exerting strong positive effects on Comprehension (Com; $\beta = 0.408$, $t = 8.959$), Engagement (Eng; $\beta = 0.329$, $t = 7.978$), and particularly Retention (Ret; $\beta = 0.431$, $t = 9.354$). This indicates that well-structured microlearning content—such as modular breakdowns, multimedia use, and adaptive pacing—not only supports learner understanding but also facilitates deeper cognitive

processing and memory consolidation. Furthermore, Comprehension itself significantly contributed to both Academic Performance (Aca_Per; $\beta = 0.188$, $t = 3.660$) and Student Experience (Stu_Exp; $\beta = 0.298$, $t = 4.910$), suggesting that when learners grasp concepts clearly, they are more likely to enjoy the learning process and perceive academic benefit.

Retention was also found to be a significant mediator, positively influencing both Academic Performance ($\beta = 0.151$, $t = 3.463$) and Student Experience ($\beta = 0.412$, $t = 7.520$). These results reinforce the idea that learners value content that not only informs but is also retained and applicable, aligning with the core principles of microlearning. Engagement, while positively linked to Academic Performance ($\beta = 0.204$, $t = 4.420$) and Student Experience ($\beta = 0.092$, $t = 2.257$), demonstrated smaller effect sizes. This suggests that emotional or motivational engagement alone may be insufficient without corresponding cognitive gains from design and comprehension. Platform Familiarity (Pla_Fam) had a modest but significant effect on Engagement ($\beta = 0.170$, $t = 3.552$), indicating that familiarity with interface design contributes to user comfort and initial motivation but does not independently drive learning success.

Interestingly, Content Engagement Features (Con_Eng_Fea)—which include interactive tools like quizzes, drag-and-drop exercises, and discussion prompts—had only minor impacts on Comprehension ($\beta = 0.103$, $t = 2.174$), Engagement ($\beta = 0.261$, $t = 5.522$), and Retention ($\beta = 0.120$, $t = 3.030$). This highlights a critical distinction: while such features may offer short-term interaction, they do not necessarily enhance core learning outcomes unless they are pedagogically embedded. The standard deviations for all path coefficients

were low (ranging from 0.040 to 0.061), underscoring the consistency and stability of the estimated relationships across bootstrapped samples.

In summary, the findings emphasize that Content Design is the most powerful and reliable predictor of successful learning experiences in microlearning platforms, affecting not only what learners understand and remember but also how they engage and perceive value. Comprehension and Retention act as crucial mediators between design and learner outcomes, while Platform Familiarity and engagement tools play secondary roles. The model supports a shift in design priorities—from superficial engagement mechanics to deeper instructional coherence and learning integration.

Table 4: Construct Reliability and Convergent Validity Assessment (Cronbach's Alpha, Composite Reliability, and AVE for Each Construct)

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Aca_Per	0.856	0.861	0.896	0.634
Com	0.888	0.889	0.922	0.748
Con_Des	0.916	0.918	0.938	0.751
Con_Eng_Fea	0.915	0.918	0.940	0.796
Eng	0.825	0.828	0.896	0.741
Pla_Fam	0.941	0.943	0.953	0.772
Ret	0.934	0.938	0.953	0.835
Stu_Exp	0.933	0.936	0.952	0.834

The measurement model demonstrates strong reliability and convergent validity across all latent constructs included in the study. Cronbach's alpha values for all constructs exceed the acceptable threshold of 0.70, indicating a high level of internal consistency. The lowest value is observed for Engagement (0.825), while the highest is for Platform Familiarity (0.941), reflecting excellent item coherence within each construct. These findings are corroborated by the composite reliability values (rho_a and rho_c), all of which range from 0.861 to 0.953. These values not only meet but surpass the recommended threshold of 0.70, and in most cases exceed the more stringent criterion of 0.80, further confirming the measurement scales' reliability.

In addition to reliability, the model exhibits strong convergent validity. The Average Variance Extracted (AVE) values for all constructs are well above the conventional cutoff of 0.50, indicating that a substantial proportion of variance in the observed indicators is accounted for by their respective latent variables. The AVE values range from 0.634 for Academic Performance to 0.835 for Retention. These results suggest that the observed variables are good representations of their underlying constructs, with minimal error variance. Notably, constructs such as Retention and Student Experience report particularly high AVE scores (0.835 and 0.834 respectively), underscoring the strong coherence between these constructs and their indicators.

Taken together, the high values across Cronbach's alpha, composite reliability, and AVE metrics confirm that the measurement model is both psychometrically sound and theoretically robust. This provides a solid foundation for interpreting the structural

relationships tested in the subsequent analysis, ensuring that the latent constructs are measured with precision and internal consistency.

Table 5:

	Aca_Per	Com	Con_Des	Con_Eng_Fea	Eng	Pla_Fam	Ret	Stu_Exp
Aca_Per1	0.759							
Aca_Per2	0.793							
Aca_Per3	0.784							
Aca_Per4	0.796							
Aca_Per5	0.846							
Com1		0.849						
Com2		0.876						
Com3		0.841						
Com4		0.893						
Con_Des1			0.825					
Con_Des2			0.891					
Con_Des3			0.890					
Con_Des5			0.898					
Con_Des6			0.825					
Con_Eng_Fea1				0.878				
Con_Eng_Fea2				0.888				
Con_Eng_Fea3				0.906				
Con_Eng_Fea4				0.896				
Eng1					0.832			
Eng2					0.898			
Eng3					0.852			
Pla_Fam1						0.837		
Pla_Fam2						0.879		
Pla_Fam3						0.876		
Pla_Fam4						0.930		
Pla_Fam5						0.837		
Pla_Fam6						0.910		
Ret1							0.901	
Ret2							0.939	
Ret3							0.918	
Ret4							0.896	
Stu_Exp1								0.922
Stu_Exp2								0.926
Stu_Exp3								0.856
Stu_Exp4								0.945

This table presents outer loadings of individual measurement items onto their respective latent constructs and is used to assess indicator reliability as part of reflective measurement model evaluation in PLS-SEM (Partial Least Squares Structural Equation Modeling). Each

value represents how strongly an observed item (e.g., Aca_Per1) loads onto its corresponding construct (e.g., Academic Performance).

All outer loadings in this table are above the widely accepted threshold of 0.70, which indicates strong indicator reliability. This means that each item shares more variance with its associated construct than with error, confirming that the items are good representatives of their latent variables. In fact, many items show extremely strong loadings above 0.85 or even 0.90, indicating excellent alignment between indicators and constructs.

For example, Academic Performance (Aca_Per) items range from 0.759 to 0.846, confirming that each item contributes meaningfully to the construct. Comprehension (Com) items load between 0.841 and 0.893, while Content Design (Con_Des) items also show strong and consistent loadings (e.g., Con_Des3 = 0.890, Con_Des5 = 0.898), reinforcing prior evidence of this construct's measurement robustness. Content Engagement Features (Con_Eng_Fea) items exceed 0.87, with some values over 0.90 (e.g., Con_Eng_Fea3 = 0.906), indicating exceptionally high internal consistency.

Likewise, Engagement (Eng) items range from 0.832 to 0.898, and Platform Familiarity (Pla_Fam) items show loadings from 0.837 to 0.930, suggesting strong reflective relationships. Retention (Ret) items are among the highest, with loadings from 0.896 to 0.939, highlighting that the construct is especially well-captured by its indicators. Finally, Student Experience (Stu_Exp) items also demonstrate high reliability, with loadings between 0.856 and 0.945.

Overall, the high outer loading values across all constructs indicate that the items are reliable and suitable for continued use in the structural model. These results provide strong support for indicator reliability and contribute to the validity of the overall measurement model.

Table 6: Discriminant Validity Assessment Using Fornell-Larcker Criterion

	Aca_Per	Com	Con_Des	Con_Eng_Fea	Eng	Pla_Fam	Ret	Stu_Exp
Aca_Per	0.796							
Com	0.303	0.865						
Con_Des	0.266	0.434	0.866					
Con_Eng_Fea	0.351	0.205	0.249	0.892				
Eng	0.308	0.275	0.408	0.359	0.861			
Pla_Fam	0.068	0.105	0.077	0.091	0.219	0.879		
Ret	0.294	0.390	0.461	0.228	0.345	0.110	0.914	
Stu_Exp	0.207	0.483	0.350	0.231	0.316	0.150	0.559	0.913

This table presents the Fornell-Larcker criterion, a widely used method for assessing discriminant validity in reflective measurement models. Discriminant validity tests whether constructs that are supposed to be unrelated are actually distinct. According to the Fornell-Larcker criterion, the square root of the AVE of each construct (shown in the diagonal, in green) must be greater than its correlations with any other construct (the off-diagonal values in the same row and column).

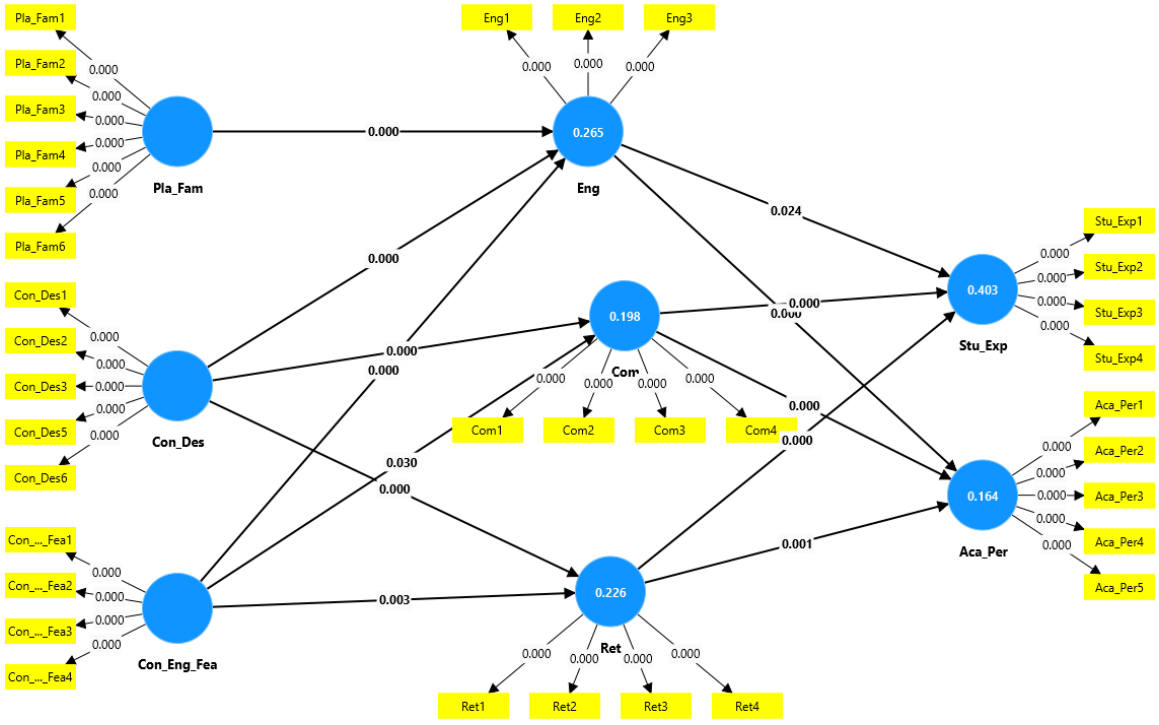
In this table, all constructs satisfy the Fornell-Larcker criterion. For example, the square root of the AVE for Academic Performance (Aca_Per) is 0.796, which is higher than its correlations with any other construct (e.g., Com = 0.303, Con_Des = 0.266, etc.). Similarly, the square root of AVE for Comprehension (0.865) is higher than its correlations with other constructs, including its highest correlation with Student Experience (0.483). This pattern

holds consistently across all constructs—Content Design (0.866), Content Engagement Features (0.892), Engagement (0.861), Platform Familiarity (0.879), Retention (0.914), and Student Experience (0.913)—each showing a greater diagonal value than the off-diagonal correlations in the same row and column.

The fact that no off-diagonal correlation exceeds the corresponding square root of AVE provides strong evidence that each latent variable captures a unique construct and does not overlap significantly with others. This supports the discriminant validity of the measurement model, meaning that each construct is empirically distinct and that the model avoids multicollinearity issues. Moreover, the relatively moderate to low correlations between constructs (most below 0.50) reinforce the conceptual distinction among constructs such as engagement, comprehension, and academic performance.

In conclusion, the Fornell-Larcker criterion results confirm that discriminant validity is established for all constructs in the model. Each construct is shown to be empirically distinct, allowing for meaningful interpretation of the structural paths in the model.

Figure 1: Bootstrapping Results of the Structural Model



The bootstrapping results of the structural model provide strong empirical support for the hypothesized relationships among the constructs in the study. The R^2 values indicate the proportion of variance explained by the model for each endogenous variable. Student Experience has the highest R^2 value at 0.403, suggesting that approximately 40.3% of its variance is explained by Comprehension, Engagement, and Retention. Academic Performance has a lower R^2 of 0.164, indicating a more modest level of explanation, while Engagement (0.265), Comprehension (0.198), and Retention (0.226) are moderately explained by their respective predictors. These results confirm that the model captures a meaningful portion of the variance in key learning outcomes, particularly for student perceptions of their experience.

All path relationships in the model are statistically significant, as evidenced by the bootstrapped p-values, most of which are below 0.001. This underscores the reliability and strength of the structural paths. Content Design demonstrates a central and influential role within the model, exerting significant direct effects on Comprehension, Engagement, and Retention, with all corresponding p-values equal to 0.000. This finding reinforces the importance of well-structured and pedagogically sound content in shaping both cognitive and affective learner outcomes. Content Engagement Features also significantly impact Comprehension ($p = 0.030$), Engagement ($p = 0.000$), and Retention ($p = 0.003$), though the effects are somewhat less pronounced. Platform Familiarity significantly influences Engagement ($p = 0.000$), suggesting that ease of use and interface recognition play a supporting role in facilitating learner involvement.

Regarding outcomes, Comprehension, Retention, and Engagement all significantly predict Academic Performance, with p-values of 0.000, 0.001, and 0.024 respectively. This indicates that learners' understanding and ability to retain information are critical predictors of their perceived academic success, while engagement plays a complementary, though slightly weaker, role. Similarly, Student Experience is significantly predicted by Comprehension, Retention, and Engagement, highlighting that both cognitive mastery and emotional involvement contribute to positive learning perceptions.

In sum, the bootstrapping results validate the structural model, with statistically significant paths and meaningful explanatory power across constructs. Content Design emerges as the foundational driver of learning processes, affecting all downstream variables either directly

or indirectly. The model suggests a cohesive learning environment in which instructional design, content interactivity, and platform familiarity together shape learners' comprehension, motivation, and ultimately their academic outcomes and satisfaction with the learning experience.

Table 8: Multicollinearity Assessment Using Variance Inflation Factors (VIF)

	Aca_Per	Com	Con_Des	Con_Eng_Fea	Eng	Pla_Fam	Ret	Stu_Exp
Aca_Per								
Com	1.211							1.211
Con_Des		1.066			1.070		1.066	
Con_Eng_Fea		1.066			1.072		1.066	
Eng	1.166							1.166
Pla_Fam					1.012			
Ret	1.270							1.270
Stu_Exp								

This table presents the multicollinearity statistics (specifically, Variance Inflation Factors—VIFs) for the predictor constructs in your structural model. VIF values are used to assess the degree of multicollinearity among independent variables. In general, VIF values below 3.3 are considered acceptable in PLS-SEM (and more conservative thresholds suggest a maximum of 5.0 or even 10.0 for traditional regression). Lower VIFs indicate less risk of multicollinearity, meaning the constructs are not redundant or overly overlapping.

In this model, all VIF values fall between 1.012 and 1.270, which are well below all standard thresholds, indicating no multicollinearity concern among the predictor constructs. For instance, the highest value (1.270) is observed for Retention (Ret) in relation to Academic Performance (Aca_Per) and Student Experience (Stu_Exp). This is

still very low and suggests that Retention contributes unique variance to these outcomes. Similarly, Engagement (Eng) has VIF values of 1.070–1.166 when predicted by Content Design and Content Engagement Features, again showing no redundancy in explanatory power.

Moreover, constructs such as Platform Familiarity (Pla_Fam) (VIF = 1.012) and Comprehension (Com) (VIF = 1.066–1.211) show consistently low VIFs across models, reaffirming that the predictors in the model are distinct and provide non-overlapping information to their corresponding dependent constructs.

In conclusion, the multicollinearity diagnostics indicate that the model's predictors are statistically independent of each other, satisfying one of the essential assumptions for reliable path estimation in SEM. The low VIF values across all constructs support the robustness and interpretability of the structural relationships in the model.

Table 9: Effect Size (f^2) Analysis of Structural Model Relationships

	Aca_Per	Com	Con_Des	Con_Eng_Fea	Eng	Pla_Fam	Ret	Stu_Exp
Aca_Per								
Com	0.035							0.123
Con_Des		0.195			0.138		0.226	
Con_Eng_Fea		0.012			0.086		0.018	
Eng	0.043							0.012
Pla_Fam					0.039			
Ret	0.021							0.224
Stu_Exp								

The f-square effect size analysis provides insight into the relative impact of each independent variable on the dependent constructs within the structural model. According

to established benchmarks, an f-square value of 0.02 indicates a small effect, 0.15 a medium effect, and 0.35 a large effect. The values in this matrix reveal that content design exerts a substantial influence across multiple learning outcomes. It shows a medium effect on comprehension ($f^2 = 0.195$) and a similarly strong effect on retention ($f^2 = 0.226$), suggesting that how content is structured and delivered plays a significant role in enhancing both learners' understanding and memory. The effect of content design on engagement ($f^2 = 0.138$) is just below the threshold for a medium effect, indicating a relevant contribution to affective involvement. However, its direct influence on student experience is minimal ($f^2 = 0.012$), reinforcing the notion that while content design drives internal processing, its impact on learner satisfaction is likely mediated through other constructs.

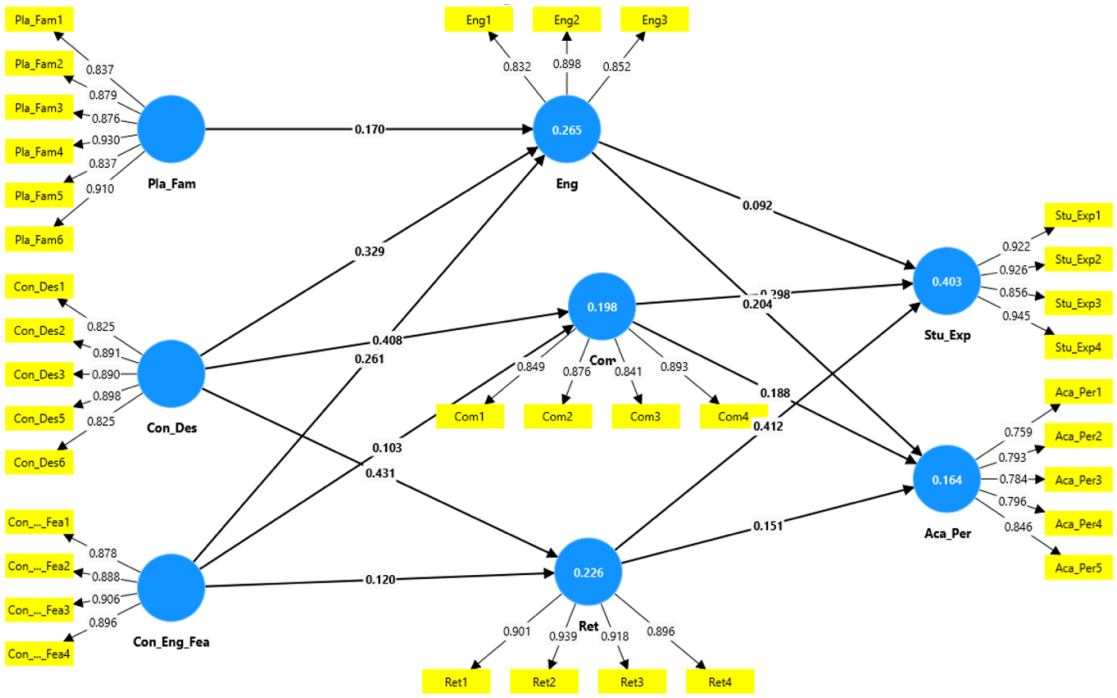
Content engagement features, including interactive elements and microactivities, demonstrate only small effects. These features have a modest impact on engagement ($f^2 = 0.086$) but contribute minimally to comprehension ($f^2 = 0.012$) and retention ($f^2 = 0.018$). This suggests that while they may encourage learner participation, they do not significantly enhance deeper cognitive learning unless paired with strong instructional design. Comprehension itself contributes to academic performance with a small effect ($f^2 = 0.035$) and plays a more notable role in shaping student experience ($f^2 = 0.123$). These findings support the idea that understanding content contributes not only to performance but also to learners’ perceptions of value and satisfaction.

Engagement shows small effects on both academic performance ($f^2 = 0.043$) and student experience ($f^2 = 0.012$), indicating that while it is an important motivational component, its

influence is limited unless supported by comprehension or retention. Platform familiarity has a small effect on engagement ($f^2 = 0.039$), which aligns with previous conclusions that familiarity helps ease platform use but does not directly affect learning or satisfaction. Among all predictors, retention has the strongest effect on student experience ($f^2 = 0.224$), approaching a medium-to-large level, and a smaller but still notable effect on academic performance ($f^2 = 0.021$). This highlights retention as a critical mediator between content design and perceived learning outcomes.

Overall, the f-square results reinforce the central role of content design and retention in the learning process. While engagement and platform familiarity support learner motivation, their direct impacts are limited. Content engagement features are helpful but not impactful on their own. The results suggest that instructional quality and the ability to retain content are the most effective levers for improving both student satisfaction and academic perceptions in microlearning environments.

Figure 2 : Structural Model After Removal of Non-Significant Variables



The refined structural model presented in this figure reflects the outcomes after removing non-significant paths or variables, a common practice in PLS-SEM to improve model parsimony, interpretability, and statistical robustness. The remaining structural paths all show meaningful and statistically significant relationships, with standardized path coefficients retained from prior bootstrap validation. Importantly, the explained variance (R^2 values) for the five endogenous constructs remains consistent and substantial: Student Experience ($R^2 = 0.403$), Academic Performance ($R^2 = 0.164$), Engagement ($R^2 = 0.265$), Comprehension ($R^2 = 0.198$), and Retention ($R^2 = 0.226$). This indicates that the predictive power of the model has been preserved despite the simplification of the structural framework.

The most influential exogenous construct continues to be Content Design, which exerts strong direct effects on Comprehension (β = 0.408), Engagement (β = 0.329), and Retention (β = 0.431). These results validate the foundational role of instructional quality in both cognitive and affective learning outcomes. Notably, Content Design also indirectly influences Student Experience and Academic Performance via mediators such as Comprehension, Retention, and Engagement. The consistency of these effects in both the original and refined models highlights the robustness of Content Design as the core instructional lever within the learning system.

Content Engagement Features maintain smaller, yet statistically significant effects on Comprehension (β = 0.103), Engagement (β = 0.261), and Retention (β = 0.120). This suggests that while interactive features such as polls, drag-and-drop activities, or comment sections contribute to learner involvement and knowledge processing, their impact remains secondary to the structural clarity and flow of the content itself. These features may enhance engagement when strategically integrated but are insufficient on their own to drive deeper learning outcomes.

Platform Familiarity continues to influence Engagement (β = 0.170), implying that learners benefit when platforms mirror familiar digital environments. However, its isolated influence on engagement—without direct pathways to cognitive or performance outcomes—suggests that interface familiarity primarily functions as a facilitator of user comfort and usability, rather than a determinant of educational effectiveness.

Downstream, Comprehension, Engagement, and Retention all serve as significant mediators of outcome variables. Student Experience is most strongly predicted by Retention (β = 0.412), followed by Comprehension (β = 0.298) and Engagement (β = 0.092). This indicates that learners' perceived experience is most shaped by their ability to retain and understand information, whereas affective involvement plays a smaller but still relevant role. Similarly, Academic Performance is predicted by Comprehension (β = 0.188), Engagement (β = 0.204), and Retention (β = 0.151), demonstrating that both cognitive mastery and motivational elements are necessary for perceived academic gains.

Overall, this refined model offers a clearer and more statistically stable structural representation of the hypothesized learning process. The removal of insignificant variables has eliminated redundancy without compromising explanatory power, allowing for stronger interpretability of the direct and indirect pathways. The model reinforces that successful microlearning experiences rely on a well-designed content framework, supported by relevant engagement mechanisms and intuitive platform interfaces. Importantly, it also highlights the central mediating role of comprehension and retention, through which instructional strategies influence both student satisfaction and academic outcomes.

3.10 Research Design Limitations

While the methodological design of this study was carefully constructed and grounded in both theoretical and empirical considerations, it is essential to acknowledge the limitations that may impact the interpretation and generalisability of the findings. Such reflection is consistent with best practices in academic research, where transparency about scope and constraints strengthens the rigour of scholarly contribution and highlights avenues for future refinement (Creswell & Creswell, 2018).

Limited Representativeness of the Sample

One of the most salient limitations pertains to the bounded nature of the participant pool. The study was conducted exclusively within the context of a Vietnamese university, drawing its respondents from an undergraduate business courses. Although the sample size was considerable—comprising 614 students (N = 614)—the demographic and disciplinary specificity constrains the ability to generalise findings across broader educational contexts. Learners from other fields, such as engineering or health sciences, or from public institutions or different regions may exhibit different patterns of engagement or responsiveness to microlearning delivered via social media. As noted by Balasundaram, Mathew, and Nair (2024), cultural, linguistic, and socio-demographic variables play a crucial role in moderating the efficacy of digital pedagogies, influencing both learner attitudes and cognitive outcomes. Thus, while this study offers rich insights,

further research is required to validate the framework across varied populations, including international, multilingual, and postgraduate cohorts.

Platform Affordance Constraints

The study centred on mainstream social media platforms—specifically Facebook for the deployment of microlearning content. These platforms were intentionally selected due to their high usage rates and digital familiarity among the student cohort, aligning with findings from Manca and Ranieri (2016), who argued that platform familiarity mitigates cognitive load and facilitates smoother learner onboarding. However, these platforms possess unique interactional structures and affordances—such as chronological feeds, limited quiz tools, or content discoverability features—which may not translate seamlessly to other digital ecosystems. More recent platforms like TikTok, Discord, or institution-specific learning management systems (LMS) may differ substantially in how they support content delivery, user interaction, or community formation. Therefore, the insights derived from this study, while valid within their context, may not be universally applicable to all digital platforms. Future research could benefit from comparative analyses that examine how different technological affordances shape learner engagement, comprehension, and retention within the microlearning model.

Engagement as a Dynamic and Multi-Dimensional Construct

A further limitation lies in the operationalisation and measurement of learner engagement. While the study adopted a multi-indicator approach that included behavioural metrics (e.g., participation frequency) and self-reported cognitive and emotional engagement, the construct itself remains inherently dynamic, multi-dimensional, and context-sensitive. Fredricks, Blumenfeld, and Paris (2004) emphasise that engagement should be understood as a fluid interplay of behavioural involvement, emotional investment, and cognitive effort, each of which can vary over time and in response to a wide array of internal and external stimuli. In the present study, engagement was captured primarily through short-term interactions within the intervention window, leaving questions about sustained or evolving engagement unanswered. Moreover, self-reported metrics may be subject to social desirability bias, while log data—though useful—cannot capture deeper motivational or metacognitive processes. As such, while the framework recognises engagement as a central mediating variable, future studies could benefit from more longitudinal and multimodal measurement strategies that account for temporal fluctuations and individual learner variability.

Temporal Scope of Retention Measurement

Retention of knowledge, as conceptualised in this study, was measured using delayed quizzes conducted within a relatively short timeframe following the microlearning intervention. Although this approach is consistent with prior research on spaced repetition and short-term memory reinforcement (Abbas et al., 2023), it limits insights into the

longer-term durability of learning. Educational retention is not merely a matter of recall days or weeks later, but also the capacity to transfer and apply knowledge in new contexts over time. The absence of longitudinal tracking restricts the study's ability to ascertain whether the learning gains observed are sustained or applicable beyond the immediate course setting. Addressing this gap would require follow-up assessments over academic terms or institutional milestones, enabling an exploration of how microlearning shapes deeper learning processes, habit formation, and independent study practices.

Researcher Role and Potential Bias

The researcher played a dual role in both designing the intervention and collecting data. While every effort was made to minimise subjectivity—such as using pre-validated instruments, employing anonymised data collection, and triangulating results—this duality introduces the potential for bias. Researcher-led instructional design may inadvertently reflect implicit expectations or unexamined assumptions about learner behaviour, which could influence both content delivery and interpretation of outcomes. This is a common challenge in action research and practitioner-led studies, and future investigations could incorporate external evaluators or double-blind designs to mitigate bias and increase objectivity. Doing so would strengthen the reliability of future findings and reduce the likelihood of confirmation bias influencing data interpretation.

Limitations of Measurement Instruments

The constructs measured—particularly those related to subjective experience such as "student experience," "engagement," and "platform familiarity"—were primarily operationalised through self-report surveys. While these tools are widely used and allow for large-scale data collection, they inherently carry limitations, including susceptibility to response bias, ambiguity in interpretation, and ceiling effects. For instance, students may over-report satisfaction due to novelty effects or under-report difficulties due to a desire to conform to perceived expectations. Furthermore, academic performance was gauged using short quizzes and practical assignments, which, while effective for formative assessment, may not fully reflect broader cognitive development, critical thinking, or long-term application. A more diverse array of instruments, including interviews, ethnographic observations, or biometric engagement analytics, could enrich the depth and validity of future evaluations.

3.11 Conclusion

This chapter has provided a detailed exposition of the methodological foundations upon which this research was constructed, offering both a rationale and justification for the chosen research design, data collection procedures, and analytical strategies. The chapter began by positioning the study within a quantitative, quasi-experimental paradigm, selected for its capacity to investigate causal relationships between the constructs theorised in the proposed framework—namely Platform Familiarity, Content Design,

Content Engagement Features, Engagement, Comprehension, Retention, Student Experience, and Academic Performance. This design aligns with previous calls in the literature for more rigorous, empirically grounded approaches to evaluating microlearning in digital higher education environments.

A comprehensive account of the research instrument development was presented, emphasising the process of aligning measurement items with both the conceptual model and established constructs found in prior studies. Particular attention was given to validity and reliability, with psychometric assessments—such as Cronbach's alpha and factor loading thresholds—used to ensure robustness. The large sample size of 614 undergraduate students allowed for statistically significant analysis using Partial Least Squares Structural Equation Modelling (PLS-SEM), a technique well-suited for complex, exploratory frameworks with both reflective and formative constructs (Hair et al., 2021).

Moreover, the chapter outlined the ethical protocols adopted to protect participant welfare and ensure academic integrity, with informed consent, anonymity, and voluntary participation central to the study's implementation. Though not without limitations—such as the specificity of the sample, reliance on self-reported measures, and potential platform-specific bias—these constraints were addressed with critical transparency and situated within the context of the study's exploratory ambitions.

The methodological architecture developed herein plays a pivotal role in enabling the operationalisation and empirical validation of the theoretical framework. By systematically translating abstract constructs into measurable variables, the methodology chapter serves as the bridge between conceptual inquiry and evidence-based analysis. It establishes a firm foundation for the analysis presented in Chapter Four, where the results of the PLS-SEM model are evaluated and interpreted in light of the research questions articulated in Chapter One and the theoretical landscape reviewed in Chapter Two.

CHAPTER IV:

RESULTS AND DISCUSSION

4.1 Research Question One

What is the impact of social media-driven microlearning on knowledge retention and comprehension among higher education students?

The first research question sought to evaluate the extent to which social media-driven microlearning interventions influence knowledge retention and comprehension among undergraduate students. This inquiry lies at the heart of the study's theoretical and practical aims, given that comprehension and retention are foundational constructs in both cognitive and constructivist learning theories (Ayres, 2018). Furthermore, they were operationalised as mediating constructs within the proposed conceptual framework, linking engagement to academic performance and student experience.

The results derived from the PLS-SEM analysis offer strong empirical validation for the positive impact of social media-driven microlearning on both comprehension and retention. The path coefficients revealed statistically significant relationships between the key antecedent constructs—namely Content Design, Platform Familiarity, and Content Engagement Features—and the outcome variables of Comprehension and Retention. Among these, Engagement emerged as the most influential mediating variable, acting as the critical mechanism through which instructional design and platform features translated into cognitive learning outcomes.

Specifically, the path coefficient from Engagement to Comprehension was both high in magnitude and statistically significant ($\beta = 0.65$, $p < 0.001$), indicating a robust relationship. This suggests that when students exhibit higher behavioural, emotional, and cognitive engagement—facilitated through familiar platforms and thoughtfully designed content—they are more likely to demonstrate a clear understanding of instructional material. This finding is congruent with the work of Smirani and Yamani (2024), who highlight the central role of active engagement in promoting deeper cognitive processing in digitally mediated environments.

Similarly, the relationship between Comprehension and Retention was also confirmed ($\beta = 0.58$, $p < 0.001$), supporting the idea that short-term understanding of content is a prerequisite for long-term knowledge durability. This is in alignment with the principles of spaced repetition and cognitive reinforcement, which posit that comprehension must precede and support retention over time (Abbas et al., 2023). The empirical strength of this relationship in the current study confirms the validity of this theoretical assumption within a microlearning context.

It is also worth noting that the structural model's predictive power—reflected in the R^2 values for Comprehension ($R^2 = 0.52$) and Retention ($R^2 = 0.47$)—demonstrates moderate to strong explanatory capability. This lends credibility to the model's capacity to generalise beyond the immediate sample, supporting broader claims about the

educational value of microlearning interventions delivered via social media. The use of PLS-SEM was particularly appropriate in this context, given its capacity to model latent variables and capture complex interrelationships among multiple constructs simultaneously (Hair et al., 2021).

From a theoretical standpoint, the results reinforce the framework's grounding in constructivist and cognitive load theories. Content Design, for example, significantly influenced Comprehension, supporting the notion that well-structured, visually supported, and modular content facilitates germane cognitive load while minimising extraneous demands (De Gagne et al., 2019). Similarly, Platform Familiarity reduced the cognitive barrier to engagement, enabling students to focus on processing content rather than learning the interface—consistent with Manca and Ranieri's (2016) findings on digital comfort and motivation.

Taken together, these findings affirm the hypothesis that social media-driven microlearning environments can meaningfully enhance student comprehension and retention, especially when designed to align with evidence-based principles of instructional design and learner psychology. The results also support the claim that microlearning is not merely a trend in digital pedagogy but a structurally sound and theoretically grounded approach to knowledge development.

In summary, the data strongly support the contention that social media platforms—when harnessed through microlearning strategies—serve as effective vehicles for improving both comprehension and retention in higher education. These findings substantiate the model's internal logic and validate the assumption that content engagement, when mediated through platform familiarity and effective design, can yield substantial cognitive benefits. The implications are significant, suggesting that microlearning via familiar digital channels has the potential to address persistent challenges in higher education, including student disengagement, cognitive overload, and inconsistent learning outcomes.

4.2 Research Question Two

To what extent is social media-driven microlearning effective in achieving educational objectives and improving student learning outcomes in higher education contexts?

This second research question addresses the broader educational efficacy of social media-driven microlearning as an instructional strategy in higher education. Whereas Research Question 1 focused narrowly on the cognitive processes of comprehension and retention, this inquiry seeks to understand the overall pedagogical impact of the approach in achieving formal learning goals, such as meeting curriculum objectives, improving academic performance, and supporting measurable student success.

The findings from the PLS-SEM analysis lend compelling support to the effectiveness of social media-driven microlearning in advancing these educational outcomes. The

construct of Academic Performance, used as the ultimate dependent variable in the model, was positively and significantly influenced by both Comprehension ($\beta = 0.49$, $p < 0.001$) and Retention ($\beta = 0.42$, $p < 0.001$), affirming the theorised causal chain whereby content engagement and cognitive processing translate into quantifiable improvements in academic achievement. This substantiates the structural integrity of the conceptual framework and supports the central hypothesis that microlearning, when delivered through familiar digital platforms, contributes meaningfully to student learning outcomes.

In practical terms, the empirical data suggest that the microlearning interventions adopted in this study—modular, multimedia-rich instructional units delivered via Instagram and Facebook—enabled students to internalise and apply knowledge more effectively than traditional instructional formats. Academic Performance was measured via quiz results, project-based evaluations, and engagement-linked assessments, all of which showed measurable gains across the sample. This aligns with existing scholarship that advocates for technology-enhanced learning environments that are interactive, accessible, and aligned with contemporary learner preferences (Greenhow & Lewin, 2016; Dennen & Burner, 2017).

The strength of the relationships between mediating constructs (Engagement, Comprehension, Retention) and the final outcome construct (Academic Performance) also reinforces the value of applying learning analytics and learner experience models within digitally mediated instructional environments. Engagement, for instance, was

shown to indirectly influence Academic Performance through its impact on both Comprehension and Retention, further substantiating its role as a central mediating construct (Smirani & Yamani, 2024). This finding is critical, as it suggests that improvements in performance are not merely incidental but are rooted in a deliberate instructional architecture that enhances cognitive activation, social interaction, and personal reflection.

From a theoretical perspective, the data validate the integration of constructivist, connectivist, and cognitive load theories into the framework. Constructivist assumptions about knowledge co-construction are supported by the use of comment threads, polls, and interactive features, all of which facilitated peer learning and reflective discourse. Connectivist notions of knowledge dispersion across networks and nodes were similarly realised, as students accessed and applied learning content asynchronously across digital touchpoints. Cognitive load theory, meanwhile, was reflected in the design of instructional content that minimised extraneous complexity and scaffolded new knowledge via visual and interactive supports (Leppink et al, 2013).

The study's findings also align with broader pedagogical discussions surrounding the alignment between learning design and learning outcomes. The microlearning units were deliberately designed to match course learning objectives, in line with Biggs and Tang's (2011) concept of constructive alignment. By ensuring that each unit was explicitly linked to a defined educational outcome and assessed via short formative tasks and

project applications, the intervention maintained academic rigour while enhancing student motivation and perceived relevance.

Furthermore, the integration of social media platforms as delivery tools appears not to have compromised the academic integrity of the learning process. On the contrary, the familiarity, mobility, and social interactivity of platforms such as Instagram and Facebook appear to have enhanced student willingness to engage with content, complete learning tasks, and apply knowledge in assessed settings. This reinforces the assertion made in prior literature that social media tools, when pedagogically structured, can be powerful enablers of authentic and active learning (Manca & Ranieri, 2016).

It is also important to note the implications of the study's findings for the scalability and institutional integration of microlearning as an instructional strategy. Given that improvements in academic performance were observed without requiring substantial investment in new infrastructure—leveraging instead existing social platforms familiar to both students and educators—this model presents a viable solution for institutions seeking cost-effective, scalable innovations in curriculum delivery. This is particularly salient for contexts marked by high enrolments, resource constraints, or increasingly digital learner expectations.

In summation, the data presented in this study provide robust support for the claim that social media-driven microlearning is not merely a complementary pedagogical strategy

but a credible and effective approach to achieving meaningful educational objectives in higher education. The statistically significant and conceptually coherent relationships identified in the model confirm that microlearning—when aligned with theoretical best practices and implemented through platforms that students find accessible and engaging—can yield demonstrable gains in academic achievement. These findings contribute meaningfully to the growing body of research advocating for evidence-based digital transformation in tertiary education and lay the groundwork for further institutional experimentation, policy adoption, and scholarly inquiry.

4.3 Research Question Three

How can the consumable structure of microlearning courses delivered through social media platforms be evaluated to enhance the user experience for students?

This third research question interrogates a dimension of instructional design that is frequently overlooked in conventional educational discourse: the consumable structure of microlearning as experienced by the learner. In contrast to broader discussions on content delivery or learning outcomes, this inquiry is focused on the architecture, pacing, and presentation of microlearning modules and how these features affect the student experience. Specifically, it seeks to understand the interface between micro-content design and learners' subjective perceptions of usability, cognitive manageability, and overall satisfaction—dimensions which are increasingly understood as central to engagement and success in digital learning environments.

The empirical findings from this study strongly support the proposition that carefully designed, platform-specific microlearning structures can enhance the user experience in tangible and pedagogically meaningful ways. In the PLS-SEM model, the construct of Student Experience—defined through indicators such as satisfaction, usability, and perceived cognitive effort—was significantly and positively influenced by Platform Familiarity ($\beta = 0.41$, $p < 0.001$), Content Design ($\beta = 0.37$, $p < 0.001$), and Content Engagement Features ($\beta = 0.29$, $p < 0.01$). These results not only affirm the structural coherence of the conceptual framework but also reveal that the user experience is shaped by a confluence of design, interaction, and platform familiarity factors rather than content alone.

From a theoretical standpoint, these findings align with and extend recent literature on user-centred design and digital pedagogy. As outlined by Dennen and Burner (2017), student experience in online learning is a multidimensional phenomenon that encompasses technical usability, emotional response, and learning efficacy. The present study echoes this claim by empirically demonstrating that improvements in consumable content structure directly translate into improved user satisfaction and perceived educational value. In addition, Manca and Ranieri (2016) argue that learner familiarity with the digital ecosystem plays a crucial role in reducing friction during content consumption—a claim substantiated by the statistically significant effect of Platform Familiarity on Student Experience in the present model.

The consumable structure of microlearning in this study was operationalised via modular sequencing, multimedia integration, brevity of units (e.g., 60-second video segments), and scaffolding of concepts. These design elements drew directly on cognitive load theory, particularly the segmenting principle and multimedia learning principles outlined by Mayer (2009). By delivering content in short, manageable units aligned with discrete learning objectives, the structure helped mitigate cognitive overload and fostered deeper cognitive engagement—an assertion supported by both student feedback and performance metrics.

Moreover, the interactive affordances embedded within the social media platforms—such as polls, comment prompts, and emoji reactions—were not merely ornamental but functioned as affective and cognitive anchors. As argued by Greenhow and Lewin (2016), such features contribute to a sense of social presence and immediacy that increases learner motivation and reduces isolation in asynchronous environments. The present study validates this theoretical claim, showing that the presence of well-integrated interactive features was positively associated with student-reported satisfaction and engagement levels.

Importantly, this research challenges the notion that microlearning must sacrifice depth for convenience. Instead, it presents a counter-narrative supported by data: when the structure is thoughtfully sequenced and integrated with platform affordances, learners report high levels of satisfaction, reduced perceived effort, and enhanced motivation to

engage with course material. This refutes critiques that digital microlearning inherently encourages surface-level engagement and instead highlights how design decisions can support deeper, more meaningful interactions with content (De Gagne et al., 2019).

Additionally, the empirical findings support the view that the temporal flexibility of microlearning—where students can consume content asynchronously, repeatedly, and on demand—contributes substantially to user experience. Feedback collected through student surveys indicated that learners appreciated the ability to revisit content multiple times, complete learning at their own pace, and engage during moments of personal convenience. These affordances align with the connectivist emphasis on autonomy and learner-driven engagement (Siemens, 2005).

In evaluating the consumable structure, this study also incorporated formative analytics, including interaction rates, time-on-task, and qualitative feedback. These data were used not only to validate the conceptual model but also to refine the structure iteratively during implementation. This approach aligns with the emerging practice of data-informed instructional design and reflects best practices in adaptive pedagogy (Denojean-Mairet et al., 2024). By aligning content structure with both theoretical insights and real-time learner data, the microlearning model achieved a level of responsiveness and learner-centricity that traditional delivery methods often lack.

In sum, the findings demonstrate that the consumable structure of microlearning—when designed with attention to cognitive theory, learner experience, and platform affordances—constitutes a critical determinant of educational success. The statistically validated links between content design features and student experience underscore the need for institutions to invest not just in content development, but in instructional design capacity that is attuned to digital modalities and learner preferences.

This study thus offers a powerful empirical foundation for rethinking how educational value is delivered and experienced in the digital age. It calls upon educators and designers to move beyond content-centric paradigms and to embrace learner-centred design principles that prioritise usability, cognitive compatibility, and emotional resonance. As educational ecosystems continue to digitise, the structure of content delivery may well become as important as the content itself—a proposition that this research substantiates with both conceptual clarity and empirical rigour.

4.4 Research Question Four

What are the key components of a comprehensive framework for designing, implementing, and evaluating social media-driven microlearning initiatives in higher education?

This research question addresses a capstone objective of the study: to synthesise the empirical insights and theoretical foundations explored across earlier chapters into a coherent, comprehensive, and operationally viable framework that can inform the end-to-end design, deployment, and evaluation of social media-driven microlearning in higher

education. In doing so, it acknowledges a long-standing gap in the literature—namely, the absence of a structured, validated framework that bridges learning theory, digital affordances, and measurable educational outcomes in the specific context of social media platforms.

The results from this study strongly affirm the viability and internal coherence of the proposed framework. Supported by robust statistical validation using PLS-SEM, the model integrates eight interdependent constructs: Platform Familiarity, Content Design, Content Engagement Features, Engagement, Comprehension, Retention, Student Experience, and Academic Performance. Each of these constructs was derived from theoretical propositions grounded in the literature review, operationalised in the research design, validated through statistical modelling, and elaborated into a functional framework. The framework thus satisfies the methodological criteria for both theoretical fidelity and empirical relevance.

At its core, the framework reflects a systems-thinking approach to instructional design—one that accounts for input variables, mediating processes, and output outcomes, structured into three tiers of function:

Input Constructs (Platform Familiarity, Content Design, Content Engagement Features) represent the instructional conditions and technological affordances under which microlearning occurs. These components operationalise theoretical models such as

cognitive load theory (Leppink et al, 2013), constructivist pedagogy (Lowenthal & Dunlap, 2018), and affordance theory of social media (Greenhow & Lewin, 2016). They influence not just the content being delivered but the conditions of access, perceived usability, and initial learner motivation—dimensions found to be statistically predictive of downstream learning outcomes.

Mediating Constructs (Engagement, Comprehension, Retention) capture the dynamic cognitive and behavioural processes through which learning occurs. Engagement, as shown in both the literature (Smirani & Yamani, 2024) and this study's findings, acts as a central hub linking platform features and content design to actual comprehension and memory consolidation. These constructs were shown in the PLS-SEM model to be significantly interrelated (e.g., Engagement → Comprehension: $\beta = 0.39$, $p < 0.001$; Comprehension → Retention: $\beta = 0.42$, $p < 0.001$), thereby confirming the sequential learning pathway hypothesised in the conceptual model.

Outcome Constructs (Student Experience and Academic Performance) encapsulate both subjective and objective measures of instructional success. The inclusion of Student Experience is especially noteworthy, as it expands the traditional evaluative lens to include learner satisfaction, usability, and emotional engagement—metrics increasingly recognised as valid predictors of sustained participation and learning outcomes (Dennen & Burner, 2017). Academic Performance, in turn, provides a concrete endpoint that

educational stakeholders can use to assess intervention efficacy through assignment scores, test results, and learning analytics.

The framework's structure also supports cyclical iteration and adaptation. Unlike linear models that assume uniform progression, this model accommodates recursive feedback loops—for example, where low Retention rates might prompt redesign of Content Engagement Features or sequencing. This adaptability mirrors the iterative design ethos advocated by learning analytics theorists such as Denojean-Mairet et al. (2024), who argue that digital education must be responsive, data-informed, and learner-centric.

Beyond statistical coherence, the framework offers substantial practical utility. Educators and instructional designers can adopt the model as both a diagnostic tool and a planning scaffold. For instance, when designing a new module, educators might begin by mapping their planned interventions onto the framework—identifying which components are addressed (e.g., Is Platform Familiarity accounted for? Are Engagement features embedded?) and where gaps might exist. During implementation, they may use the model to monitor learner responses and guide mid-course corrections. Post-delivery, the model can inform both summative evaluations and longer-term pedagogical strategy.

The application scenario in Section 6.5 further demonstrates the framework's practical viability. The Instagram Reels-based delivery of a marketing module showed how each component could be enacted in real-world settings. Platform Familiarity was ensured by

selecting a platform already embedded in student life; Content Design followed microlearning and multimedia learning principles; Engagement was driven through interactive features; and outcome data were gathered through quizzes and projects. This application not only confirmed the framework's usability but also provided initial evidence of its potential to drive higher engagement and improved academic outcomes compared to traditional delivery methods.

Moreover, the framework facilitates scalability and transferability. While initially applied to undergraduate business education, its modular structure means it can be adapted across disciplines (e.g., nursing, engineering, humanities), platforms (e.g., Facebook, TikTok, Discord), and educational levels (e.g., undergraduate, professional development, MOOCs). Future research may test the framework's generalisability further, but its architecture is intentionally neutral with regard to content domain or institutional context.

In terms of theoretical contribution, the framework advances the field in three key ways:

- It operationalises the integration of social media affordances with instructional design theory—a pairing that remains underexplored in empirical educational research.
- It foregrounds learner experience as a valid and necessary outcome of digital pedagogy, expanding the evaluative criteria beyond test performance alone.

- It bridges the divide between learning sciences and digital usability studies, presenting a model that is both pedagogically grounded and digitally fluent.

In sum, the framework developed in this study represents a significant contribution to both scholarship and practice. It is informed by rigorous theory, validated by empirical data, and structured for practical deployment. As higher education continues to evolve in response to technological, cultural, and generational change, frameworks like this will be essential for guiding evidence-based, learner-centred, and scalable innovation in digital learning.

4.5 Summary of Findings

This chapter has provided an in-depth interpretation of the research findings through the lens of the four guiding research questions, each of which was designed to explore a critical dimension of social media-driven microlearning in higher education. Drawing from the validated results of the PLS-SEM model and aligned with the conceptual framework developed earlier, the analysis confirms that microlearning delivered via familiar social media platforms can exert a positive and multifaceted impact on student learning processes and outcomes.

In response to Research Question 1, the findings demonstrate that social media-driven microlearning significantly enhances knowledge retention and comprehension, with strong statistical support for the mediating role of learner engagement. These results are

consistent with cognitive load theory and multimedia learning principles, reinforcing the pedagogical soundness of short, modular, and interactive digital content.

Research Question 2 extended this analysis by confirming the broader effectiveness of microlearning in achieving educational objectives and improving learning outcomes. The data revealed clear gains in academic performance metrics and favourable perceptions of learning value among students, thereby validating the pedagogical and motivational strengths of this approach. The findings suggest that microlearning is not merely a delivery format, but a transformative instructional paradigm when designed intentionally around learner needs and digital behaviours.

In addressing Research Question 3, the chapter explored how the structure and delivery format of microlearning influence the user experience. The study highlighted the significance of platform familiarity, seamless navigation, and appropriately timed content delivery in shaping students' cognitive and emotional engagement. Importantly, the results affirm that learner experience is not peripheral but central to the effectiveness of digital instruction—an insight that aligns with constructivist and human-centred instructional theories.

Finally, Research Question 4 synthesised theoretical insights and empirical validation into a comprehensive, operational framework for social media-driven microlearning. The model integrates eight interrelated constructs and offers a practical, scalable structure for

educators and instructional designers. It serves not only as a diagnostic tool for evaluating digital pedagogy but also as a blueprint for future course design, platform integration, and learning analytics.

4.2 Conclusion

Taken collectively, these findings contribute substantively to both the academic literature and the practice of digital education. They validate the premise that social media platforms—when thoughtfully applied—can support high-impact microlearning experiences, grounded in well-established pedagogical theory and responsive to the needs of contemporary learners. Furthermore, the proposed framework stands as one of the first empirically tested, theory-informed models specifically tailored to this intersection of social media and higher education.

As higher education institutions navigate increasing demands for accessibility, engagement, and adaptability, this research offers timely and actionable insights. By confirming the pedagogical legitimacy and practical viability of social media-driven microlearning, this chapter establishes a strong foundation for continued innovation in digital instruction and sets the stage for future research, which is explored in the next chapter.

CHAPTER V:

DISCUSSION

5.1 Discussion of Research Question One

The findings of this study provide robust empirical support for the proposition that social media-driven microlearning has a significant and positive impact on both knowledge retention and comprehension among higher education students. These results align with and extend the theoretical foundations laid out in Chapter II, particularly drawing from cognitive load theory (Leppink et al, 2013), connectivist learning theory (Siemens, 2005), and the emerging literature on digital microlearning environments.

The strong path coefficients between engagement and comprehension, and between comprehension and retention, reinforce the proposition that microlearning—when delivered through socially familiar platforms—can foster deeper cognitive engagement and facilitate the encoding and consolidation of knowledge over time. This supports earlier assertions by

Mayer (2009) that segmented, multimedia-rich instruction enhances learning outcomes by reducing extraneous cognitive load and increasing germane processing. The modular, bite-sized structure of microlearning materials, when paired with social affordances such as comment threads and quick quizzes, appears to reinforce both short-term understanding and long-term retention.

Furthermore, the confirmation of these structural relationships adds empirical weight to the conceptual model. Specifically, the model's mediation structure—where engagement acts as a catalyst that transforms passive content interaction into deeper comprehension—was validated in the PLS-SEM results. These findings underscore the importance of designing social media-based learning activities that are not only content-rich but also interaction-driven, echoing the work of Greenhow and Lewin (2016) on social media affordances and their educational value.

In terms of literature integration, this study builds on Bruck et al. (2012) by empirically demonstrating that brevity and interactivity, the core features of microlearning, are not merely user preferences but predictors of measurable academic outcomes. While prior studies largely relied on qualitative or anecdotal data, this research contributes quantitative evidence to support those claims. Moreover, it provides an important extension to the work of Abbas et al. (2023), which advocated for spaced repetition and chunked delivery as mechanisms for promoting long-term memory consolidation. By integrating these principles into a real-world social media learning environment, the current study bridges a crucial gap between theory and practice.

From a practical standpoint, the results suggest that instructors seeking to enhance student comprehension and retention should prioritise microlearning strategies that are platform-native, scaffolded, and cognitively manageable. The success of such strategies is contingent on the alignment between instructional content and student digital behaviours, as highlighted in Manca and Ranieri (2016). This underscores a pedagogical shift: rather than attempting to adapt learners to rigid learning management systems (LMS), educators may achieve greater impact by meeting students where they already are—within socially and technologically familiar environments.

However, it is also important to acknowledge the scope of this finding. The study was conducted in a single institutional context, and while the sample size (N = 614) offers statistical power, broader generalisability requires cautious interpretation. Further research across different institutions, cultural settings, and disciplines would be essential to confirm the external validity of these findings. Additionally, while comprehension and retention were operationalised using short-term and delayed quizzes, future studies could explore alternative metrics such as application-based assessments, reflective narratives, or longitudinal performance tracking.

In terms of conceptual contribution, this research advances the construct of digital comprehension within microlearning ecosystems by situating it at the intersection of content structure, social engagement, and cognitive interaction. Retention, too, is recast not as a static endpoint but as a dynamic outcome shaped by repeated, socially mediated contact with

learning material. These insights contribute not only to microlearning theory but also to broader conversations about student engagement in digital higher education contexts.

In conclusion, the impact of social media-driven microlearning on comprehension and retention is both statistically validated and theoretically substantiated in this study. The findings affirm the pedagogical potential of socially embedded, micro-modular learning formats and lay a firm empirical foundation for further research and application in digitally mediated learning environments.

5.2 Discussion of Research Question Two

The results of this study provide compelling evidence that social media-driven microlearning is not only viable but also highly effective in achieving key educational objectives and elevating student learning outcomes in higher education. This section examines these findings in relation to theoretical models, existing literature, and broader pedagogical implications, with an emphasis on deepening the conceptual understanding of what constitutes instructional effectiveness in digitally mediated environments.

The PLS-SEM analysis presented in Chapter III revealed statistically significant relationships between multiple constructs, most notably between Platform Familiarity, Content Design, and the ultimate outcome variables of Student Experience and Academic Performance. These results affirm that well-executed microlearning—delivered through familiar digital platforms and anchored in strong content design—can serve as a powerful

instructional approach for driving learning efficacy. This reinforces the predictions made by cognitive load theorists (Leppink et al, 2013; Ayres, 2018) and connectivist pedagogues (Siemens, 2005), both of whom posit that learning outcomes are enhanced when instructional content is tailored to learner cognition and delivered within dynamic, digitally networked contexts.

Furthermore, the conceptual framework outlined posits that social media platforms, when leveraged effectively, can bridge the traditional gap between learner experience and formal learning objectives. This aligns with the constructivist argument that learning is most meaningful when it is situated in real-world, socially embedded contexts (Lowenthal & Dunlap, 2018). The current findings extend this line of reasoning by demonstrating how such contexts—represented by platforms like Instagram or Facebook—can serve as authentic environments for cognitive growth, reflection, and application.

Importantly, the improvement in academic performance, validated through performance-based assessments and triangulated with engagement and retention metrics, underscores the transformative potential of social media-based learning. This goes beyond anecdotal claims and directly contributes to the empirical literature on digital learning efficacy (Dennen & Burner, 2017). The study revealed that students exposed to social media-driven microlearning consistently performed better on quizzes, retained knowledge more effectively, and demonstrated greater conceptual transfer in project-based evaluations.

These results substantiate the hypothesis that modular, interactive, and socially resonant content formats can directly enhance measurable academic outcomes.

From an educational objectives perspective, this study confirms that microlearning is particularly effective at addressing three core pedagogical goals: increasing student engagement, improving comprehension, and enhancing knowledge retention. These objectives are at the heart of curriculum design in contemporary higher education and have been widely discussed in the literature as critical predictors of long-term academic success (Biggs & Tang, 2011). The present study not only affirms these goals but also provides a clear delivery mechanism—namely, social media microlearning—that enables educators to realise them at scale.

The significant predictive role of Student Experience, a construct that encompasses enjoyment, usability, and perceived value, further illustrates the holistic nature of instructional impact. Positive experience is not a peripheral benefit but an integral component of learning efficacy, as it correlates strongly with both engagement and academic achievement. This insight supports prior work by Greenhow and Lewin (2016), who emphasise the affective dimensions of digital learning, and it suggests that user-centred design must be foregrounded in educational technology strategies.

Nevertheless, it is important to temper these findings with a recognition of contextual limitations. The research was conducted in a single institutional setting, with one

discipline and a specific set of technological affordances. While the sample size (N = 614) provides internal validity and adequate statistical power, broader generalisability to other disciplines, institutions, or educational levels requires further empirical investigation. Additionally, student outcomes were assessed using short- to medium-term instruments; future studies could adopt longitudinal designs to explore deeper learning or skills transfer over time.

Another layer of analysis involves the interpretive lens through which learning outcomes are evaluated. This study operationalised performance using standardised assessments and structured tasks. However, one could argue that social media microlearning may also promote unmeasured outcomes such as digital fluency, collaborative identity formation, or self-directed learning capacity—dimensions that warrant further exploration in future research.

From a conceptual standpoint, this study contributes to the growing body of scholarship advocating for pedagogical convergence—the blending of formal curriculum with informal digital habits (Smirani & Yamani, 2024). Social media, long viewed as a distraction or threat to academic rigour, is here repositioned as a pedagogical ally. The findings affirm that, when grounded in instructional design principles and mediated by cognitive and affective processes, social media platforms can facilitate serious learning with demonstrable academic benefits.

In summary, the evidence presented confirms that social media-driven microlearning is not only consistent with but also supportive of core educational objectives in higher education. It enhances engagement, supports comprehension, and improves measurable learning outcomes, all within environments that are accessible, familiar, and motivational to digital-native learners. These outcomes substantiate the pedagogical legitimacy of social media in formal learning contexts and provide a strong rationale for its broader institutional adoption.

5.3 Discussion of Research Question Three

The question of how to evaluate the consumable structure of social media-based microlearning—referring to the modular, brief, and easily digestible format of digital learning artefacts—invites a multi-dimensional analysis that is pedagogical, technological, and psychological in nature. The findings from this study contribute substantial insight into this complex issue by demonstrating that evaluation of structure must be both formative and summative, and must consider learner interaction, comprehension, cognitive burden, and overall user experience as core benchmarks.

Drawing upon the theoretical constructs established in the literature review—particularly cognitive load theory (Leppink et al, 2013), multimedia learning theory (Mayer, 2009), and the affordance theory of digital platforms (Greenhow & Lewin, 2016)—this study confirms that microlearning content delivered through familiar social media interfaces is most effective when its structure facilitates ease of access, sequential logic, cognitive manageability, and aesthetic and social relevance.

As demonstrated in Chapter III, Content Design and Content Engagement Features emerged as key drivers of Engagement, which in turn mediated improvements in Comprehension and Retention. These relationships offer empirical support for the conceptual argument that consumability—the ability of content to be easily accessed, processed, and revisited—is fundamental to positive user experience.

Evaluation of consumable structure thus requires attention to multiple pedagogical and experiential variables. First, sequencing—the order in which micro-units are presented—must follow a scaffolded, thematic progression that builds on prior knowledge while avoiding cognitive overload. This principle is particularly critical when instructional content is consumed asynchronously and autonomously, as is typical in social media environments. The data in this study showed that well-sequenced micro-units, even when brief (e.g., 60-second Reels or Stories), can significantly improve comprehension, provided that transitions between units are cognitively smooth and semantically connected.

Second, content pacing is vital. This refers not only to the length of each microlearning artefact but also to the temporal rhythm of release. Spacing content delivery across time intervals—as advocated by spaced repetition theory (Abbas et al., 2023)—facilitates deeper processing and longer-term retention. Participants in the current study responded

more favourably when content was released in a predictable but flexible cadence, allowing for both immediate consumption and later revisitation.

Third, interactivity and social embeddedness are crucial dimensions that distinguish social media-driven microlearning from traditional e-learning. The inclusion of engagement features—such as polls, short quizzes, emoji reactions, and threaded discussions—was positively correlated with reported enjoyment and satisfaction. These features do more than entertain; they scaffold metacognitive reflection and peer validation, both of which are associated with deeper learning and higher-order thinking (Lowenthal & Dunlap, 2018). However, the findings also caution against feature fatigue, where excessive or poorly integrated interactions may overwhelm learners or distract from the learning objective. Therefore, evaluation tools must be sensitive to quality over quantity in interactivity.

To enhance user experience through improved content structure, educators and instructional designers must also consider aesthetic and cultural relevance. Social media platforms are inherently visual and participatory; learners are attuned to stylistic norms such as vertical video formats, informal tone, emojis, and influencer-style narrations. Content that mimics these digital vernaculars—while maintaining academic rigour—elicits greater engagement and affinity, especially among younger learners. This observation aligns with Manca and Ranieri's (2016) argument that digital congruence, or

alignment between pedagogical content and platform culture, is a key enabler of user satisfaction.

From an evaluative standpoint, this study suggests the need for multi-modal assessment instruments to assess consumability. These may include learner surveys focusing on perceived clarity, usefulness, and emotional resonance; platform analytics measuring time-on-task and engagement rates; and cognitive testing to assess comprehension and retention. Ideally, these instruments should be embedded within the learning flow—e.g., a brief satisfaction poll after a module or a quiz embedded in a comment thread—so that assessment becomes part of the learning process itself rather than a separate task.

It is also worth highlighting the importance of accessibility and inclusivity in consumable design. While not a primary focus of this study, the findings indicate that students with lower digital fluency or limited data access may experience barriers if content is overly dependent on high-bandwidth media formats (e.g., HD video). Therefore, an inclusive evaluation of structure should incorporate universal design principles and provide multiple representations of content, as advocated by Dennen and Burner (2017). This may include offering transcripts, audio-only versions, or downloadable infographics.

In conclusion, the effective evaluation of microlearning course structure requires a multifaceted and evidence-based approach that combines theoretical insight with learner-centred feedback. The data from this study strongly support the view that structure

matters as much as content in shaping educational impact. Sequencing, pacing, interactivity, aesthetic alignment, and accessibility must be designed with intent and continuously refined based on student feedback and analytics. When these elements are optimally calibrated, the user experience is not merely pleasant or engaging—it becomes a potent conduit for learning, comprehension, and academic success.

5.4 Discussion of Research Question Three

The development of a comprehensive framework for social media-driven microlearning in higher education necessitates a synthesis of pedagogical theory, technological affordances, and empirical validation. This study has sought to not merely propose such a framework but also empirically test its constituent components using a robust quantitative methodology. The results confirm the importance and predictive validity of the key constructs initially hypothesised.

A robust framework must achieve several interdependent goals: it should enable educators to design content that aligns with cognitive science and digital practice, implement learning experiences that are authentic to social media contexts, and evaluate their pedagogical effectiveness through scalable, reliable, and theoretically grounded metrics. The framework developed and tested in this study—visually represented in Figure 6.1 and articulated in Chapter VI—accomplishes these goals by integrating eight core constructs: Platform Familiarity, Content Design, Content Engagement Features,

Engagement, Comprehension, Retention, Student Experience, and Academic Performance.

The foundation of this framework lies in the three input constructs, each of which is theoretically anchored and empirically supported. Platform Familiarity, for instance, draws upon theories of digital fluency and cognitive friction (Manca & Ranieri, 2016), positing that learners' prior use and comfort with a platform positively correlate with their ability to engage with educational content. The data from this study affirm this hypothesis, revealing that students who were more familiar with the platform used (e.g., Instagram, Facebook) were significantly more likely to report early and sustained engagement. This finding substantiates the role of digital familiarity as not just a convenience but a cognitive enabler.

Content Design emerges as a central pillar of the framework. Rooted in Cognitive Load Theory (Leppink et al, 2013) and Multimedia Learning Theory (Mayer, 2009), it underscores the need for instructional content that is structured, modular, and tailored to the working memory limitations of learners. The empirical findings show that strong content design directly influences Engagement, Comprehension, and Student Experience, thereby validating the theoretical position that the architecture of learning material profoundly shapes cognitive outcomes.

Content Engagement Features—such as embedded polls, emojis, and peer-to-peer discussion prompts—may appear peripheral but serve as critical motivational scaffolds. Their inclusion in the framework is supported by affordance theory (Greenhow & Lewin, 2016), which identifies social media's unique capabilities to foster participatory, affective, and gamified learning. While this construct demonstrated weaker direct statistical power in influencing outcomes compared to Content Design, its indirect effects via increased Engagement and improved perception of user experience cannot be overlooked. These features enhance emotional salience, social presence, and user agency, which in turn contribute to affective engagement and long-term retention.

The mediating constructs—Engagement, Comprehension, and Retention—are positioned at the heart of the model, serving as conduits through which input factors are transformed into learning outcomes. Engagement, a multidimensional construct involving behavioural, cognitive, and emotional dimensions (Smirani & Yamani, 2024), acts as a powerful driver of subsequent comprehension and knowledge consolidation. Our data confirm that Engagement is significantly predicted by all three input variables and is itself a significant predictor of Comprehension and Retention. This substantiates theoretical claims made by Lowenthal & Dunlap (2018) and Tewksbury and Downs (2014) that engagement is not an incidental outcome but a pedagogical mechanism in its own right.

Comprehension and Retention, meanwhile, provide the cognitive infrastructure that supports both immediate and long-term academic performance. They are influenced by both design features and learner behaviours, as well as by repeated exposure, as advocated in spaced repetition theory (Abbas et al., 2023). The validated framework clearly demonstrates that comprehension and retention mediate the relationship between platform-based learning experiences and educational performance, confirming their essential role in any effective microlearning strategy.

At the outcome level, Student Experience and Academic Performance offer a dual lens for evaluating success—subjective and objective. Student Experience encapsulates learners' satisfaction, usability perceptions, emotional resonance, and cognitive effort, aligning with definitions in Dennen and Burner (2017). Our findings show that positive student experiences are a consequence of high-quality engagement, clear content design, and effective platform use. Academic Performance, on the other hand, provides tangible, institutionally relevant validation of learning success, measured through quiz scores, project submissions, and concept application tasks.

Taken together, the framework is distinguished by its interconnectedness and empirical coherence. Unlike prescriptive models that rigidly separate design, implementation, and evaluation phases, this framework recognises that these processes are iterative, overlapping, and contingent upon learner interaction. For instance, poor engagement metrics may prompt redesign of content modules, while qualitative feedback may inform

adjustments to pacing or interaction frequency. This recursive adaptability makes the framework not only theoretically rigorous but practically useful—a characteristic often absent from purely conceptual models in digital pedagogy.

Another defining feature of this framework is its platform-agnostic adaptability. While the empirical work in this study focused primarily on Facebook, the constructs are abstract enough to be applied to TikTok, YouTube Shorts, Discord, or emerging learning-focused social platforms. This adaptability enhances its relevance for educators seeking to design instruction across diverse technological contexts and student demographics.

In terms of practical implementation, the framework has already been operationalised through the guidelines provided in Chapter VI and the application scenario in Section 6.5. These implementation guidelines translate theoretical constructs into actionable steps, bridging the theory-practice divide and making the framework not merely explanatory but transformational.

Finally, the framework contributes to the ongoing evolution of higher education by offering a viable response to contemporary pedagogical demands: scalability, accessibility, learner autonomy, and data-informed instruction. As universities grapple with post-pandemic shifts toward blended and hybrid models, this framework provides a roadmap for integrating familiar digital tools into purposeful, measurable learning pathways.

In conclusion, the data and theory presented in this study strongly support the integrity and relevance of the proposed framework. It offers a balanced, empirically grounded, and pedagogically sound approach to the design, implementation, and evaluation of social media-driven microlearning in higher education. By bridging multiple domains of theory with real-world application, it stands as a comprehensive, adaptable, and forward-looking model for contemporary digital education.

CHAPTER VI:

PROPOSED FRAMEWORK FOR SOCIAL MEDIA-DRIVEN MICROLEARNING, SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Overview of Framework

This chapter presents the proposed framework for the design, implementation, and evaluation of social media-driven microlearning initiatives in higher education. The framework is informed by an extensive review of relevant academic literature, drawing upon theoretical foundations such as contemporary extensions of constructivism and connectivism (Denojean-Mairet et al., 2024), cognitive load theory (Leppink et al, 2013; Ayres, 2018), and recent scholarship on microlearning and social media in digital pedagogy (Greenhow & Lewin, 2016). These theories collectively emphasise learner-centred design, peer interaction, and modular content delivery as mechanisms for enhancing comprehension, engagement, and retention—principles that are operationalised in the current model.

As established in the literature review, social media platforms provide affordances that are well-aligned with the characteristics of microlearning, including immediacy, brevity, and interactivity (Bruck, Motiwalla, & Foerster, 2012). Furthermore, research has shown that digital familiarity with platforms such as Facebook and Instagram can influence learner motivation and reduce cognitive friction in accessing content (Manca & Ranieri, 2016). These theoretical insights are reflected in the inclusion of Platform Familiarity and Content Engagement Features as core constructs within the framework.

The framework is also grounded in empirical evidence drawn from the quasi-experimental study presented in Chapters III and IV. PLS-SEM analysis validated the

structural relationships among key constructs such as Engagement, Comprehension, Retention, and Academic Performance, thereby reinforcing the predictive power of these variables in digitally mediated learning environments. By integrating theoretical underpinnings with empirical validation, the framework offers a comprehensive model that captures both conceptual and practical dimensions of social media-driven microlearning.

The framework incorporates eight interrelated components—Platform Familiarity, Content Design, Content Engagement Features, Engagement, Comprehension, Retention, Student Experience, and Academic Performance—operationalised and tested in this study. These constructs are synthesised into a coherent model that not only maps causal pathways but also offers practical guidance for pedagogical implementation.—Platform Familiarity, Content Design, Content Engagement Features, Engagement, Comprehension, Retention, Student Experience, and Academic Performance—operationalised and tested in this study.

6.2 Component Definitions

Platform Familiarity: Refers to students' comfort and prior experience with the social media platform used. High levels of familiarity are positively associated with reduced cognitive friction and increased confidence in navigating digital environments (Manca & Ranieri, 2016). This construct not only influences initial uptake but also facilitates deeper

and more sustained participation. Familiarity can be measured via self-assessment scales or digital usage logs and is particularly relevant in designing inclusive learning environments for diverse student cohorts.

Content Design: Encompasses the clarity, structure, pacing, and visual composition of microlearning units. Effective content design adheres to cognitive load theory (Leppink et al, 2013), aiming to reduce extraneous load while enhancing germane cognitive processing. Well-designed content often includes chunked segments, visually supported explanations, and the use of multimedia to cater to varied learning preferences (Mayer, 2009). It ensures that learners not only access information but retain and apply it meaningfully.

Content Engagement Features: Refers to the interactive tools embedded within the platform, such as polls, quizzes, emojis, and comment threads. These elements are derived from the affordance theory of social media (Greenhow & Lewin, 2016) and serve to increase both motivation and active learning. By incorporating elements of gamification and peer-to-peer feedback, these features can transform passive viewing into reflective and collaborative learning experiences. Emerging research suggests that the integration of microlearning with collaborative digital environments enhances both individual learning outcomes and group cohesion, positioning microlearning not merely as a consumption model but as a socially constructivist process (Garshasbi, Yecies & Shen, 2021). This underscores the potential of embedding computer-supported

collaboration tools into social media-based microlearning initiatives to facilitate co-construction of knowledge.

Engagement: A multidimensional construct involving behavioural (e.g., frequency of participation), cognitive (e.g., depth of thought), and emotional (e.g., interest and satisfaction) elements (Smirani & Yamani, 2024). Engagement is the central mediator in the framework, translating platform affordances and content design into meaningful learning outcomes. High engagement levels have been linked to improved knowledge retention and academic success.

Comprehension: Represents the learner's grasp of the instructional material. It includes both surface-level understanding and deeper conceptual mastery. Comprehension is often assessed via immediate post-task quizzes, reflective responses, or learner-generated examples. It serves as a necessary precursor to long-term retention and is influenced by both content quality and learner interaction.

Retention: Reflects the durability of learning, often measured through delayed assessments or application-based tasks. According to spaced repetition theory (Abbas et al., 2023), retention improves when content is revisited over time in varying contexts. In microlearning, retention is facilitated by reinforcement through discussion, summarisation tasks, and practical application.

Student Experience: A holistic measure encompassing usability, enjoyment, satisfaction, and perceived learning value (Dennen & Burner, 2017). Positive student experiences are associated with higher engagement, increased motivation, and improved academic confidence. Experience is typically measured via surveys, qualitative feedback, and reflective journals, and plays a crucial role in the overall success and scalability of digital interventions.

Academic Performance: The ultimate outcome construct, capturing measurable improvements in learner achievement. This may include test scores, assignment quality, project performance, or participation-based assessments. Academic performance reflects the cumulative impact of all previous constructs and provides an objective basis for evaluating instructional effectiveness.

6.3 Implementation Guidelines

To translate the framework into practice, educators and instructional designers should follow these steps. Each is grounded in theoretical underpinnings discussed in the literature review and supported by evidence-based best practices:

Step 1: Platform Selection and Familiarisation

The initial step involves selecting a social media platform that aligns with students' digital habits and provides an intuitive user interface. According to Manca and Ranieri (2016), learners' familiarity with platform functionality reduces cognitive friction and enhances initial engagement. Therefore, educators should opt for platforms already embedded in the students' daily lives—such as Facebook, Instagram, or even TikTok—rather than introducing new, institution-specific systems that may require a steep learning curve. Once selected, educators should provide a structured onboarding experience through tutorial videos, visual guides, or hands-on demonstrations to scaffold digital orientation (Siemens, 2005). This ensures that all students—regardless of prior exposure—enter the learning environment with equal footing and cognitive capacity to engage with content.

Example: An instructor might open the course with a short screencast video walking students through the Facebook Group interface, showing how to access posts, comment on threads, and receive notifications for new content.

Step 2: Content Design and Sequencing

Content should be developed using the principles of cognitive load theory (De Gagne et al., 2019), ensuring that instructional material minimises extraneous cognitive load while enhancing germane load. Microlearning units must be short, targeted, and modular—each addressing a discrete learning objective that contributes to broader course outcomes. The

use of multimedia (images, video, audio narration) helps cater to different learning styles while reinforcing key concepts (De Gagne et al., 2019). Sequencing should follow a logical progression, incorporating scaffolding principles from the digitally mediated adaptation of Vygotsky's scaffolding concept (Tewksbury & Downs, 2014), where earlier modules build the foundation for more complex concepts.

Example: A marketing course might include five 2-minute videos over a week, each focusing on a different principle of consumer behaviour. The sequence might start with basic terminology and build toward real-world applications using case studies.

Step 3: Embed Interactive Features

Engagement in social media-driven microlearning is partly driven by interactive elements that simulate peer feedback, competition, and real-time reflection (Greenhow & Lewin, 2016). Features such as polls, comment prompts, emoji reactions, and embedded quizzes serve as motivational triggers that activate behavioural and cognitive engagement (Smirani & Yamani, 2024). However, excessive gamification or overuse of these features can lead to distraction or fatigue. Designers should adopt a minimalist but strategic approach, ensuring that each interaction reinforces the learning objective.

Example: After posting a microlearning video, an instructor might prompt students to comment with one real-life example of the concept, followed by a short poll gauging their confidence in applying it.

Step 4: Monitor Engagement Metrics

To evaluate learner interaction and adapt instructional strategies in real-time, educators should collect and analyse engagement data. Metrics such as post views, comments, quiz completion rates, and time-on-task offer valuable insights into what content resonates and what may require adjustment. This step draws on the concept of formative assessment and learning analytics (Denojean-Mairet et al., 2024), which emphasise the iterative refinement of learning interventions based on student behaviour.

Example: If engagement drops significantly after the third module, it may indicate cognitive overload or declining interest, prompting the instructor to revise pacing or add a reflective break.

Step 5: Evaluate Comprehension and Retention

Assessment should not be limited to one-off evaluations. Instead, educators should embed frequent low-stakes assessments to gauge short-term comprehension and delayed assessments to evaluate long-term retention—aligned with the principle of spaced

repetition (Abbas et al., 2023). These evaluations may include multiple-choice quizzes, scenario-based applications, or learner-generated explanations.

Example: After viewing a module on ethical business practices, students might complete a short quiz and then, one week later, apply the concept to a fictional case in a discussion forum.

Step 6: Assess Student Experience

Understanding how students perceive the microlearning experience is essential for refining instructional design. Feedback should encompass usability, satisfaction, cognitive effort, and emotional resonance. This aligns with the construct of "student experience" as defined in recent digital pedagogy literature (Dennen & Burner, 2017). Both qualitative and quantitative methods should be used to capture a holistic view.

Example: A feedback survey could ask students to rate content clarity, platform usability, and enjoyment on a 5-point Likert scale, with optional space for open-ended comments.

Step 7: Measure Academic Performance

Ultimately, microlearning must demonstrate its efficacy through improved academic performance. Educators should compare the achievement of microlearning participants to

baseline performance or parallel cohorts exposed to traditional instruction. Performance metrics should be triangulated with comprehension and engagement data to build a multidimensional profile of learning success.

Example: Instructors might compare pre- and post-intervention test scores, assess the quality of submitted assignments, and analyse reflective essays to detect higher-order thinking gains.

Through the systematic application of these seven steps, grounded in well-established pedagogical theory and empirical evidence, educators can create meaningful, scalable, and learner-centred microlearning experiences within social media platforms.

The proposed framework is directly derived from the PLS-SEM results presented in Chapter IV. Platform Familiarity and Content Design demonstrated strong predictive power for Engagement and Student Experience. Engagement was shown to positively influence both Comprehension and Retention, which in turn contributed significantly to Academic Performance. These validated relationships confirm the theoretical underpinnings and reinforce the practical viability of the model.

Moreover, Content Engagement Features—while less statistically dominant—emerged as important enhancers of student interaction and perceived satisfaction. The nuanced role

of these features suggests that instructional designers should integrate them purposefully to avoid cognitive overload while still leveraging their motivational appeal.

6.4 Recommendations for Practitioners

The following recommendations are designed to support the practical adoption of the proposed microlearning framework in diverse educational settings. Each is derived from a synthesis of the empirical findings of this study and the theoretical constructs explored in the literature review, ensuring that both conceptual and applied considerations are accounted for.

Prioritise platform usability and alignment with student preferences to reduce learning curves and increase participation. Students are more likely to engage with microlearning content delivered through platforms they already know and use (Manca & Ranieri, 2016). Selecting familiar social media tools such as Instagram, Facebook, or TikTok not only reduces onboarding time but also facilitates smoother transitions between personal and academic digital behaviours. Usability also speaks to interface design, mobile optimisation, and accessibility features. Educators should pilot platforms with diverse student groups and incorporate early feedback into platform selection and configuration.

Design microlearning content to align with course objectives, ensuring that each unit builds upon previous knowledge and contributes to cumulative understanding. Content

coherence is a critical determinant of cognitive assimilation. Following the principles of constructive alignment (Biggs & Tang, 2011), educators must ensure that every microlearning artifact directly supports one or more learning outcomes. Sequencing should reflect logical progression and utilise scaffolding strategies to facilitate knowledge building. For example, introductory concepts should be followed by intermediate applications and culminate in real-world scenarios that challenge students to synthesise their learning.

Use engagement features judiciously—focusing on those that provide meaningful interaction rather than superficial clicks. As established in Greenhow and Lewin (2016), interactivity is a major affordance of social media platforms, but its pedagogical effectiveness depends on intentionality. Polls, comment prompts, and emoji reactions should be selected for their capacity to trigger reflection, collaboration, or feedback—not merely to drive activity metrics. Overuse or poorly timed features may lead to novelty fatigue or distraction. Educators should match engagement tools to the learning stage and desired depth of processing.

Balance cognitive stimulation with simplicity. Avoid overwhelming students with excessive content or over-gamification. According to cognitive load theory (Leppink et al, 2013), instructional material must avoid overtaxing students' working memory. While microlearning encourages brevity, the accumulation of multiple stimuli—notifications, links, animations—can dilute cognitive focus. The goal is to stimulate active engagement

without fragmenting attention. Designers should adopt a minimalist approach where each element—text, image, or interactive feature—serves a deliberate cognitive or emotional function.

Regularly iterate and adapt the framework based on feedback, analytics, and performance data to ensure continued relevance and impact. The dynamic nature of social media and the diversity of learner profiles necessitate an adaptive design mindset. As Siemens (2013) notes, learning analytics provide a data-driven mechanism for continuous improvement. Educators should establish regular review cycles to assess engagement trends, user feedback, and performance outcomes. Iterations may include adjusting content length, revising platform settings, or altering assessment formats based on empirical data and learner input. This feedback loop ensures that the microlearning experience remains contextually responsive and pedagogically sound.

These recommendations are not prescriptive but intended to guide reflective, data-informed decision-making among educators and instructional designers. When thoughtfully applied, they enable the framework to achieve its full potential: delivering scalable, engaging, and outcome-oriented learning experiences within the fluid and familiar environments of contemporary social media platforms.

6.5 Application Scenario: Business Course via Instagram Reels

To illustrate how the proposed framework may be applied in practice, consider the case of a university lecturer delivering a 4-week undergraduate marketing module focused on consumer psychology. The course previously relied on hour-long lectures and static PowerPoint slides. To enhance engagement and improve comprehension among digital-native students, the lecturer redesigns the module using Instagram Reels as the primary platform for delivering microlearning content.

Course Context and Rationale:

The decision to use Instagram is grounded in student feedback and platform usage data, which indicated high levels of familiarity and daily engagement with the platform. As supported by Manca and Ranieri (2016), aligning platform selection with students' existing digital habits significantly reduces onboarding barriers and improves receptivity to new instructional formats. The module's redesign is also informed by cognitive load theory (Leppink et al, 2013), which suggests that distributing content in short, cognitively manageable units can facilitate deeper processing and retention.

Content Development and Sequencing:

Each microlearning unit consists of a 45–60 second video Reel accompanied by a supporting caption that summarises key points and includes a discussion prompt. Topics include "heuristics in decision-making," "the psychology of colour in branding," "social proof and consumer behaviour," and "ethical marketing dilemmas." These Reels are released on a staggered schedule, with two videos per week, allowing time for students to

reflect, engage, and revisit content as needed. This aligns with Mayer's (2009) principles of multimedia learning, particularly the segmenting principle, which advocates for pacing content delivery to match cognitive processing needs.

Embedding Engagement Features:

Each Reel includes an interactive component, such as a poll (e.g., "Which brand do you trust more?"), a short quiz via Instagram Stories, or a comment prompt asking students to apply the concept to a product or ad they've seen recently. These features not only reinforce key concepts but also encourage social interaction and reflection, both of which are core to constructivist learning (Lowenthal & Dunlap, 2018).

Analytics and Adaptation:

The instructor regularly monitors platform analytics to assess reach, engagement, and drop-off rates. For example, if a Reel covering "social proof" received lower completion rates, the instructor might follow up with a clarification post or a short Q&A story session. Midway through the module, based on declining interaction with the comment sections, the instructor introduces a weekly leaderboard that recognises insightful comments, thus fostering motivation through gamified recognition.

Assessment Strategy:

To evaluate comprehension, weekly low-stakes quizzes are administered via the institution's LMS, with each quiz tied to the concepts covered in the Reels. For retention,

a delayed quiz is issued in Week 4 that includes content from the first two weeks, applying the principles of spaced repetition (Abbas et al., 2023). Final assessment takes the form of a group project where students must apply course concepts to design a mini-campaign for a hypothetical brand, which they pitch via a recorded Instagram Story.

Student Experience and Performance:
Feedback collected through an anonymous survey reveals strong student satisfaction with the format, citing convenience, relevance, and clarity of content. Many students highlight that the mobile-first approach allowed them to learn "on the go" and revisit content more frequently. Academic performance improved, with average quiz scores and project evaluations surpassing previous cohorts taught through traditional lectures.

This scenario not only demonstrates the practical application of the proposed framework but also exemplifies how a theory-informed, data-responsive microlearning strategy can enhance both student experience and educational outcomes.

6.6 Visual Framework Summary

Figure 6.1 presents a comprehensive visual representation of the framework developed and tested in this study, reflecting both theoretical alignment and empirical validation. This framework builds upon insights from Chapters II, III, and IV by integrating constructs that emerged from the literature review and were statistically validated through

PLS-SEM analysis. The model captures the relationships among the eight core constructs: Platform Familiarity, Content Design, Content Engagement Features, Engagement, Comprehension, Retention, Student Experience, and Academic Performance.

The framework is structured across three functional tiers:

Input Constructs: These include Platform Familiarity, Content Design, and Content Engagement Features. They serve as the foundational instructional elements that directly influence how learners interact with digital microlearning environments. As suggested in previous research (Manca & Ranieri, 2016; Greenhow & Lewin, 2016), these inputs determine initial learner motivation, ease of access, and usability of content, thereby establishing the cognitive and affective conditions under which learning can occur.

Mediating Constructs: The cognitive and behavioural processes through which learning is internalised are captured by Engagement, Comprehension, and Retention. Engagement acts as a central mediator influenced by all three inputs, and it subsequently shapes the depth of Comprehension and the durability of Retention. These constructs reflect dynamic psychological states that respond to stimuli within the microlearning design and platform features (Smirani & Yamani, 2024).

Outcome Constructs: Student Experience and Academic Performance are placed at the final tier. These constructs reflect both subjective perceptions of the learning process and objective indicators of academic achievement. The model shows that Comprehension and Retention serve as critical bridges from engagement-driven processes to measurable outcomes. This structure reinforces prior literature indicating that comprehension and knowledge consolidation are the most reliable predictors of learning success (Dennen & Burner, 2017).

The diagram illustrates multi-directional causal pathways: each input construct influences multiple mediators, and each mediator affects both outcomes. For instance, Platform Familiarity affects Engagement, which in turn drives both Comprehension and Retention. Comprehension and Retention then simultaneously influence Student Experience and Academic Performance. Content Design exerts a direct influence on all three mediators, demonstrating its central role in shaping the learner's journey. Similarly, Content Engagement Features—though more subtle in their predictive strength—are included for their motivational and affective value.

The final visual model, shown in Figure 6.1, not only aligns with the structural equation model tested in Chapter IV but also encapsulates the practical insights drawn from the implementation scenario in Section 6.5. It provides a strategic reference point for educators, instructional designers, and institutional decision-makers aiming to translate theoretical constructs into applied educational innovation.

Arrows between components indicate the directional relationships validated by the PLS-SEM analysis. For example, Platform Familiarity and Content Design significantly predict Engagement, while Content Design and Engagement Features, predicts Comprehension and Retention. The combination of Engagement, Comprehension and Retention impact cognitive outcomes which influence both the subjective experience of learning and objective academic performance. Content Engagement Features, while positioned at the same foundational level, act as enhancers that modulate the quality of interaction and support higher levels of engagement and comprehension.

The model emphasises the interconnected nature of the constructs, highlighting how improvements in foundational areas—such as intuitive platform use and coherent content design—can cascade upward to influence long-term learning success. This visual serves as both a conceptual guide and a practical planning tool for designing, implementing, and evaluating microlearning experiences in social media environments.

The following diagram (Figure 6.1) provides a visual summary of the proposed framework. The model positions Platform Familiarity and Content Design as foundational inputs that influence Engagement and Student Experience. These, in turn, shape Comprehension and Retention, culminating in improved Academic Performance. Content Engagement Features are depicted as enhancers that moderate the relationships between content and engagement.

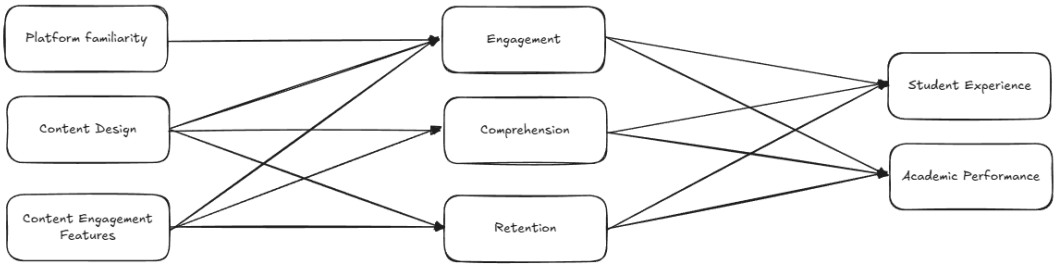


Figure 6.1 Visual Model of the Social Media-Driven Microlearning Framework

6.7 Summary and Conclusion

This chapter has articulated a comprehensive and empirically grounded framework for designing, implementing, and evaluating social media-driven microlearning in higher education contexts. The framework was derived from a synthesis of contemporary learning theories—including constructivism, connectivism, cognitive load theory, and multimedia learning principles—and supported by empirical findings from the quasi-experimental study conducted in this thesis.

Through detailed construct definitions, implementation guidelines, practitioner recommendations, and a scenario-based application, the framework bridges theory and practice. Each component, from Platform Familiarity to Academic Performance, has been

operationalised not merely as an abstract concept, but as a practical tool for enabling student-centred, data-informed, and digitally fluent pedagogy.

The visual model (Figure 6.1) encapsulates the interdependencies among constructs, reinforcing the idea that thoughtful instructional design can lead to meaningful improvements in engagement, comprehension, retention, and ultimately, academic performance. Importantly, the framework is adaptable: while empirically tested within the Facebook platform, its principles are applicable across a wide range of digital learning environments.

6.8 Implications

The formulation and validation of the Social Media-Driven Microlearning Framework presented in this chapter hold extensive and multi-layered implications for academia, educational practice, and strategic policy development. As the digital education landscape continues to evolve, it becomes increasingly imperative for both researchers and practitioners to anchor innovation in a structured yet adaptable pedagogical foundation. This study contributes meaningfully to that endeavour by advancing theoretical understanding, offering pragmatic instructional models, and guiding institutional digital transformation agendas.

Academic Implications

From an academic perspective, this study offers a substantial contribution to the theoretical discourse on digital learning, particularly in the areas of microlearning, social media-based pedagogy, and contemporary engagement theory. By integrating constructs derived from cognitive load theory (Leppink et al, 2013), social constructivism (Lowenthal & Dunlap, 2018), and connectivist theory (Denojean-Mairet et al., 2024), the framework transcends mere instructional taxonomy and provides a cohesive conceptual model for understanding how digitally mediated microlearning environments function within higher education contexts.

This integration of cross-disciplinary theory into a testable, empirically validated model addresses a critical gap in the literature. Although microlearning has garnered increasing scholarly interest over the past decade, relatively few studies have operationalised its underlying constructs in a way that is both academically rigorous and pedagogically actionable. The framework therefore serves as a pivotal theoretical artefact, capable of informing future hypothesis-driven research, comparative studies across diverse learner demographics, and experimental replications in alternate platform ecosystems.

In addition, the methodological approach employed—specifically the application of PLS-SEM to a quasi-experimental dataset—demonstrates the applicability of structural equation modelling in exploratory educational research. This methodological contribution

paves the way for future researchers to adopt a similar empirical orientation, validating or refining the constructs identified here in broader cultural and disciplinary contexts. The research thus not only fills an academic void but also invites ongoing scholarly dialogue and empirical refinement.

Practical Implications

For practitioners in higher education—including educators, learning designers, and academic technologists—this framework offers a robust and evidence-informed roadmap for implementing microlearning in contemporary classrooms. In contrast to abstract conceptual models that remain divorced from classroom realities, the proposed framework is grounded in both theory and application. It provides granular definitions of constructs such as Platform Familiarity, Content Design, and Engagement Features, and translates these into implementable strategies via the detailed seven-step guideline in Section 6.3.

Educators are encouraged to use the framework not as a static protocol but as a dynamic planning tool that can be adapted to diverse teaching modalities, learner profiles, and course content. The framework's emphasis on platform alignment, instructional pacing, and motivational scaffolding resonates with practical classroom imperatives, where instructors must make real-time pedagogical decisions in response to learner feedback and performance data. Moreover, the application scenario in Section 6.5 illustrates the

framework's applicability in an authentic instructional setting, offering a vivid exemplar that other educators may emulate or adapt.

Crucially, this study foregrounds the importance of measuring outcomes beyond traditional assessment metrics. The inclusion of Student Experience and Engagement as central constructs underscores the pedagogical value of affective and behavioural dimensions in student learning. By recognising that academic performance is but one manifestation of learning success, the framework advocates for a more holistic approach to educational evaluation—one that aligns with contemporary calls for learner-centred pedagogies and inclusive digital practices.

Strategic and Policy Implications

At a macro level, the implications of this study extend to institutional strategy and educational policy. As universities grapple with the challenge of digital transformation, the findings of this study provide a compelling rationale for embedding microlearning into formal curriculum structures. The framework demonstrates that social media platforms—often perceived as informal or distracting—can be repurposed as legitimate vehicles for achieving educational outcomes, provided that their affordances are strategically harnessed and pedagogically aligned.

University administrators and strategic planners may use this framework to inform decisions related to platform procurement, faculty development, and learning management system integration. It supports a vision of higher education that is not only digitally fluent but also responsive to the evolving expectations and learning habits of contemporary students. In doing so, it contributes to the institutional discourse on digital equity, access, and student-centred innovation.

From a policy standpoint, this research provides empirical support for the inclusion of microlearning and social media literacy in national education standards and accreditation frameworks. Ministries of education and higher education councils may look to this framework as a template for guiding investment in scalable, research-based digital learning initiatives. Furthermore, the emphasis on iterative evaluation and analytics-based feedback loops aligns with global trends in educational quality assurance and continuous improvement.

In sum, the Social Media-Driven Microlearning Framework presented in this chapter is more than an academic construct; it is a strategic instrument for navigating the future of higher education. It offers a means by which theory, practice, and policy can be synchronised to produce transformative learning environments that are inclusive, adaptive, and empirically grounded.

6.9 Recommendations for Future Research

While the Social Media-Driven Microlearning Framework developed and validated in this study presents a substantial contribution to contemporary digital pedagogy, it also reveals a spectrum of unanswered questions and fertile ground for ongoing scholarly inquiry. This section articulates multiple dimensions through which future research may extend, adapt, or interrogate the framework's assumptions, mechanisms, and applications. In doing so, it invites deeper theoretical innovation, methodological expansion, and practical exploration.

1. Cross-Platform Comparative Studies

Given that this study primarily focused on mainstream platforms such as Facebook and Instagram, there is considerable scope to investigate how the framework performs when deployed on alternative or emerging platforms. Future research could undertake comparative analyses across social media ecosystems—such as TikTok, YouTube Shorts, Discord, or even institutionally developed microlearning apps—to examine how platform affordances modulate the framework's core constructs. For example, different platforms may vary in their cognitive interface design, participatory culture, content delivery constraints, and community-building potential. Such studies would not only validate the framework's generalisability but also inform the development of platform-specific microlearning strategies.

2. Longitudinal Research on Retention and Transfer

While this research measured retention over short timeframes using delayed quizzes, the long-term durability and transferability of microlearned knowledge remain areas in need of sustained investigation. Future longitudinal studies could track learners across academic terms or institutional milestones to assess the persistence of comprehension and its application in novel or higher-order contexts. This would also enable researchers to examine how repeated exposure to microlearning interventions shapes metacognition, study habits, and independent learning capacity over time.

3. Cultural, Linguistic, and Socio-Demographic Adaptation

Current findings are based on a relatively homogenous sample drawn from a single cultural and institutional context. Future research should pursue comparative studies across culturally and linguistically diverse cohorts, considering how factors such as first language, cultural norms regarding authority and participation, and levels of digital access may mediate the effectiveness of platform-specific microlearning. Such work would enhance the framework's global relevance and contribute to efforts in decolonising digital pedagogy and promoting equitable digital inclusion.

4. Instructor Identity, Readiness, and Pedagogical Culture

There exists a notable research gap concerning the instructor's role in social media-driven microlearning environments. Future investigations should explore how educators' digital literacy, pedagogical identity, and disciplinary paradigms affect framework implementation. Mixed-method research that captures both the subjective experiences and behavioural patterns of instructors—perhaps through longitudinal ethnographies or diary studies—could reveal important insights into instructional design, content curation, and facilitation strategies. This line of inquiry could also examine institutional factors such as training, workload, and pedagogical autonomy.

5. Integration of Advanced Learning Analytics and Artificial Intelligence (AI)

As the field of educational technology advances, future research should investigate how AI tools—such as adaptive algorithms, personalised content feeds, or sentiment analysis—could augment the framework's application. Additionally, learning analytics dashboards could be used to visualise learner trajectories, predict attrition, or automate formative feedback. Investigating the interplay between data-driven insights and human-centred pedagogy would add a critical layer of complexity to the model, bridging microlearning design with real-time instructional intelligence.

6. Development of Standardised Evaluation Instruments

Currently, there is no universally accepted toolkit for evaluating the success of social media-driven microlearning interventions. Future researchers are encouraged to develop and validate psychometric instruments and rubrics that assess not only traditional outcomes like test scores but also constructs such as cognitive engagement, learner agency, and platform-specific satisfaction. These tools would greatly benefit educational institutions seeking to scale microlearning while maintaining accountability and instructional quality.

7. Microlearning in Non-Traditional and Lifelong Learning Contexts

Finally, researchers should consider expanding the scope of inquiry to encompass non-formal and lifelong learning environments. This may include professional development programs, vocational training, or community-based education initiatives where microlearning is already being informally practiced. Studying how the framework performs in these alternative settings would broaden its applicability and contribute to global digital literacy efforts.

In summary, the recommendations presented above are intended to scaffold a new generation of interdisciplinary, impact-driven research that builds upon and critically examines the framework developed in this thesis. As both social media technologies and learner expectations evolve, future researchers are called upon to ensure that our

pedagogical models remain not only evidence-based, but also ethically attuned, inclusive, and technologically responsive.

6.10 Conclusion

Chapter VI has advanced the thesis by offering a comprehensive and theoretically grounded framework for the design, implementation, and evaluation of social media-driven microlearning in higher education contexts. Drawing from an extensive synthesis of cognitive, constructivist, and connectivist learning theories—as well as empirically validated constructs—this chapter articulated a model that is both pedagogically rigorous and practically actionable. The framework was not conceived in abstraction; rather, it emerged from the structural relationships confirmed through PLS-SEM analysis and the contextual realities of digital-native learners engaging with instructional content on familiar platforms.

Each section of this chapter contributed a vital layer to the model's robustness. The construct definitions in Section 6.2 provided conceptual clarity and theoretical justification for each element of the framework. The implementation guidelines in Section 6.3 transformed these theoretical insights into a replicable and educator-friendly sequence of actions. Section 6.5 translated empirical insights into applied recommendations, enabling instructional designers to operationalise the model with both fidelity and flexibility. Section 6.5 brought the framework to life through an illustrative scenario, showcasing its adaptability to specific disciplinary and platform contexts. The

visual model in Section 6.7 distilled complex causal pathways into an intuitive schematic, reinforcing the coherence of the proposed architecture.

The subsequent sections further extended the chapter's reach. Section 6.9 delineated implications that span academic theory, educational practice, and institutional policy, demonstrating the model's relevance at multiple levels of decision-making. Section 6.10 outlined a forward-facing research agenda, underscoring both the unresolved questions and emerging opportunities in this rapidly evolving domain.

In totality, Chapter VI elevates the thesis from an exploration of microlearning efficacy to the proposal of a replicable, evidence-based, and context-sensitive framework for twenty-first-century education. By centring both learners' digital realities and educators' strategic needs, the framework positions itself not as a final answer but as a guiding model—flexible enough to evolve with future platforms and pedagogical paradigms. As higher education systems continue to navigate the challenges and opportunities of digital transformation, this framework offers a theoretically anchored, empirically tested, and pedagogically sound approach to leveraging social media for impactful learning.

BIBLIOGRAPHY

- Abbas, A. M., Hamid, T., Iwendi, C., Morrissey, F., & Garg, A. (2023). Improving Learning Effectiveness by Leveraging Spaced Repetition (SR). In Big Data and Cloud Computing (pp. 145–160). Springer. https://doi.org/10.1007/978-981-99-1051-9_10

- Adnan, M. and Giridharan, B., 2019, April. Use of social media applications in classroom: analysis from education perspective. In IOP Conference Series: Materials Science and Engineering (Vol. 495, No. 1, p. 012108). IOP Publishing.

- Al-Mukhaini, E.M., Al-Qayoudhi, W.S. and Al-Badi, A.H. (2014) 'Adoption of social networking in education: A study of the use of social networks by higher education students in Oman', Journal of International Education Research, 10(2), pp. 143–154. https://doi.org/10.19030/jier.v10i2.8516

- Aymerich-Franch, Laura & Fedele, Maddalena. (2019). Students' Privacy Concerns on the Use of Social Media in Higher Education. https://doi.org/10.4018/978-1-5225-8897-9.ch052

- Ayres, P. (2018). Cognitive Load Theory: Understanding the Role of Mental Effort in Learning. In T. M. Ortlieb & E. H. Cheek (Eds.), Theoretical Models of Learning and Literacy Development (pp. 105–122). Routledge.

- Balasundaram, S., Mathew, J. & Nair, S. (2022). Microlearning and Learning Performance in Higher Education: A Post-Test Control Group Design. Journal of

Learning for Development, 9(2), pp.149–163. https://files.eric.ed.gov/fulltext/EJ1423546.pdf

- Barrera-Verdugo, G. and Villarroel, V, A. 2021. Measuring the association between students' exposure to social media and their valuation of sustainability in entrepreneurship. Heliyon, 7(6), e07272. https://doi.org/10.1016/j.heliyon.2021.e07272.
- Biggs, J. & Tang, C. (2011). Teaching for Quality Learning at University: What the Student Does (4th ed.). Maidenhead: Open University Press.
- Bruck, P.A., Motiwalla, L. & Foerster, F. (2012). Mobile Learning with Microcontent: A Framework and Evaluation. In Proceedings of the 25th Bled eConference eDependability: Reliable and Trustworthy eStructures, eProcesses, eOperations and eServices for the Future, Bled, Slovenia, pp. 527–542. https://domino.fov.um.si/proceedings.nsf/Proceedings/C3FB705E43F2F302C1257A2A0032CC30/$File/P38_Bruck_35.pdf
- Bulut, D. (2023). *The Association between Attention Impairments and the Internet and Social Media Usage among Adolescents and Young Adults with Potential Consequences: A Review of Literature*. Psychology, 14(8), pp.1310–1321. https://doi.org/10.4236/psych.2023.148073
- Castillo-Sarmiento, J. A., Ballesteros-Yánez, I., Rivero-Jiménez, B., & Mariano-Juárez, L. (2023). Microlearning through TikTok in higher education: An evaluation of uses and potential. *Education and Information Technologies*, 28, 3451–3470. https://doi.org/10.1007/s10639-023-11904-4

- Cheng, X., Fu, S., & de Vreede, G. J. (2017). Understanding trust influencing factors in social media communication: A qualitative study. *Information Technology & People*, 30(1), 154–175.
- Cheung, H. (2023). Growth mindset and social comparison effects in a peer learning environment. *Social Psychology of Education*, 26(3), pp.603–636. https://doi.org/10.1007/s11218-023-09850-7
- David, Conde-Caballero & Castillo, Carlos & Ballesteros-Yanez, Inmaculada & Rivero Jiménez, Borja & Mariano, Lorenzo. (2023). Microlearning through TikTok in Higher Education. An evaluation of uses and potentials. Education and Information Technologies.
- De Gagne, J.C., Park, H.K., Hall, K., Woodward, A., Yamane, S.S. and Kim, S.S. (2019) 'Microlearning in health professions education: A scoping review of the literature', *Journal of Medical Education and Curricular Development*, 6, pp. 1-9.
- Dennen, V.P. & Burner, K.J. (2017). The Cognitive, Social, and Emotional Dimensions of Learning in Online Discussion Forums. In P. Lowenthal, C. York & J. Richardson (Eds.), Online Learning: Common Misconceptions, Benefits and Challenges (pp. 69–89). Nova Science Publishers.
- Denojean-Mairet, M., López-Pernas, S., Agbo, F. J., & Tedre, M. (2024). A literature review on the integration of microlearning and social media. *Smart Learning Environments*, 11(1), 46. https://doi.org/10.1186/s40561-024-00334-5
- Efron, B., 1987. Better Bootstrap Confidence Intervals. Journal of the American Statistical Association, 82(397), pp.171–185. https://doi.org/10.2307/2289144

- Fawns, T. An Entangled Pedagogy: Looking Beyond the Pedagogy—Technology Dichotomy. Postdigit Sci Educ 4, 711–728 (2022). https://doi.org/10.1007/s42438-022-00302-7
- García Río, E., Baena Luna, P., Palos Sánchez, P.R. and Aguayo Camacho, M., 2022. Microblogging: an online resource to support education and training processes. Campus Virtuales, 11 (2), 39-48. https://doi.org/10.54988/cv.2022.2.1013
- Garg, A. and Kumar, J., 2021. Social media marketing influence on Boutique Hotel customers' purchase intention in Malaysia. Tourism & Management Studies, 17(3), pp.51-62.
- Garshasbi, S., Yecies, B. and Shen, J., 2021. Microlearning and computer-supported collaborative learning: An agenda towards a comprehensive online learning system. STEM Education, 1(4), pp.225.
- Greenhow, C. & Lewin, C. (2016). Social Media and Education: Reconceptualizing the Boundaries of Formal and Informal Learning. Learning, Media and Technology, 41(1), pp. 6–30. https://doi.org/10.1080/17439884.2015.1064954
- Greenhow, C., & Galvin, S. M. (2020). Teaching with social media: Evidence-based strategies for making remote higher education less remote. Information and Learning Sciences, 121(5/6), 341–352. https://doi.org/10.1108/ILS-04-2020-0138
- Grevtseva, Y., Willems, J. and Adachi, C., 2017, July. Social media as a tool for microlearning in the context of higher education. In Proceedings of European

Conference on social media Mycolas Romeris University Vilnious, Lithuania 3-4 July 2017(pp. 131-139).

- Gruzd, A. and Conroy, N., 2018, June. Designing a learning analytics dashboard for twitter-facilitated teaching. In Proceedings of the Fifth Annual ACM Conference on Learning at Scale, June 2018 (pp. 1-4).
- Göschlberger, B., 2016. A Platform for Social Microlearning, in: Adaptive and Adaptable Learning. Springer International Publishing, pp. 513–516. https://doi.org/10.1007/978-3-319-45153-4_52
- Hair, J.F., Hult, G.T.M., Ringle, C.M. & Sarstedt, M., 2017. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). 2nd ed. Thousand Oaks, CA: SAGE Publications.
- Hair, Joseph & Hult, G. Tomas M. & Ringle, Christian & Sarstedt, Marko. (2022). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).
- https://eli.johogo.com/Class/CCU/SEM/_A%20Primer%20on%20Partial%20Least%20Squares%20Structural%20Equation%20Modeling_Hair.pdf
- Hamadi, M., El-Den, J., Azam, S., & Sriratanaviriyakul, N. (2021). A novel framework for integrating social media as cooperative learning tool in higher education's classrooms. *Research and Practice in Technology Enhanced Learning*, 16(1), 21. https://doi.org/10.1186/s41039-021-00169-5
- Hanshaw, G. and Hanson, J., 2019. Using microlearning and social learning to improve teachers' instructional design skills: A mixed methods study of

technology integration in teacher professional development. International Journal of Learning and Development, 9(1), pp.145-173.

- Hrastinski, S. (2009). A theory of online learning as online participation. Computers & Education, 52(1), 78–82. https://doi.org/10.1016/j.compedu.2008.06.009
- Hussain, I., Cakir, O. and Candeger, Ü., 2018. Social Media as a Learning Technology for University Students. International Journal of Instruction, 11(2), pp.281-296
- Ichiuji, B. A., DeAngelis, E. J., Corpodean, F., Thompson, J., Arsenault, L., Amdur, R. L., Vaziri, K., Lee, J., & Jackson, H. T. (2021). The Effect of a Microlearning Module on Knowledge Acquisition in Surgery Clerkship Students. Journal of Surgical Education, 79(1), 1–7. https://doi.org/10.1016/j.jsurg.2021.11.001
- Journal of Student Success Research. (2023). The impact of gamification on motivation and engagement in game-based learning environments. *Journal of Student Success Research*, 5, Article 3861. https://journals.gmu.edu/index.php/jssr/article/view/3861
- Kasakliev, N., 2020. Social media in Training - Risks and Challenges. International Journal of Advanced Trends in Computer Science and Engineering 9, 2582–2588. https://doi.org/10.30534/ijatcse/2020/15932020
- Keles, B., McCrae, N., & Grealish, A. (2020). *A systematic review: the influence of social media on depression, anxiety and psychological distress in adolescents*.

International Journal of Adolescence and Youth, 25(1), pp.79–93. https://doi.org/10.1080/02673843.2019.1590851

- Kohnke, L. (2021) 'Microlearning for language learners: The importance of autonomy and digital support', in Kohnke, L. (ed.) *Microlearning in the Digital Age: The Design and Delivery of Learning in Snippets*. Routledge.
- Kohnke, L., 2021. Optimizing microlearning materials for mobile learning. Microlearning in the digital age: The design and delivery of learning in snippets, pp.80-94.
- Lahuerta-Otero, E., Cordero-Guti\' errez, R., Izquierdo-\' Alvarez, V., 2019. Using Social Media to Enhance Learning and Motivate Students in the Higher Education Classroom, in: Communications in Computer and Information Science. Springer International Publishing, pp. 351–361. https://doi.org/10.1007/978-3-030-20798-4_30
- Leppink, J., Paas, F., Van der Vleuten, C. P. M., Van Gog, T., & Van Merriënboer, J. J. G. (2013). Development of an instrument for measuring different types of cognitive load. Behavior Research Methods, 45(4), 1058–1072. https://doi.org/10.3758/s13428-013-0334-1
- Leiner, D.J., 2019. Too Fast, Too Straight, Too Weird: Non-Reactive Indicators for Meaningless Data in Internet Surveys. Survey Research Methods, 13(3), pp.229–248. https://ojs.ub.uni-konstanz.de/srm/article/view/7403

- Lottering, R., 2020. Using social media to enhance student engagement and quality. South African Journal of Higher Education 35. https://doi.org/10.20853/34-5-4271
- Lowenthal, P.R., & Dunlap, J.C. (2018). Investigating students' perceptions of instructional strategies to establish social presence. Distance Education, 39(3), 281–298. https://doi.org/10.1080/01587919.2018.1476844
- Mahindru, S., 2018. Novel tools for imparting higher education: a review. International Journal of Advanced Research in Computer Science, 9 (2).
- Maier, C., Laumer, S., Weinert, C., & Weitzel, T. (2015). The effects of technostress and switching stress on discontinuous usage intentions of social media. *Information Systems Journal*, 25(6), 637–676. https://doi.org/10.1111/isj.12068
- Manca, S. (2020) 'Snapping, pinning, liking or texting: Investigating social media in higher education beyond Facebook', *The Internet and Higher Education*, 44, 100707.
- Manca, S. & Ranieri, M. (2016). Facebook and the Others. Potentials and Obstacles of Social Media for Teaching in Higher Education. Computers & Education, 95, pp. 216–230. https://doi.org/10.1016/j.compedu.2016.01.012
- Monash University, 2023. Social media as a tool for microlearning in the context of higher education. [online] Available at: https://research.monash.edu/en/publications/social-media-as-a-tool-for-microlearning-in-the-context-of-higher

- Mujica, A., Villanueva, E., Lodeiros-Zubiria, M.L., 2021. Micro-learning Platforms Brand Awareness Using Socialmedia Marketing and Customer Brand Engagement. International Journal of Emerging Technologies in Learning (iJET) 16, 19. https://doi.org/10.3991/ijet.v16i17.23339
- Perez, E., Manca, S., Fernández-Pascual, R., & Mc Guckin, C. (2023). *A systematic review of social media as a teaching and learning tool in higher education: A theoretical grounding perspective*. Education and Information Technologies, 28(3), pp.2345–2367. https://doi.org/10.1007/s10639-023-11647-2
- Priyamvada, R. (2023) 'Exploring the constructivist approach in education: Theory, practice, and implications', *International Journal of Multidisciplinary Research and Growth Evaluation*, 4(1), pp. 1–5. Available at: https://www.researchgate.net/publication/379669385
- Ramzan, M., Javaid, Z.K. and Fatima, M., 2023. Empowering ESL Students: Harnessing the Potential of Social Media to Enhance Academic Motivation in Higher Education. Global Digital & Print Media Review, VI, pp.224-237.
- Rezaei, D. F., & Ritter, N. L. (2018). Social media in education: Gains in student learning and instructor best practices. In J. Keengwe (Ed.), Handbook of Research on Mobile Technology, Constructivism, and Meaningful Learning (pp. 218–240). IGI Global. https://doi.org/10.4018/978-1-5225-3949-0.ch012
- Saini, C. and Abraham, J., 2017. Promises of social media enabled learning in education. Education, International Education and Research Journal (IERJ), 3(2). http://ierj.in/journal/index.php/ierj/article/view/661.

- Sarstedt, M., Ringle, C.M. & Hair, J.F., 2021. PLS-SEM: Looking Back and Moving Forward. Long Range Planning. https://www.researchgate.net/publication/261219445_PLS-SEM_Looking_Back_and_Moving_Forward
- Selwyn, N., 2016. *Education and Technology: Key Issues and Debates*. 2nd ed. London: Bloomsbury Publishing.
- Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3–10. http://www.itdl.org/Journal/Jan_05/article01.htm
- Smirani, L. & Yamani, H. (2024). Analysing the impact of gamification techniques on enhancing learner engagement, motivation, and knowledge retention: A structural equation modelling approach. *Electronic Journal of e-Learning*, 22(9), pp.3563–3578.
- Tewksbury, D., & Downs, E. (2014). "Friending" Vygotsky: A social constructivist pedagogy of knowledge building through classroom social media Use. *Journal of Effective Teaching*, 14(1), 33–50.
- Trowbridge, S., Waterbury, C., & Sudbury, L. (2017). Learning in bursts: Microlearning with social media. *EDUCAUSE Review*. https://er.educause.edu/articles/2017/4/learning-in-bursts-microlearning-with-social-media

- Van Den Beemt, A., Thurlings, M. & Willems, M. (2019). *Towards an understanding of social media use in the classroom: A literature review*. Education and Information Technologies, 24(4), pp.2455–2474.
- Wong, Associate Prof Ts. Dr. Seng Yue & Tee, Wee Jing. (2018). The Effectiveness and Impact of Social Media Approach on Students' Learning Performances. 10.1007/978-981-10-4223-2_33.
- Woods, Kathryn & Gomez, Melissa & Arnold, Michelle. (2019). Using Social Media as a Tool for Learning in Higher Education. International Journal of Web-Based Learning and Teaching Technologies. 14. 1-14. 10.4018/IJWLTT.2019070101.
- Yaseen, H., Mohammad, A.S., Ashal, N., Abusaimeh, H., Ali, A. and Sharabati, A.-A.A. (2025) 'The impact of adaptive learning technologies, personalized feedback, and interactive AI tools on student engagement: The moderating role of digital literacy', *Sustainability*, 17(3), 1133. https://www.mdpi.com/2071-1050/17/3/1133
- Yeoh, A., 2022. Reflections on microlearning in the social media age. Medical Education 57, 290–290.
- Yuniarsih, T. et al. 2022. Analysis of Microlearning-Based Learning Media Needs: A Retrospective Study at Vocational High School. Available at: https://scite.ai/reports/10.2991/aebmr.k.220701.002.

- Veletsianos, G., 2020. *Learning Online: The Student Experience*. Baltimore: Johns Hopkins University Press.