

Microlearning: A New Frontier in Online Learning

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Table 2 — [What We Know About Microlearning's Evidence](#)

List of Abbreviations

CAGR — Compound Annual Growth Rate

CLT — Cognitive Load Theory

ICT — Information and Communications Technology

LMS — Learning Management System

LTM — Long-Term Memory

MOOCs — Massive Open Online Courses

SMBs — Small to Medium-Sized Businesses

WM —Working Memory

Executive Summary

Microlearning: A New Frontier in Online Learning examines how microlearning presents a promising solution to the challenges facing modern education and corporate training. Grounded in Cognitive Load Theory (CLT), this report demonstrates that microlearning, through its concise and focused design, can significantly reduce cognitive overload, enhance learner engagement, and promote better knowledge retention.

The report begins by explaining how today's information-rich environments demand flexible learning strategies that accommodate short attention spans and busy lifestyles. Microlearning addresses these needs by breaking down complex information into manageable, bite-sized lessons, typically lasting between 30 seconds and 15 minutes. Supported by empirical evidence, the report demonstrates that microlearning enhances motivation, performance, and long-term retention in both formal educational settings and professional environments.

Drawing on the principles of CLT, the report outlines how effective microlearning minimises extraneous cognitive load and increases germane processing. Moreover, the report highlights best practices, including dual-channel presentation (combining audio and visuals), information chunking, and just-in-time access. These best practices are all critical to optimising working memory use and maximising learning outcomes.

CourseClout's Role

CourseClout's approach to microlearning exemplifies how innovative course design, adaptive delivery, and data-driven improvements can create meaningful and personalised learning experiences. By harnessing the power of microlearning within a broader online education framework, CourseClout enables organisations, educators, and learners to meet the evolving demands of modern education and ongoing professional development.

Conclusion

When thoughtfully designed and based on the evidence-based principles of Cognitive Load Theory, microlearning can transform online education. As this report demonstrates, microlearning can

enhance learner engagement, improve retention, and promote flexible, on-demand access to education. *These benefits are essential in today's fast-paced, digitally driven world.* However, microlearning is most effective when integrated into broader instructional strategies that foster deeper learning, skill development, and long-term application¹.

¹ Previously, a CourseCloud report detailed how AI can function as an instructional strategy. When combined with microlearning, course creators possess the ability to significantly enhance the learning experience, making it both engaging and practical.

About the Author

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Transforming Learning with AI: CourseCloud's Insights into Education 4.0 and Online Learning

"The success or otherwise of educational technology is affected by the characteristics of human cognitive architecture. Technology-based instruction used without reference to the instructional design principles that flow from human cognition is likely to be random in its effectiveness." (Sweller, 2019)

— **John Sweller** is an Australian educational psychologist renowned for developing a significant theory of cognitive load.

"Microlearning needs to be part of a larger learning structure or strategy to optimize its effectiveness. When it stands by itself, each microlearning product only has a singular outcome. Therefore, it cannot provide an opportunity for holistic mastery of any topic." (Kapp & Defelice, 2019, in the book 'Microlearning: Short and Sweet')

— **Karl M. Kapp & Robyn A. Defelice** are leading experts in instructional technology and learning design.

Chapter 1 — Microlearning

Modern education and training environments are evolving rapidly as digital media transform the way learners² consume information. Today's learners are bombarded with dynamic, short-form content from social platforms, leading to a significant challenge: maintaining engagement during long, traditional lectures or extensive training sessions. Research indicates that human attention spans are declining ([Lorenz-Spreen et al., 2019](#); [Mark, 2023](#)), making it increasingly challenging for learners to maintain focus on extended content. This is where microlearning comes in since it has been shown to reduce cognitive load ([Taylor & Hung, 2022](#)) and provide a way to learn at a time when our limited attention spans are bombarded with information from various sources ([Sun & Yang, 2023](#)).

Microlearning is an instructional approach that breaks down complex information into bite-sized, focused units, typically lasting between 30 seconds and 15 minutes ([Denojean-Mairet et al., 2024](#); [Stracqualursi & Agati, 2024](#)). The term "microlearning" became popular in 2002 ([Denojean-Mairet et al., 2024](#)). While there is no universally accepted definition, microlearning is generally understood as a teaching method focusing on a specific topic or skill ([Denojean-Mairet et al., 2024](#); [Rof et al., 2024](#); [Taylor & Hung, 2022](#)). It offers small, digestible amounts of information that learners can consume quickly, making it suitable for immediate application ([Rof et al., 2024](#)). This method caters to today's learners' digital habits and aligns with cognitive load theory (CLT). In fact, microlearning is designed to work within the limitations of CLT by delivering information in small, manageable segments ([Rodrigues, 2023](#); [Samala et al., 2023](#)). **CLT suggests that our working memory has limited capacity, and by presenting information in smaller, manageable chunks, educators can reduce cognitive overload and facilitate better retention and understanding** (Serembus et al., 2020; Sweller, 2019)

Microlearning offers a flexible solution for formal and informal learning contexts ([Bannister et al., 2020](#); [Garshasbi et al., 2021](#); [Shail, 2019a](#)). In corporate training environments, for example, employees can access short, targeted modules on mobile devices during breaks or commutes, supporting just-in-time learning and continuous professional development ([c.f., Garshasbi et al., 2021](#)). Microlearning supplements traditional lectures in academic settings by offering concise review sessions

² In this report, learners or students refer to individuals trying to learn a new skill, whether professionals, students, or hobbyists. Unless, of course, if the word students are used to refer to highschool or university students, but that will be explicitly stated. [CourseCloud](#) effectively engaged these diverse target groups with the courses it created and can help you reach them more successfully.

that reinforce key concepts without overwhelming students, enhancing overall learner satisfaction and performance ([Lee et al., 2021](#); [Moore et al., 2024](#); [Neffati et al., 2021](#); [Wang et al., 2020](#))

Chapter 2 — Aims and Scope of The Report

2.1. Aims

This report examines the transformative potential of microlearning in enhancing learning. To demonstrate this, I highlight how cognitive load theory provides both theoretical and empirical support for the success of microlearning in various domains. Moreover, in this report, I aim to demonstrate how our [CourseClout's](#) comprehensive online course creation services can leverage these innovative strategies to produce engaging, personalised, high-impact learning experiences.

[CourseClout](#) is a company that provides comprehensive online course creation services for course creators, small to medium-sized businesses (SMBs), government education initiatives, academic institutions, and enterprises. They provide end-to-end solutions for creating engaging, high-quality courses, encompassing curriculum design, production, and the implementation of learning management systems (LMS). The company aims to enhance online learning, minimise dropouts, and boost learner engagement. They assist clients in creating and delivering effective educational content, paired with striking videography, to produce engaging learning experiences.

Specifically, this report will:

- **Highlight the Theoretical Foundations:** Explore the principles of cognitive load theory and other supporting frameworks, explaining how they underpin effective microlearning design. See chapters [4](#) and [6](#).
- **Define and Delineate Microlearning:** This concept was introduced in the [first chapter](#) and will be reiterated throughout the text. Also, see chapters [3](#) and [5](#).
- **Showcase Evidence-Based Benefits:** Present empirical findings demonstrating microlearning's effectiveness in enhancing learner engagement, retention, and performance across various educational and professional contexts.
- **Discuss Implementation Strategies:** Offer practical guidance for integrating microlearning into formal education and workplace training, including best practices for instructional design, technology integration, and personalisation (Chapters [3](#), [5](#), [6](#), and [7](#)).

- **Address Challenges and Future Directions:** Identify potential drawbacks and research gaps, which necessitate future research (Chapters [7](#) and [8](#))

Ultimately, the report is designed for educators, course creators, and organisational leaders seeking to innovate online learning environments. It articulates how [CourseClout's](#) end-to-end course development solutions can harness microlearning to minimise dropouts, boost learner engagement, and deliver tailored educational content that meets the needs of modern, digitally driven learners.

2.2. Process of Literature Review

The literature for this report includes institutional reports, review articles, chapters in academic books, and data from institutional databases. The primary sources were academic databases, such as ERIC and Web of Science, with Google Scholar used occasionally as a last resort. I also used secondary sources cited in the primary sources to expand the pool of relevant research. Additionally, [Research Rabbit](#), an AI-powered tool, was utilised to identify new academic studies within the existing pool of sources. I used [Grammarly](#) to polish the language of this report, and tools as [Zotero](#) and [NotebookLM](#) were used to organise the research.

Given that this report can only provide a limited glimpse into the current landscape of microlearning research in online education, I recommend consulting the review articles cited in this report for a more comprehensive understanding of the topic ([see: Alias & Razak, 2024; Berssanette & De Francisco, 2022a; Cascio, 2019; De Gagne et al., 2019; Denojean-Mairet et al., 2024; Fialho et al., 2024; Hug, 2010; Latimier et al., 2020; Leong et al., 2021; Monib et al., 2024; Nikkhoo et al., 2023; Nissen et al., 2024; Sankaranarayanan et al., 2023; Shail, 2019a; Sweller et al., 2019](#)). Therefore, for more in-depth reviews, please consult the [References](#) section at the end of this report.

Chapter 3 - Microlearning Statistics and Findings

Key Takeaways of Chapter 3:

- **Global Market Growth:** Microlearning is projected to grow from \$3.4 billion in 2023 to \$7.9 billion by 2030, with a steady compound annual growth rate (CAGR) of approximately 12.5%, indicating that it is viewed as a long-term, scalable solution for education and workforce training.
- **Increasing Scientific Interest:** Academic research into microlearning is growing at an annual rate of approximately 19.37%, with a 47-fold increase in publications between 2006 and 2019, indicating a rising credibility and relevance within the scholarly community.
- **Caution Against Unsupported Claims:** Many popular blog posts cite exaggerated or unverified statistics about microlearning's effectiveness; this report emphasises the importance of relying on peer-reviewed studies for credible data.
- **Evidence of Effectiveness:** Rigorous studies demonstrate that microlearning can lead to better learning outcomes, including 18% higher scores for school learners, increased final exam scores for university students, and faster skill acquisition for employees.
- **Growing Learner Demand:** Around 80% of employees prefer on-demand, flexible learning formats. Microlearning's short, accessible design meets the needs of the growing millennial workforce, which is expected to dominate by 2025.
- **Boost in Motivation and Engagement:** Microlearning formats, including chatbots and LMS-integrated modules, not only maintain academic performance but also significantly increase intrinsic motivation and learner engagement.
- **[CourseClout's](#) Angle:** The rising market investment, growing academic validation, and learner demand provide strong support for [CourseClout's](#) focus on delivering mobile-first, concise, and compelling microlearning solutions.

Microlearning: Statistics and Findings

It is essential to consider current estimates on various key indicators to understand the scope of microlearning in online education. Therefore, *for a start*, I provide a brief examination of the global market growth in microlearning. I include this as it is essential for understanding the increased importance of microlearning in online education. Additionally, an understanding of its demand enables businesses to make informed choices regarding the use of microlearning to boost learner engagement, particularly for their workforce in online learning for skill development. Ultimately, market growth statistics offer a glimpse into the ever-evolving landscape of global education demands.

Secondly, I highlight the growth of microlearning in academia. I chose to highlight this because scientific interest demonstrates the credibility and relevance of microlearning in the area of education, and more specifically, in online education. Furthermore, the inclusion of scholarly articles in this report provides credible support for areas of innovation and trends in microlearning. Moreover, using these sources later in the report offers a benchmark for microlearning's effectiveness by providing scientific evidence of its impact on (a) learning outcomes, (b) learner engagement, and (c) retention and related behavioural outcomes.

3.1 Global Market Growth

In 2023, the [‘Microlearning - Global and Strategic’ report](#) valued the global microlearning market at \$3.4 billion and projects the market value to reach \$7.9 billion by 2030 ([2024, as cited in GlobeNewswire, 2024](#)). This, therefore, means that the worldwide microlearning market is expected to exhibit a compound annual growth rate (CAGR) of approximately 12.5%. Another market research report anticipates that the microlearning platform market will grow from \$2.2 billion in 2024 to \$7.3 billion by 2034, representing a CAGR of 12.7% ([Market.US, 2025](#)).

Consistent double-digit CAGRs of 12.5% and 12.7% suggest that organisations and investors recognise microlearning as a long-term investment, not just a trend, but as a core element of future learning strategies. Moreover, since these are global figures, they signal that microlearning has widespread appeal across geographies and industries, establishing it as a practical and scalable solution for global online education providers.

3.2. Scientific Interest

Many blog posts by companies cite impressive statistics³ claiming that microlearning is significantly more effective, often using percentages to illustrate the superiority of this approach over traditional learning methods (e.g., "retention increases by X%"). A popular phrase across some of the posts I mentioned is a supposed study by the Dresden University of Technology. However, not providing links to these supposedly scientific studies raises doubts about the veracity of their claims. Even when links to sources are provided, they often fail to substantiate the findings presented in these blog posts. What is even more troubling is that some of these sources cite only other similar blog posts and provide no peer-reviewed research to support their claims. This report will later highlight the potential of microlearning; however, for now, it will refrain from using questionable data to provide statistics solely for the sake of providing statistics. Instead, below, a brief substantiation of the growing academic interest in microlearning is given, drawing on peer-reviewed scholarly research. I briefly allude to the significance of these findings in this section's last paragraph.

Below is a list of publications that clearly show the rise of scientific interest in and examination of microlearning:

- Based on an analysis of 256 documents from 206 sources, [Monib et al. \(2024\)](#) found that microlearning research is growing at an annual rate of 19.37%.
- Another study found that between 2006 and 2019, the number of microlearning publications increased by a factor of 47 ([Leong et al., 2021](#)).
- Moreover, a bibliometric analysis by [Pham et al. \(2024\)](#) suggests an increase in scholarly research publications over the past two decades, particularly a notable rise in publications from 2019 to 2022⁴. [Pham et al. \(2024\)](#) suggest that this notable rise coincides with developments and increasing interest in educational technology, including

³ I choose not to include the sources out of respect for the livelihoods of the authors and organizations who made these posts. However, readers who wish to verify this claim are welcome to contact CourseClout. They will direct your inquiries to me, and I will provide the sources upon request.

⁴ Pham et al. (2024) identified 297 publications on microlearning. I refer readers who want to delve deeper into the state-of-the art scientific literature on microlearning to consult the bibliography of this publication.

chatbots, virtual learning, massive open online courses (MOOCS), online learning, and blended learning.

- In another review article, [Fialho et al. \(2024\)](#) concur with [Pham et al. \(2024\)](#) that there has been a more pronounced rise in publications since 2009. Fialho et al. (2024), however, argue that the COVID-19 pandemic and consequent movements towards distance learning are responsible for this increased interest.⁵
- Some review articles suggest an interest in microlearning even before the pandemic, particularly in the 2010s (e.g., [Sankaranarayanan et al., 2023](#); [Shail, 2019a](#)), with [Sergeyevich et al. \(2021\)](#)⁶ suggesting that microlearning emerged as the fastest-growing education trend during that time. Other publications have noted a particular surge during the COVID-19 pandemic⁷ ([Alias & Razak, 2024](#); [Sadeghian & Otarkhani, 2023](#); [Samala et al., 2023](#)).
- Most of the review articles included in this report do not provide estimates of the number of publications after 2023⁸. However, the estimated increase in global microlearning investment suggests that scholarly articles may increase or at least remain steady for the foreseeable future. Moreover, review articles cited in this report (e.g., [Alias & Razak, 2024](#); [Dennen et al., 2024](#); [Nissen et al., 2024](#)) suggest a steady and continued interest in understanding the potential of microlearning by studying its mechanisms, application contexts, and other moderating or mediating variables.

⁵ It is the opinion of this report that the only indication we have now that microlearning will continue to surge in the post-pandemic era is the global market estimations and increased academic interest beyond the pandemic. Luckily, the review articles mentioned in this list seem to indicate a sustained interest in the subject matter.

⁶ However, I have my doubts about the veracity of the statements made in this article, as not all mentioned statements in this article included sources.

⁷ Here the report defines the pandemic as the period of COVID-19 that ranged from 2019 to 2023.

⁸ By virtue of being published in 2024, the review article of Denojean-Mairet et al. (2024) mentions articles written in 2024 but cannot provide a holistic picture of publication frequency in 2024 compared to previous years.

This marked increase in peer-reviewed publications signals more than just academic curiosity. Instead, it signals a growing consensus within the scholarly community that microlearning is a relevant educational approach worthy of empirical investigation. As the rise in research aligns with technological advancements and shifting learning environments, the increasing number of academic publications suggests that scholars are seriously exploring microlearning as a solution to modern educational challenges. Accordingly, grounding this report in peer-reviewed trends rather than unverified claims, I aim to present a more credible, research-backed account of microlearning's potential and role in online education.

3.2.1. Some Statistics and Findings from Microlearning Studies

This report deliberately avoids sweeping claims, such as “microlearning boosts test scores by 20%,” as isolated statistics can obscure the methods behind such findings and offer no guidance on when microlearning is, or is not, appropriate. While the literature on microlearning has grown rapidly, numerous caveats about its efficacy persist. I briefly highlight two of these caveats in Section [6.2. Limitations and Caveats](#).

Nevertheless, here are a few headline statistics and findings that suggest microlearning is worth considering in your course design.

- **About 80% of employees favour accessing learning on demand, exactly when they need it** ([Mazareanu, 2019](#)). In this way, microlearning allows working individuals to incorporate bite-sized learning into their programs flexibly ([Karlsen et al., 2023](#)). This flexibility results, in part, from microlearning's ability to provide concise, focused content precisely when learners require it, enabling busy individuals to integrate brief lessons into their daily routines and tailor their learning to fit their time constraints ([Taylor & Hung, 2022](#)).
- **By 2025, millennials are expected to make up 75% of the workforce.** Given this, [Samala et al. \(2023\)](#) argue that microlearning may be an attractive option for this part of the workforce who may be more technologically skilled than their older counterparts.

- In a study comparing microlearning to traditional learning among seventh graders, **the microlearning group scored 18% higher across five different subjects than the traditional learning group** ([Mohammed et al., 2018](#))
 - Overall, in [Mohammed et al.'s \(2018\)](#) study, **the microlearning group had a superior average passing rate (i.e., 82%) than the traditional learning group (64%) across all five subjects.**
- [Sözmen et al.'s \(2023\)](#) study on first-year medical students illustrates how embedding daily microlearning modules (i.e., short quizzes, crosswords, drag-and-drop exercises, and interactive multimedia) directly into the learning management system (LMS) **significantly boosted final exam scores** (7.35 vs. 7.06; $p = .038$).
 - Moreover, using microlearning kept students significantly more engaged, **with over 90% of participants reporting that the bite-sized exercises increased their motivation and confidence in mastering the material.**
- [Correa et al. \(2018\)](#) introduced a microlearning format to accelerate the web application skills of novice developers. **Compared to traditional training, the microlearning cohort completed tasks faster and cycled through more development iterations.**
- In [Polasek and Javorcik's \(2019\)](#) pilot study, university students ($n = 21$) who followed an education course **using microlearning achieved scores 11% higher than the control group**⁹, which followed the course using only traditional online materials. The former scored 19.49 / 28 points on the post-test versus 17.52 / 28 in the control group ($t(19)=2.19, p=.045$).
- A study by [Kalludi et al. \(2015\)](#) found that **dental students ($n=46$) who watched a 12-minute audiovisual podcast following their regular lectures scored 20 % higher ($p=.021$) on a 10-question follow-up quiz than their counterparts in the control group**

⁹ The small sample size is typical of a pilot study, but inhibits the generalisability of this finding.

(n=54). This indicates the potential for incorporating microlearning into blended learning settings.

- **Research by [Yin et al. \(2021\)](#) found that chatbot-based microlearning yields results for university students similar to those of traditional learning in a computer science course.** However, students using chatbot microlearning demonstrated significantly higher levels of intrinsic motivation. Since intrinsic motivation plays a crucial role in self-efficacy and mastery of the course material¹⁰, chatbot-based microlearning may offer advantages over traditional learning methods. A blended-learning approach could be even more effective.

In conclusion, these diverse studies collectively offer a glimpse into the promise of microlearning in achieving measurable performance gains across educational and workplace contexts. However, to understand how microlearning works, it is essential to grasp the underlying theory behind it.

¹⁰ I discuss the importance of intrinsic motivation in the previous two reports previous reports published by CourseClout.

Chapter 4: Cognitive Load Theory

Key Takeaways of Chapter 4:

- **Limited Working Memory:** Learning is hindered when too much information overloads our finite working memory capacity. **Cognitive architecture**, i.e., the way our mind works to produce learning, provides insight into how information overload inhibits learning.
- **Three Types of Cognitive Load:**
 - *Intrinsic Load* relates to the inherent complexity of the material.
 - *Extraneous Load* stems from poor instructional design that unnecessarily taxes cognitive resources.
 - *Germane Load* is the mental effort directed toward learning and schema construction.
- **Optimising Instructional Design:** Effective online courses reduce extraneous load while boosting germane load to enhance understanding and retention.
- **Practical Applications in Online Learning:** Multimedia learning, microlearning, and self-directed strategies are key to balancing cognitive load.
- **CourseClout's Approach:** By integrating these principles, CourseClout creates engaging, well-structured courses that prevent cognitive overload and promote deep learning.

4.1. Foundations of Cognitive Load Theory

John Sweller initially developed cognitive load theory (CLT) in the 1980s to describe how human cognitive architecture influences learning and problem-solving. At its core, CLT posits that working memory has a limited capacity, making it susceptible to “overload” when too much information is presented simultaneously ([Rof et al., 2024; Sweller, 1988](#)). Cognitive load refers to the amount of mental effort required to process information. If the brain doesn't rehearse information or is presented with too much information simultaneously, information processing slows, and key data is lost (Serembus et al., 2020). Therefore, to promote effective learning, online courses must account for this constraint by minimising unnecessary mental effort (i.e., extraneous load while optimising germane load to facilitate the construction of new knowledge structures, called schemas ([Paas & Van Merriënboer, 2020](#))). **CLT thus serves as a foundational guide for designing clear and concise online learning material.** However, a question arises about CLT's basic assumptions and tenets.

Although the sources I consulted while writing this report do not explicitly state the basic assumptions of CLT, a clear understanding emerges regarding the significance of limited working memory capacity, the role of long-term memory, and the various types of cognitive load that are central to CLT. **Such a discussion necessitates a delineation of our cognitive architecture.**

4.1.1. Cognitive Architecture

Cognitive architecture describes the basic "wiring" of our minds. It refers to the cognitive structures and processes that enable us to learn, process, and apply information in our lives ([Janssen & Kirschner, 2020](#)). Simplistically stated, cognitive architecture assumes that the core of learning involves two memory systems: a limited-capacity working memory (WM) and virtually unlimited long-term memory ([LTM; Denojean-Mairet et al., 2024; Karlsen et al., 2023; Nikkhoo et al., 2023; Samala et al., 2023; Sweller et al., 2019](#)).

4.1.1.1. Working Memory and Information Manipulation

WM is where we store and manipulate new information ([Denojean-Mairet et al., 2024; Sweller & Sweller, 2006](#)). Take a simple math problem, like 6×3 : the digits "6" and "3" plus your multiplication facts must all be active in WM to compute the answer. In practice, WM retrieves relevant schemas ([i.e.,](#)

[your stored understanding of numbers: Paas & Van Merriënboer, 2020](#)) from LTM and then manipulates them to produce the result ([Karlsen et al., 2023](#); [Sweller & Sweller, 2006](#)). Since WM can only juggle a handful of items at once ([Miller, 1956](#); [Serembus et al., 2020](#)), presenting too much new material at once overloads it, leading to what CLT refers to as cognitive overload. While I have referred to cognitive overload above, I discuss the different types of cognitive load in a [section](#) below.

4.1.1.2. Long-Term Memory

Long-term memory (LTM) is our repository for all the knowledge we accumulate throughout our lives ([Berssanette & De Francisco, 2022a](#); [Sweller et al., 2019](#); [Szulewski et al., 2021](#)). Accordingly, LTM includes facts, skills, experiences, and more. When WM actively processes new information by elaborating, rehearsing, or linking it to existing knowledge, it "encodes" that material into LTM ([Brown & Craik, 2000](#); [Sweller & Sweller, 2006](#); [Szulewski et al., 2021](#)). This process is called **encoding** (Brown & Craik, 2000). Microlearning proponents argue that breaking content into small, focused chunks makes this encoding far more efficient because each chunk stays within WM's capacity before being offloaded into LTM ([c.f., Denojean-Mairet et al., 2024](#); [Garshasbi et al., 2021](#); [Lee et al., 2021](#); [Nissen et al., 2024](#); [Paas & Van Merriënboer, 2020](#); [Shail, 2019a](#)).

4.1.1.3. The Interaction Between Long-Term Memory and Working Memory

Microlearning is closely related to these components of cognitive architecture, particularly in relation to WM and LTM, and how they interact during learning ([Denojean-Mairet et al., 2024](#); [Sweller et al., 2019](#)). LTM and WM interact to facilitate learning new information. When we learn something new, WM first holds and processes the information, after which it aims to encode it into LTM for later use. Later use can involve something as simple as a class assessment and, hopefully, something as complex as applying the new information to daily life. As in the multiplication example above, WM later again 'reaches' into LTM to retrieve that knowledge when needed, for example, by recalling grammar rules to write a sentence or troubleshooting software based on past experience ([Karlsen et al., 2023](#)). This reaching process is called **retrieval**.

Let us take a learning example of a person who can multiply 6 by 8. In the early years of school, this person learns to count and form a simple counting schema, i.e. a sequence of numbers from 1 to 10. Schema theory posits that these low-level schemas store basic facts or procedures, making them readily available for future learning ([Paas & Van Merriënboer, 2020](#); [Smith, 2021](#)). In subsequent classes, the

person learns to add, building an “addition” schema that allows them to combine numbers quickly (e.g., $6 + 6 = 12$). Over time, the teacher may introduce the 6-times table, allowing the person to develop a schema for multiplying by six by repeatedly adding six. As new schemas integrate earlier ones, higher-level schemas emerge that automate more complex tasks ([Paas & Van Merriënboer, 2020](#)). In their study of how skilled performers learn content through schema integration, [Ericsson and Charness \(1994\)](#) refer to this process as **schema construction**. Finally, when asked to calculate 6×8 in a later homework assignment, the person can retrieve the “multiples of 6” schema up to $6 \times 7 = 42$, then apply the addition schema one more time ($42 + 6$) to arrive at 48. Through practice, this multi-step process becomes a single, streamlined “ $6 \times n$ ” schema, enabling them to solve similar multiplications effortlessly in the future.

My exposition of cognitive architecture above provides the information needed to understand the types of CLT, and I now turn to a discussion of it.

4.1.2. Types of Cognitive Load

When people learn new information, their WM is bombarded with cognitive load ([Rodrigues, 2023](#)). Since WM is limited, when cognitive load exceeds WM capacity, it creates a scenario in which knowledge is not fully learned and stored in students’ LTM ([Paas et al., 2003](#); [Samala et al., 2023](#)). Moreover, [Serembus et al. \(2020\)](#) note that a lack of rehearsal of information creates a void, where learners do not transfer course material from their finite WM into LTM. The three different types of cognitive loads, as defined by CLT, can explain such failure to encode material into LTM. These three types of cognitive load are Intrinsic cognitive load, extraneous cognitive load, and german cognitive load ([Sweller, 1988, 2010, 2019](#)). Different Types of Cognitive Loads

4.1.2.1. Intrinsic Cognitive Load

Intrinsic cognitive load is related to the inherent complexity of the information being learned ([Sweller, 1988, 2010, 2019](#)). Some concepts are simply more challenging to understand than others, regardless of how they are presented. For example, learning about advanced calculus would likely have a higher intrinsic cognitive load than learning basic arithmetic. Intrinsic load is, therefore, unavoidable because it is tied to the nature of the information.

4.1.2.2. Extraneous Cognitive Load

Unlike intrinsic cognitive load, extraneous cognitive load is not influenced by the difficulty of the subject matter taught. Instead, it concerns how courses and their instructions are designed and delivered ([Sweller, 2010](#)). For instance, presenting information in separate formats (the split-attention effect) requires unnecessary mental integration, drawing on WM resources that learners could use instead to understand the content ([Sweller et al., 1990](#)).

Several key strategies demonstrate how eliminating unnecessary mental effort enables people to focus on what truly matters. For example, **goal-free problems** eliminate complex goal requirements, allowing learners to focus on solving the problem ([see Sweller, 1983, 2010](#)). **Worked examples, on the other hand**, walk learners through each step, rather than requiring them to create strategies from scratch ([Cooper & Sweller, 1987](#)). Presenting words and visuals together (rather than separately) also prevents the **split-attention** effect, which can often overwhelm WM. By eliminating these extra demands, learners can allocate more mental resources to truly understanding and retaining the material ([Sweller, 2010](#)).

From a course creation perspective, CourseClout takes extraneous cognitive load very seriously, and this principle forms the basis of my discussion in [Chapter 6](#) about how microlearning connects with CLT.

4.1.2.3. Germane Load

Germane cognitive load refers to the WM resources that a learner dedicates to managing the intrinsic cognitive load of the material, which is the inherent complexity arising from the interacting elements and information that learners must understand and master ([Cooper & Sweller, 1987; Paas et al., 2003; Sweller, 2019](#)). According to [Sweller \(2010\)](#), the germane cognitive load is the cognitive effort directed towards processing the essential interacting elements of the information, ultimately aimed at schema acquisition and knowledge construction. In simple English, germane cognitive load is the mental effort learners spend trying to *really* understand and make sense of new, complex ideas. Unlike intrinsic and extraneous cognitive load, germane cognitive load is not an independent source of cognitive load, but rather a description of how people use their resources in response to inherent load. The goal of instructional design, as suggested by Sweller (2010), is to minimise extraneous cognitive load so that

more WM resources are available to be allocated as germane cognitive load, thus maximising learning by focusing on the necessary elements of interactivity in the content. This goal aligns with the argument in [Sweller \(1988\)](#) that cognitive processing capacity needs to be available for schema¹¹ acquisition; when problem-solving processes demand too much capacity (akin to high extraneous load), less is available for learning the underlying schemas, which is the essence of germane load. In essence, the germane load effectively utilises cognitive resources for meaningful learning.

4.2. CLT and Online Learning

[Sweller et al. \(2019\)](#) stated that CLT is relevant to technology-assisted learning and that the instructional procedures of CLT are often complicated to implement without the support of educational technology. In online education, learners frequently encounter vast amounts of digital content, making it particularly prone to overburdening learners' limited WM capacity ([Karlsen et al., 2023; Zhao et al., 2024](#)). It is essential to consider how online course creation can utilise CLT to inform its design and implementation. Let us consider some of these:

- **One aspect in which online learning can be designed to address CLT principles is through the application of multimedia learning theory ([Karlsen et al., 2023](#)).** Multimedia learning theory suggests that learners have separate channels for processing visual and auditory information, and that each channel has a limited capacity. **This theoretical approach is highly relevant to the courses CourseCloud creates, as our company produces bingeable learning by incorporating a variety of multimedia formats.**
- **Their effective online instructional design, guided by CLT principles, leverages multimedia to reduce extraneous cognitive load and promote essential information processing.** Moreover, as noted by [Karlsen et al. \(2023\)](#), individuals may learn more effectively with this multimedia approach, as integrating information from different types of media does not overload WM.
- However, one also needs to consider element interactivity! **CLT defines task complexity based on the interactivity of elements, which refers to the number of interacting**

¹¹ A schema is like a mental map built from what you have learned about the world. It helps you recognise what type of problem you are facing and guides you on how to solve it (Sweller, 1988).

elements that must be simultaneously processed in the WM ([Chen et al., 2023](#)). High element interactivity increases cognitive load ([Chen et al., 2023](#)). In online learning design, educators must consider the element of interactivity in their tasks, ensuring that the complexity aligns with the learners' expertise to avoid overwhelming their WM. Therefore, while multimedia incorporation is essential, it must be balanced sufficiently to prevent cognitive overload. **Over time and through experience, CourseClout has found this Goldilocks zone for multimedia use in online courses.**

- **The "forgetting curve" concept highlights the rapid rate at which information can be lost if not effectively processed and reinforced** ([Samala et al., 2023; Zhao et al., 2024](#)). CLT informs strategies to combat this in online learning by emphasising the importance of presenting information to facilitate deeper processing in WM, thereby increasing the likelihood of transfer to LTM ([c.f., Samala et al., 2023; Zhao et al., 2024](#)).
- **Self-directed learning is another aspect to consider when designing online courses with CLT.** Online learning often provides learners with greater control over their learning process ([c.f., Karlsen et al., 2023](#)). CLT can inform the design of online learning environments that support self-regulated learning by presenting information in manageable ways, allowing learners to effectively process and integrate new knowledge without being cognitively overwhelmed. This further ties into the possible links between microlearning and CLT, which I will discuss in '[Chapter 6 — Microlearning and Cognitive Load Theory](#)'. For more information on the importance of self-directed learning and how it fosters engagement in learning, refer to report 1.
- **In online learning, keeping students engaged can be difficult.** CLT scientists suggest that instructional design should prioritise the content and reduce unnecessary cognitive load to help students focus on understanding the material ([Dennen et al., 2024; Rodrigues, 2023; Samala et al., 2023; Zhao et al., 2024](#)). **One particularly suited method is microlearning, which forms a foundation for CourseClout's courses.** However, I deal with the links between CLT and microlearning in more detail in [Chapter 6](#).

CLT, therefore, offers valuable insights for creating compelling online learning experiences. By recognising the limitations of WM and the effects of cognitive load, educators can implement strategies such as microlearning, effective multimedia design, and focused content delivery. Such approaches

minimise extraneous cognitive load, optimise germane load, and ultimately improve learning outcomes. CourseClout's pioneering approach, balancing multimedia engagement and microlearning strategies to achieve the optimal "goldilocks" cognitive load, exemplifies the practical application of CLT in online education. This innovative design not only reinforces CLT's value in transforming digital learning but also sets a benchmark for effective course creation.

Chapter 5 —The Gist of Microlearning

Key Takeaways of Chapter 5:

- **Definition of Microlearning:** Microlearning delivers small, focused units of instruction designed for quick consumption, aligning with the digital habits and limited attention spans of modern learners.
- **Optimal Length and Flexibility:** Microlearning modules typically range from 30 seconds to 10 minutes, offering learners the flexibility to engage with content anytime and anywhere, primarily through mobile devices.
- **Core Characteristics:** Effective microlearning is built around bite-sized content, a focus on a single learning objective, spaced retrieval practices, and delivery through various engaging formats like videos, podcasts, and infographics.
- **Learning Benefits:** Research highlights microlearning's ability to improve knowledge retention, enhance engagement and motivation, reduce cognitive load, and increase learning performance across educational and corporate settings.
- **CourseClout's Specialisation:** CourseClout maximises the power of microlearning by creating Pixar-style, bingeable videos and mobile-first solutions that keep learners motivated, engaged, and progressing efficiently.

5.1. What is Microlearning? A Recap

Microlearning is an instructional approach that delivers small, focused units of learning, often referred to as "bite-sized" content, designed for quick consumption and application ([Prior Filipe et al., 2020](#)). It presents information concisely and focuses on a specific idea ([Maddox, 2020](#)), making it easier to condense, refine, and enhance the accessibility of training ([Dolasinski & Reynolds, 2020](#)).

Microlearning aligns with the literature, which suggests that people's learning experience becomes more effective when a body of knowledge is broken down into digestible, bite-sized chunks ([Shail, 2019a](#)). Microlearning aligns well with online learning, particularly since it enables course creators to leverage the power of microlearning on mobile devices. Mobile microlearning¹² comprises brief lessons designed for on-the-go learning, typically lasting between 90 seconds and five minutes ([Lee et al., 2021](#)). It now allows users to learn at their own pace, anytime, using mobile devices ([Lee et al., 2021](#)). **However, a new question arises about the length of these bite-sized chunks used in microlearning modules.**

Although there is debate about the optimal length of microlearning units, they can range from 30 seconds to 10 minutes, with some sources suggesting that they can be as long as 18 minutes ([Dolasinski & Reynolds, 2020](#); [Lee et al., 2021](#); [Yin et al., 2021b](#)). The emphasis of microlearning is on brevity and conciseness, aligning with contemporary learning preferences shaped by factors like mobile usage, social media, and limited attention spans ([Denojean-Mairet et al., 2024](#); [Fialho et al., 2024](#); [Moore et al., 2024](#); [Rof et al., 2024](#); [Stracqualursi & Agati, 2024](#)).

[Sedaghatkar et al. \(2023\)](#) **suggest that microlearning appeals to Gen Z students due to their unique learning preferences.** This cohort generally prefers personalised learning experiences presented in brief formats and relies on technology that allows access at their convenience. Unlike traditional lengthy lectures, these students favour microlearning as a way to effectively absorb and master new information ([Sedaghatkar et al., 2023](#)). [Fialho et al. \(2024\)](#) also mention that Generation Z values "quick responses" and is characterised by intensive use of social networks. [Fialho et al. \(2024\)](#) define microlearning as a brief teaching experience enhanced by information and communication technology (ICT). This learning method occurs in "short periods" with flexible times and locations ([Fialho et al.](#)

¹² In this specific study, Lee et al. (2021) employed mobile microlearning by employing smartphones, specifically.

[2024](#)). They emphasise that the widespread use of mobile devices has contributed to the growth of microlearning by providing increased convenience and flexibility ([Fialho et al., 2024](#)).

Additionally, microlearning aims to reduce cognitive load and accommodate limited attention spans ([Fialho et al., 2024](#)). [Rof et al. \(2024\)](#) also identify mobile devices, social connectedness, and time scarcity as the primary drivers of microlearning. [Rof et al. \(2024\)](#) attribute renewed interest in microlearning to the rise of an informal learning culture characterised by brief and immediate information consumption akin to YouTube-style videos. Moreover, [Rof and colleagues \(2024\)](#) suggest that microlearning may hold promise in reducing cognitive load and adapting to the limited attention span pervasive in society.

Microlearning can be effectively integrated into a course by segmenting traditional, lengthy lectures into concise, focused modules that target specific learning objectives. For example, in an introductory programming course, the curriculum can be restructured so that each module covers one fundamental concept, such as variables, control structures, or functions, in a 5- to 10-minute video lesson. Each micro-module is followed by interactive elements, such as a brief quiz or coding exercise, which reinforce the concept immediately after it is presented. This approach not only facilitates incremental learning and immediate feedback but also supports learners in building confidence as they master each component before progressing to more complex topics, ultimately leading to enhanced comprehension and retention.

5.2. Key Characteristics of Microlearning

5.2.1. Bite-Sized Content

Microlearning simplifies complex topics by breaking them into smaller, digestible chunks, reducing cognitive load on WM ([Denojean-Mairet et al., 2024](#); [Moore et al., 2024](#); [Rof et al., 2024](#); [Stracqualursi & Agati, 2024](#)). This approach facilitates easier processing, encoding, and retention of information, aligning with the principles of CLT ([Rof et al., 2024](#); [Wang et al., 2020](#)).

5.2.2. Focus on a Single Learning Objective

Each microlearning unit typically addresses one clearly defined learning objective, which promotes focused attention and a deeper understanding of the learned material ([Alias & Razak, 2024](#);

[Prior Filipe et al., 2020](#)). This targeted approach helps learners grasp specific concepts or skills without feeling overwhelmed by excessive information at once ([Rof et al., 2024](#)). Concentrating on one concept or skill at a time encourages learners to recall information from their memory, strengthening neural connections and improving long-term retention (*c.f.*, [Denojean-Mairet et al., 2024; Thompson & Hughes, 2023a](#)).

The small, focused nature of microlearning units makes it easier for learners to retain information.

5.2.3. Coincides with Active Recall¹³

Microlearning enhances the learning process by spreading it over time, often requiring a longer duration to master the duplicate content ([Rof et al., 2024](#)). Microlearning leverages the benefits of *spaced retrieval*, a learning technique where information is reviewed at increasing intervals to strengthen memory and prevent forgetting, resulting in improved retention compared to traditional, longer teaching sessions ([Rof et al., 2024](#)). Moreover, the review of [Wang et al. \(2020\)](#) found that ten out of the 26 reviewed studies utilised at least two microlearning segments, with many demonstrating significant cognitive improvements. This study, therefore, supports the effectiveness of delivering microlearning in intervals. In addition, [Wang et al. \(2020\)](#) emphasised that such micro-content sequence learning is more effective than one-time interventions for cognitive improvement. Microlearning, therefore, aligns with concepts of *active recall*, such as spaced retrieval, to enhance learners' recall and mastery of educational material.

5.2.4. Variety of Formats and Delivery Methods

Course creators can deliver microlearning through various formats, including videos, text, podcasts, quizzes, infographics, short messages, and even social media posts ([Bezhovski & Poorani, 2016; De Gagne et al., 2019; Denojean-Mairet et al., 2024](#)). Short videos are a popular form of microlearning, with one review noting that they accounted for 22 out of 26 studies on self-care capabilities ([Wang et al., 2020](#)). Video-based learning is also emphasised in the context of surgical education and social media ([Palmon et al., 2021](#)). **Courseclout specialises specifically in creating bingeable, Pixar-style videos that effectively deliver this type of microlearning.**

Among these various microlearning formats, short videos have emerged as a particularly popular and effective means of delivering microlearning content. Research supports this trend, with one review finding that 22 out of 26 studies on self-care capabilities utilised short videos as their primary teaching tool ([Wang et al., 2020](#)). Moreover, the effectiveness of video-based microlearning extends to various fields, including surgical education and the use of social media for learning ([Palmon et al., 2021](#)).

Courseclout has recognised the power of video-based microlearning and has positioned itself as a leader in this space. The company specialises in creating short, engaging videos that are designed to be consumed in a "bingeable" manner, similar to the way viewers consume content from Pixar. This approach not only leverages the popularity and effectiveness of video-based microlearning but also incorporates elements of entertainment and storytelling to enhance the learning experience. By creating content that is both informative and enjoyable, Courseclout can capture and maintain learners' attention, increasing the likelihood that the information being presented will be retained and applied. This innovative approach to microlearning has the potential to revolutionise the way people learn and develop new skills, making professional development more accessible, engaging, and effective.

5.3. Benefits of Microlearning

This section will briefly explore some of the advantages of microlearning and explain the possible mechanisms proposed by researchers and academics. While microlearning offers a plethora of benefits in the field of education and for educational courses,¹⁴ research highlights five recurring benefits of microlearning: flexibility and convenience, cost-effectiveness, increased learning performance, better retention and lower cognitive load, and increased engagement and motivation.

5.3.1. Flexibility and Convenience

Moreover, microlearning is convenient in that it is available in multiple formats ([c.f., Highhouse & Gallo, 1997; Shail, 2019a](#)), giving busy professionals immediate access to course content at any time or place. This benefit, according to [Sergeyevich et al. \(2021\)](#), makes microlearning suitable for millennials

¹⁴ **Why use education. Also what does it include.** Note, that like (Cascio, 2019), this report regards microlearning as an extension of progress made in online education. This also includes the blended learning, where traditional face-to-face courses can be supplemented with online learning.

who prefer personalised¹⁵ and accessible education. It also makes microlearning lucrative for corporate training, where onboarding, skills training, and other types of training can effectively help employees to learn something whenever they need it ([Clark et al., 2020](#); [Garshasbi et al., 2021](#)). [Garshasbi et al., 2021 \(p. 226\)](#) call this 'learning on the go' and [Shail \(2019, p.2\)](#) refers to it as 'just-in-time learning'.¹⁶ **It is no wonder that it has become an inextricable part of the corporate training landscape** (*c.f.*, [Clark et al., 2020](#))

5.3.2. Cost-effectiveness of Microlearning

Microlearning's flexibility enables employees, students, and individuals to utilise their time efficiently ([Shail, 2019a](#)). Moreover, its efficiency allows learners to learn material quicker than regular e-learning formats ([Polasek & Javorcik, 2019](#)). Furthermore, developing microlearning takes less time and resources than traditional courses ([Garshabi, 2021](#)). Also, since informal learning minimises company training costs and aligns well with microlearning ([Zhang & Ren, 2011](#)), it is clear why many researchers emphasise its potential for cost reduction in ways traditional education cannot. **With CourseCloud, organisations can implement microlearning modules that require less creation time, decrease training overhead, and empower learners to advance at their own pace.**

5.3.3. Increased Performance

Studies suggest that microlearning helps both students and employees perform more effectively. A review of several studies found that it enhances learners' memory retention and their ability to apply what they've learned ([Shatte & Teague, 2020](#)). For example, one study found that 82% of students in a microlearning group passed, compared to 64% of those in traditional face-to-face classes ([Mohammed et al., 2018](#)). It has also been linked to higher test scores in universities ([Sedaghatkar et al., 2023](#); [Shatte & Teague, 2020](#)). Microlearning has led to a significant increase in test scores in higher education ([Sedaghatkar et al., 2023](#); [Shatte & Teague, 2020](#)). [Sedaghatkar and colleagues \(2023\)](#), for example, demonstrated that medical students who utilised microlearning in conjunction with task-based learning achieved better outcomes and received higher grades. A separate study examining journalism

¹⁵ AI plays a big role in personalising not only microlearning but various types of online learning. Luckily, CourseCloud published a report that can be found [here](#).

¹⁶ Just-in-time learning is such an apt phrase. Imagine that you need to know how to use a specific type of command in Google Sheets at work. In this case, a quick bite-sized microlearning video or micro-exercises may be just enough to help you learn 'just-in-time' to finish the task before the deadline.

professionals and university students found that microlearning had a significant benefit for both groups. ([Lee et al., 2021](#)).

5.3.4. Better Retention and Reduced Cognitive Load

Microlearning has improved learner performance in part because it significantly enhances knowledge retention. Its short, focused content eases cognitive load, making it easier for learners to absorb and recall information ([Dennen et al., 2024](#); [Denojean-Mairet et al., 2024](#); [Nikkhoo et al., 2023](#)). Microlearning is especially effective when paired with spaced retrieval practice, which is a strategy that involves recalling key concepts over increasing intervals ([Denojean-Mairet et al., 2024](#); [Rof et al., 2024](#)). This method, well-supported in cognitive psychology, has been shown to boost LTM formation (c.f. the extensive systematic review of [Thompson & Hughes, 2023](#)). Additionally, microlearning encourages repeated engagement with small content units, thereby reinforcing memory and facilitating refresher training for professionals ([De Gagne et al., 2019](#)). Research also shows that students using microlearning score higher in subject assessments and report better exam preparedness ([Román-Sánchez et al., 2023](#)).

5.3.5. Increased Engagement and Higher Motivation

Microlearning not only helps people to retain information, but it also keeps them more engaged and motivated. The concise and focused format of the lessons, together with their interactive deployment on phones, helps learners become more motivated and focused ([Shail, 2019a](#)), creating an educational experience that is more engaging and enjoyable. In one study, 52% of medical students reported that engaging in daily microlearning increased their motivation to learn during distance education ([Sözmen et al., 2023](#)). Whereas mobile microlearning courses that feature games and quick feedback have helped keep professionals engaged and learn their lessons more quickly ([Lee et al., 2021](#)). The causal link between engagement and better academic performance is well established.¹⁷ **Since microlearning increases engagement, engagement is another mechanism that explains the relationship between microlearning and improved academic performance.**

Besides, social connections also play a role in explaining the increased engagement of microlearning. This is especially true when microlearning is used on social media platforms, as evidence suggests that learners tend to share and revisit the content more frequently ([Denojean-Mairet et al.,](#)

¹⁷ See the first report I authored, as published by [CourseClout](#). This report clearly illustrates this link between engagement and academic performance. Also, see CourseClout's LinkedIn page, [here](#)!

[2024](#)). Moreover, tools like discussion and note sharing, paired with microlearning, form a potent combination of keeping learners involved ([Lohman, 2024; Samala et al., 2023](#)).

Even when *microreading*¹⁸ activities are coupled with electronic and mobile microlearning, students stay more engaged. For example, [Zhao et al.'s \(2024\)](#) study demonstrated that students using e-readers for microreading took more notes and were more involved than students who used a physical book for the same purpose. This suggests an intriguing possibility that, in certain instances, microlearning may be more effective in an electronic format. **However, for now and given the scope of this report, this remains a tentative possibility that will not be explored.**

CourseClout's mobile-first, socially integrated microlearning solutions are well-positioned to capitalise on these proven engagement benefits. That is because CourseClout combines short, gamified lessons with social and collaborative tools to help keep learners motivated and focused!

5.4. Conclusion

Microlearning is emerging as a transformative educational strategy that aligns with modern technological habits and cognitive principles, enabling people to learn at their best. Moreover, microlearning offers individuals concise and focused learning models, enabling them to learn on the go. All of this addresses the needs of busy professionals and today's digital-native learners. As briefly illustrated, its format enhances retention, boosts motivation, and increases learner performance by reducing cognitive load and increasing engagement. The benefits outlined in this chapter are further enhanced by tools such as social media, gamification, and mobile applications.

¹⁸ Microreading is a form of microlearning, where students read small pieces of texts whenever and wherever. For more information refer to Zhao et al. (2024)

Chapter 6 — Microlearning and Cognitive Load Theory

Key Takeaways of Chapter 6:

- **Microlearning and Cognitive Load Theory (CLT):** Microlearning naturally aligns with CLT principles by reducing extraneous load, enhancing germane load, and facilitating effective schema building in learners.
- **Enhancing Germane Load:** Microlearning isolates key concepts into manageable units through chunking, promoting deeper cognitive processing and better long-term memory formation.
- **Managing Extraneous Load:** Microlearning minimises common instructional design flaws such as split-attention effects, single-modality overload, and redundancy, making learning more streamlined and efficient.
- **Microlearning Design Advantages:** Clear, focused, and concise micro-units prevent cognitive overload by optimising information across visual and auditory channels without unnecessary duplication.
- **CourseClout's Contribution:** CourseClout applies microlearning and cognitive design best practices to deliver engaging, bite-sized content that supports efficient learning and reduces cognitive strain.

6.1. Optimising Learning Through Microlearning: The CLT Perspective

In the preceding chapters, CLT was introduced as a framework for understanding how mental resources are managed during learning, with particular emphasis on its core types of load: **Intrinsic, extraneous, and germane**. Similarly, I discussed the theoretical foundations, delivery modes, and benefits of microlearning for modern learners. This chapter brings these two threads together by examining how microlearning can be intentionally designed to align with the cognitive principles imbued in CLT. Instead of repeating the theory already explained, this chapter focuses on (a) the synergy between microlearning's short format and (b) CLT's focus on making learning efficient. Specifically, this chapter will demonstrate how microlearning can reduce extraneous load, enhance germane processing, and address complex tasks that require significant cognitive effort. **Microlearning aligns well with these principles, providing concise and targeted content for learners that ultimately facilitates their mental processing and enhances their learning in online courses** ([c.f., Hug, 2010](#)).

6.2. Enhancing Germane Load Through Chunking in Microlearning

One of the key strengths of microlearning is its use of chunking, a cognitive strategy that involves grouping information into manageable units ([Garshasbi et al., 2021; Nissen et al., 2024; Paas & Van Merriënboer, 2020](#)). Chunking, a well-established concept in cognitive psychology, is known to promote the effective processing of information in the WM to ensure better encoding into and later retrieval from LTM ([Kirschner, 2002; Paas & Van Merriënboer, 2020](#)). Rather than overwhelming learners with dense material, microlearning isolates single concepts or skills in short modules ([Lee et al., 2021](#)). **This, therefore, makes it easier for professionals to rapidly learn and apply information on the go during their work** ([see the comprehensive systematic review by Moore et al., 2024](#)).

Chunking, therefore, reduces extraneous load and encourages learners to devote cognitive effort to understanding and integrating the material, thereby increasing germane load ([Alias & Razak, 2024; Paas & Van Merriënboer, 2020; Szulewski et al., 2021](#)). To recap, increasing germane load means that learners devote more mental effort to organising, processing and integrating new information into existing schemas.¹⁹ As a result, microlearning enhances the likelihood that new information will be encoded into LTM, fulfilling the core instructional goal of CLT. For instance, **a study by** [Wimmer et al.](#)

¹⁹ The word 'load' is ambiguous. It is, therefore, a 'good' kind of load.

[\(2018\)](#) found that adult learners who received segmented training retained information significantly longer than those who received training in one continuous session.

Let us consider this section in simpler terms. In any course with a large body of knowledge, it is vital to separate the essential information from the extraneous details to identify the key concepts of the course. By identifying the key concepts, they can link them together in their WM to gain an understanding of what they are learning. By setting up a course that incorporates microlearning, the key concepts can be transformed into bite-sized chunks that do not overwhelm the WM and are at a level of complexity that allows learners to link these concepts together. In other words, microlearning increases germane load. This, in turn, is ideal for making schemas that can be stored in the LTM. This ‘ideal’ schema acquisition process is the penultimate goal of germane load. **This can explain why, in an online course, micro-challenges and bite-sized review shorts at the end of a lesson can help learners process and apply new information more effectively.**

6.3. Managing Extraneous Load²⁰ Through Design

Earlier sections discussed how poor instructional design increases extraneous load and impedes effective learning. A substantial body of scientific literature confirms this over and over ([Alias & Razak, 2024](#); [Chen et al., 2023](#); [Lohman, 2024](#); [Schnitzler & Kirschner, 2007](#); [Sweller, 2010](#); [Sweller et al., 2019](#)). However, so far, exact examples and possible reasons for this have been left unexplained, and it should be explained because the effective reduction of extraneous overload is what makes microlearning most useful.²¹ Below, I explain how poor instructional design can lead to poor learning by providing examples from the CLT literature. I, moreover, explain these examples with reference to element interactivity. Finally, I give a table that highlights how microlearning solves common design problems that cause extraneous load, and how course creators can use CourseCloud to design microlearning courses that make learning efficient and transformative.

The gist of this section is, therefore, quite simple:

²⁰ To recap of the definition of *extraneous load* see [4.1.2.2. Extraneous Cognitive Load](#) above.

²¹ This the reason why this subsection of chapter 6 is longer than [section 6.2.](#)’s explanation of how microlearning enhances *germane load*.

1. Poorly designed online learning can lead to an unnecessary extraneous load.
2. Microlearning addresses this issue by enabling course creators to eliminate content clutter and present only the essential information. The strength of microlearning can be even more pronounced when course creators deliver microlearning courses that integrate multimedia and allow for mobile-first delivery (e.g., courses optimised for tablets or cellphones).

6.3.1. How Instructional Design Causes Extraneous Load

Below, I present the various ways in which an online course can increase extraneous load.

6.3.1.1. Split-Attention Effect

When elements (or ‘pieces’) of the same idea are presented in different places, such as a diagram on one slide and its explanation on another, students must continually switch back and forth to connect these ideas. Every switch adds clutter to the WM that leaves less mental space for understanding and storing the lesson ([Sweller, 2010, 2019; Sweller et al., 2019](#)).

Why does it matter? Remember that WM is finite and can only juggle a few items at once. The harder learners must work to patch different elements together, the less WM capacity they have to facilitate real learning ([Sweller et al., 2019](#)). Psychologists call this **the split-attention effect** ([Sweller, 2010, 2019](#)), and experiments show that simply integrating text with visuals with audio ([e.g., Tarmizi & Sweller, 1988](#)), or matching narration with animation in learning videos ([e.g., Mayer & Anderson, 1992](#)), reduces cognitive overload and improves learning. In e-learning parlance, such integration is called the **‘contiguity principle’** (Clark & Mayer, 2008).

In CLT terms, split attention raises element interactivity, which refers to the number of elements a learner must handle simultaneously ([Sweller, 2019](#)). High interactivity is unavoidable for complex topics because elements from different knowledge units need to be combined by a learner to master it ([c.f., Chen, 2018](#)). However, poor layout makes it worse by adding needless elements. **Therefore, course designers should aim to keep the interactivity at the level a topic really needs, freeing the working for learning instead of ‘slide-hopping’ or ‘video-hopping’, or any other ‘hopping’ for that matter.**

6.3.1.2. Single-Modality Overload

Just as scattering text and pictures across slides forces learners to switch between sources, causing the switch-attention effect, cramming all the information into a single sensory channel (usually the eyes) overloads that sensory channel and impedes WM processing([Schnotz & Kürschner, 2007](#)). When a diagram already keeps the visual system busy, adding written sentences in the same place crowds the screen and clogs WM ([c.f., Schnotz & Kürschner, 2007](#)). This **single-modality overload**, therefore, adds unnecessary extraneous load and impedes learning.

Nevertheless, researchers found a simple solution: leave the picture on the screen and provide the explanation through spoken audio. Studies by [Mousavi et al. \(1995\)](#) and [Mayer and Moreno \(2003\)](#) show that shifting the explanation to spoken audio (while the diagram stays on screen) offloads half of those elements to the auditory store, cuts cognitive load scores, and boosts transfer test performance. All of this is made possible because it efficiently handles element interactivity, making learning more streamlined for students. **What does this mean for course creators?** A clean visual and concise narration allow each channel to focus on one task, keeping learners focused on the idea instead of being distracted by clutter. Concise narration already suggests why microlearning can address this.

6.3.1.3. Element Redundancy and Unnecessary Information

Redundancy occurs when a lesson repeats the same idea, such as a paragraph that narrates what a clear diagram has already illustrated. Since learners, in this example, are forced to decide whether to read, look at the diagram, or do both, this can lead to unnecessary strain on their WM as they try to cross-check duplicate information (or elements) instead of building new schemas (Sweller, 2019). In courses that rely heavily on screens (i.e., online courses), this “busy-ness” can obscure important content amidst visual clutter ([c.f., Sweller, 2019](#)).

The example of redundancy above has caveats that make it more nuanced when applied to extraneous. The experiment of [Albers et al. \(2023\)](#) provides some clear findings regarding extraneous load. The authors demonstrated that content redundancy, where different learning modalities reinforce the same information, can improve learning outcomes and reduce extraneous cognitive load. On the other hand, [Albers et al. \(2023\)](#) found that modal redundancy, where the same information is presented

in different formats (e.g., text and diagrams conveying essentially the same message), can increase cognitive load and hinder learning.

Practical fix. When creating a micro-lesson, select one primary medium per idea: a concise graphic or a single-sentence text frame. Reserve any supporting format, such as audio narration, for truly new information, not a word-for-word repeat. A quick design check asks, “Can the learner grasp the point if I hide one of the two formats?” If the answer is yes, delete the duplicate and let the microlearning slide, or video segment, do its own lifting. **CourseClout’s design team follows this principle by ensuring each microlearning module focuses tightly on one essential concept, presented through the clearest and most streamlined format possible.**

6.4. How Microlearning Fixes Common Extraneous Load Problems

As the examples above illustrate, poorly designed instruction creates an unnecessary extraneous cognitive load by forcing learners to process disjointed and poorly designed information. This places an excessive load on the finite WM that could have been better utilised to learn and practice the content learned.

Luckily, microlearning provides a natural solution to many of these design flaws. Microlearning mitigates extraneous load and makes learning more efficient by structuring learning around short, self-contained modules that emphasise clarity, focus, and minimalism.

The table below summarises how microlearning design principles address the primary sources of extraneous cognitive load discussed in [5.3.1. How Instructional Design Causes Extraneous Load](#).

Table 1: Microlearning as a Solution to Common Extraneous Load Problems

Problematic Design Feature	How Microlearning Addresses It
Split-Attention Effect	Microlearning presents related information (e.g., visuals and explanations) together on the same page or frame, reducing the need for mental integration and minimising switching between elements.

Single-Modality Overload	Microlearning effectively utilises dual channels by pairing concise visual materials with brief audio explanations as needed, thereby preventing overload in a single modality.
Element Redundancy and Unnecessary Information	Microlearning delivers one core idea per unit, using only essential representations. Supporting formats (e.g., text, audio) are used to add new information, not duplicate existing content.

6.5. How CourseClout Reduces Extraneous Load

Following the discussion on how poor instructional design can lead to increased extraneous cognitive load, it's essential to explore how microlearning, particularly as implemented by CourseClout, addresses these challenges.

CourseClout's microlearning design principles are specifically tailored to counteract issues like the split-attention effect, single-modality overload, and redundancy. By presenting information in concise, focused formats that align with our cognitive processing capabilities, CourseClout enables learners to absorb and retain information without undue cognitive strain.

Our platform delivers engaging and optimised content for efficient learning. Our emphasis on bite-sized lessons that effectively integrate multimedia elements allows learners to focus on one concept at a time, reducing cognitive overload and enhancing comprehension.

For more information on CourseClout's microlearning strategies, you can visit their website at <https://courseclout.com>.

Chapter 7 — Microlearning's Promise and Future: Insights and Challenges

Microlearning's Promise and Future: Insights, Challenges, and CourseClout's Approach

Microlearning has emerged as a practical, research-grounded response to the twin challenges of (a) shrinking attention spans and (b) the well-documented limits of WM. Across the chapters you have just read, five core themes recurred: (1) the importance of aligning content length with cognitive architecture; (2) the effectiveness of chunking, dual-channel presentation, and tight focus for lowering extraneous load; (3) measurable gains in engagement, retention, and on-the-job performance when microlearning is deployed well; (4) the risks of redundancy, fragmented curricula, and poor sequencing; and (5) the need to embed bite-sized lessons inside a broader, data-driven learning strategy. **The evidence base, whether from laboratory experiments on split-attention and modality effects to field trials in universities, healthcare, and industry, shows that when micro-modules are carefully designed, learners remember more, finish courses at higher rates, and apply new skills faster** ([Cierniak et al., 2009](#); [Guzmán & Zambrano, 2024](#); [Lopez, 2024](#); [Penzo, 2023](#); [Rof et al., 2024](#); [Zhu et al., 2024](#)).

7.1. A Summary of Research Evidence²² on Microlearning

Table 2: Examples of Key Research Findings on Microlearning

Insights	Evidence Base	Practical Implications for Course Creators
Micro-chunks lower extraneous load by eliminating unnecessary element interactivity.	Split-attention and redundancy studies in STEM classes and multimedia tutorials. (c.f., Zhu et al., 2024)	- Keep one idea per micro-lesson - Integrate text, audio, and visuals contiguously (refer to: Clark & Mayer, 2008;

²² It is worth mentioning that this is a summary of the research available and what is possible given the scope of this report. It is beyond the scope of this report to provide an in-detail systematic review of the literature. However, if the reader wants to get to know more about microlearning, refer to the review articles in the [reference section](#), below ([specifically, see: Alias & Razak, 2024; Berssanette & De Francisco, 2022a; Cascio, 2019; De Gagne et al., 2019; Denojean-Mairet et al., 2024; Fialho et al., 2024; Hug, 2010; Latimier et al., 2020; Leong et al., 2021; Monib et al., 2024; Nikkhoo et al., 2023; Nissen et al., 2024; Sankaranarayanan et al., 2023; Shail, 2019a; Sweller et al., 2019](#)). Also, you are welcome to contact the author of this report via [the contact page of CourseClout](#).

		Sweller, 2020; Sweller et al., 2019 for more details.
Dual-modality delivery boosts transfer of knowledge from WM to LTM , for example, when diagrams remain on-screen while narration is delivered verbally.	Modality-effect replications in animation, computer science, healthcare, engineering, and general workplace training (Alias & Razak, 2024; Berssanette & De Francisco, 2022b; Cascio, 2019; Guzmán & Zambrano, 2024).	- Pair crisp narration with motion graphics. - Avoid dense on-screen text
Spaced micro-reviews significantly enhance retention compared to a single and/or long course review.	Meta-analyses and systematic reviews on spaced practice in higher education and workplace case studies (Albulescu et al., 2022; Cepeda et al., 2006; Latimier et al., 2020; Thompson & Hughes, 2023b; Yuan, 2022).	- Schedule follow-up flash quizzes or recap videos 24 hours, 1 week, and 1 month in advance.
Engagement and, possibly, completion can quadruple when courses are divided into 10-minute episodes or shorter.	Corporate L&D dashboards and MOOC data (Arist, 2025).	- Aim for 3–8 minutes per unit. - Surface progress bars and streak nudges, similar to Duolingo.

7.2. Limitations and Caveats

First, researchers caution against the stand-alone use of microlearning lessons, as it may encourage surface learning rather than deeper learning. Microlearning is especially promising in lower-order cognitive skills, such as remembering and understanding new material ([Garshasbi et al., 2021; Shail, 2019b; Shatte & Teague, 2020](#)). However, research suggests that microlearning has limitations when it comes to teaching more complex learning outcomes, such as advanced skills (e.g., critical thinking, advanced problem-solving, creative writing), processes (e.g., conducting scientific experiments, performing surgical procedures), and behaviours ([e.g., leadership skills, conflict resolution; Jomah et al., 2016](#)). Microlearning is neither as helpful as a standalone pedagogical tool for helping learners attain knowledge at the level of analysis (e.g., evaluating statistical data to identify trends) and

creation (e.g., developing a new marketing strategy; Lee et al., 2021). For this reason, some authors suggest that microlearning should be integrated into a course; for example, it can be used in conjunction with face-to-face learning in blended learning settings or combined with other online learning strategies ([Nissen et al., 2024](#); [Pham et al., 2024](#); [Rof et al., 2024](#); [Shail, 2019b](#)). **Luckily, CourseClout designs clients' learning management systems in such a way that microlearning becomes a feature that is part of, rather than central to, the whole course.**

Moreover, while microlearning may be beneficial for higher levels of learning mentioned in the previous paragraph, there is insufficient evidence to reach a definitive conclusion (see the [review by De Gagne et al., 2019](#)). For example, [De Gagne and colleagues \(2019\)](#) conducted a scoping review of microlearning in health professions education, which included 17 studies published between 2011 and 2018. Their review found that few studies measured the higher levels of learning outcomes according to the Kirkpatrick model. Most studies examined student reactions (Level 1; 94%, or 16 out of 17) and a majority evaluated knowledge or skill acquisition (Level 2; 82%, or 14 out of 17). However, only 29% (5 out of 17) assessed Level 3 outcomes, which measure the impact of microlearning on student behaviour and the application of learning to real tasks. In a similar review of 26 studies utilising microlearning in self-care courses, [Wang et al. \(2020\)](#) that few studies measured Level 3 (behaviour) and Level 4 (business impact) outcomes longitudinally. Instead, the studies reviewed focused more on assessing learner response (Level) or Level 2 (learning or task performance). **Taken together, these findings suggest that further research is needed.**

Chapter 8 — CourseClout's Value Proposition

8.1. CourseClout's Implementation of Microlearning: A Summary

CourseClout puts these best practices into action in three ways:

- **Short, movie-style lessons:** CourseClout creates concise, Pixar-style videos with voiceovers and helpful on-screen text. This makes it easier for learners to understand the lesson using both their eyes and ears without repeating the same information. **By combining visuals and sound in a concise and focused manner, learners can quickly grasp each small lesson without being overwhelmed or forced to process repetitive information.**
- **Smart lesson timing:** Lessons are unlocked at the correct times. If a learner performs well, the next lesson is scheduled to come a little later. If a learner struggles, the next lesson comes sooner. This keeps the learning just right, neither too hard nor too easy, and helps students focus better.²³ **This ensures that microlearning remains at the right level of difficulty, assisting learners to stay focused and motivated without feeling overwhelmed.**
- **Helpful microlearning progress tracking:** CourseClout provides teachers and companies with easy-to-read charts that show learners' performance, including the frequency of video rewinds or pauses. **This allows course creators to fine-tune each micro-lesson, removing confusing parts and making microlearning even more efficient and effective.**

8.2. Final Word

Microlearning is not a silver bullet, but, grounded in CLT and paired with sound instructional sequencing, it provides evidence-based ways to lighten WM demands, increase engagement, and help learners transfer their skills to real-life situations. Organisations that move beyond long training sessions, often marred by information overload, and adopt microlearning stand to realise substantial returns in

²³ In another report published by [CourseClout](#) I discuss why using AI in this personalised way, leads to better academic and learning outcomes.

both learner satisfaction and performance. CourseClout's model demonstrates how thoughtful production, adaptive delivery, and continuous analytics can transform short-form content into a long-term capability.

For more information on CourseClout's microlearning strategies, you can visit their website at <https://courseclout.com>.

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