

A Comparative Study of Procedural and Strategic Scaffolding in Interactive Video-Based Learning for Financial Literacy

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Abstract

As the financial landscape becomes increasingly complex, equipping university students with financial literacy and practical application skills has become a critical focus in contemporary education. Traditional instruction tends to emphasize knowledge transmission, offering limited support for students' practical decision-making and strategic thinking. In response, this study adopted interactive video-based instruction, integrating two types of learning support strategies—procedural scaffolding and strategic scaffolding—to explore their potential impact on students' learning outcomes and processes. Using a quasi-experimental design, students without a finance-related academic background were randomly assigned to two groups. Multiple assessment tools, including a financial literacy scale, concept mapping, and performance-based tasks, were employed to examine knowledge construction and strategic application. The findings aim to inform future instructional design and personalized learning support strategies in digital financial education.

Keywords: financial literacy, interactive video, procedural scaffolding, strategic scaffolding, digital learning

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Introduction

With the increasing diversity of financial products, financial literacy has become a key competency for modern citizens (Lusardi et al., 2017). Although students generally possessed basic financial knowledge, they often struggled with practical application and decision-making, revealing the limitations of traditional instruction that emphasized content transmission over applied skills (Yin Yin et al., 2023; Zaini et al., 2022). Effective learning should have incorporated strategic guidance and procedural support to foster higher-order thinking (Belland et al., 2013; Shao et al., 2023).

Scaffolding strategies, as an effective form of instructional support, provide phased assistance tailored to learners' needs, thereby enhancing task performance and cognitive engagement. This study focuses on the differential effects of procedural and strategic scaffolding on students' learning processes and decision-making behaviors. By integrating these scaffolding approaches into interactive video-based instruction, two types of scaffolded learning videos were developed to support students' acquisition of financial literacy. The goal is to clarify how different scaffolding designs contribute to learning outcomes and to address the current gap in empirical research.

Accordingly, this study aims to examine whether procedural and strategic scaffolding designs result in different levels of financial knowledge acquisition and application among university students in a financial literacy course. It also investigates whether students' decision-making behaviors vary depending on the type of scaffolding embedded in the interactive videos. Ultimately, the study seeks to propose a theoretically grounded and practically applicable model for digital instructional design in financial education.

Literature Review

Application of Procedural and Strategic Scaffolding

The concept of scaffolding, first introduced by (Wood et al., 1976), emphasized the provision of temporary support by instructors to help learners accomplish tasks they were not yet able to complete independently. Core functions of scaffolding included task guidance, reducing complexity, managing frustration, highlighting key information, and modeling task execution. Hannafin et al. (2013) further classified scaffolding into four types—conceptual, procedural, strategic, and metacognitive—and stressed the importance of dynamically adjusting support throughout the learning process while incorporating context and reflection to foster learner autonomy.

Procedural scaffolding focused on the “how-to” of learning by offering learners clear task explanations and operational steps. It helped students build task-execution skills through sequenced and structured guidance (Chen et al., 2011; Huang et al., 2012). Typical applications included task initiation, step-by-step breakdown, decision cues, real-time feedback, and knowledge transfer to new contexts. Research showed that procedural scaffolding reduced cognitive load and enhanced skill development when it was widely implemented in digital learning, multimedia instruction, and hands-on courses (Kaldaras et al., 2024; Thomann & Deutscher, 2025). When combined with digital prompts and technologically enabled feedback, it could also enhance learners' reflection and adjustment capabilities (Nonthamand, 2024).

In contrast, strategic scaffolding emphasized “how to think” or “how to choose,” using questioning and reflective prompts to guide learners in complex tasks (Belland et al., 2013; Hannafin et al., 2013). This type of scaffolding has been widely applied in science education, language learning, and game-based learning environments. Studies confirmed that strategic scaffolding enhanced reasoning, creative thinking, and self-monitoring (Alanazi et al., 2024; Wang et al., 2025). Similarly, Sun et al. (2023) found that phased questioning and adaptive support significantly enhanced students’ self-regulated learning and problem-solving abilities by facilitating planning, monitoring, and reflection processes. Research further demonstrated that it contributed to the improvement of learners’ self-regulation strategies and academic performance (Li et al., 2023; Shao et al., 2023).

In sum, while procedural and strategic scaffolding addressed different dimensions, both were valuable for supporting cognitive development. Procedural scaffolding enhanced operational capability and simplified complex tasks, whereas strategic scaffolding promoted effective strategy use and self-regulation (Faber et al., 2024; Zuo et al., 2023). Building on this distinction, the present study adopted these two types of scaffolding as instructional variables to examine their specific applications and effected in the context of digital financial literacy learning.

Instructional Applications of Multimedia Tools

Video has become one of the most widely used media in multimedia instruction due to its dual-channel advantage of visual and auditory input, which enhances the concretization of abstract concepts and increases learners' motivation (Pan et al., 2012; Zaini et al., 2022). According to multimedia learning theory, instructional videos that were designed in alignment with multimedia principles were more effective in facilitating knowledge construction and procedural learning (Mayer & Moreno, 2003; Zhang et al., 2006).

However, traditional videos are inherently passive and lack opportunities for feedback and interaction. Interactive videos, by contrast, incorporated embedded questions, branching scenarios, and real-time feedback mechanisms to engage learners in ongoing judgment, reflection and strategy adjustment during the viewing process. This interactivity enhanced learners’ sense of engagement and promoted better learning outcomes (Dahlan et al., 2023; Haerawan et al., 2024; Kim et al., 2015; Vakilian et al., 2022). Instructors could also utilize learning analytics tools to track student progress and provide differentiated and personalized guidance (Staneviciene & Žekienė, 2025).

In financial education, interactive videos showed strong potential. Research indicated that such tools not only improved learners’ financial knowledge and behavioral performance (Lusardi et al., 2017; Zaini et al., 2022), but also fostered active learning and self-regulation (Azevedo et al., 2010; Moreno & Mayer, 2007). When combined with scaffolding, interactive videos served as effective vehicles for a dual-cycle learning process of “view–reflect–respond” and “question–reflect–apply.”

Procedural scaffolding could be embedded into videos through nodes such as task initiation, step-by-step guidance, decision prompts, feedback correction, and transfer challenges, enabling learners to clearly grasp the operational process and task structure (Gündüzalp, 2024; Nonthamand, 2024; Pan et al., 2012). On the other hand, strategic scaffolding might be incorporated via strategic cues, reflective tasks, and open-ended scenarios to enhance

learners' depth of thinking and self-monitoring skills (Alanazi et al., 2024; Li et al., 2023; Wang et al., 2025; Zheng, 2016).

In summary, the integration of scaffolding design supported the acquisition of procedural knowledge but also facilitated the development of strategic thinking and higher-order learning (Shao et al., 2023; Sun et al., 2023). Based on this rationale, the present study developed two versions of scaffolding-based interactive videos and examined their differential effects on students' financial literacy learning, aiming to offer concrete implications for multimedia instructional practices.

Methodology

This study aims to explore the effects of integrating procedural scaffolding and strategic scaffolding with interactive video instruction on the financial literacy learning outcomes of university students. To achieve this goal, this chapter outlines the instructional design rationale, the video production process, and the application of scaffolding strategies. By clarifying how different scaffolding interventions affect learning outcomes in multimedia learning environments, the findings are expected to provide practical insights for the development of future digital instructional models and course design.

Learning Content Design

The learning content design for university students focuses on four major themes, beginning with understanding types of expenses by distinguishing between “needs” and “wants” as well as fixed versus variable expenses to establish fundamental budgeting and management concepts. To help students reach various financial goals, the sources detail the differences in savings instruments, comparing regular savings, fixed deposits, and high-yield accounts based on their interest rates, liquidity, and risk. The curriculum also guides students in selecting investment instruments, such as stocks, ETFs, and mutual funds, while emphasizing risk-return evaluation and the development of an understanding regarding personal risk tolerance. Finally, students are taught principles of financial allocation through frameworks like the 6-3-1, 3-3-3, and 50/30/20 rules, which encourage effective income and expense planning and the rational allocation of resources in their daily lives.

Video and Scaffolding Design

This study developed two types of interactive multimedia instructional videos, each incorporating either procedural scaffolding or strategic scaffolding, to examine the effects of different scaffolding strategies on college students' learning processes and decision-making performance in financial literacy. The videos were designed based on multimedia learning principles (Mayer & Moreno, 2003), utilizing dual channels of animation and narration to convey financial concepts. Interactive tasks and contextual decision points were embedded at key moments to enhance learner engagement, cognitive processing, and strategy application.

The video for the procedural scaffolding group focused on task-oriented guidance through five stages. As shown in Table 1, these stages included: Task Orientation, utilizing context-based scenarios to establish clear learning goals and focusing student attention on the specific content. This was followed by Step Decomposition, which segmented complex tasks into manageable parts and used interactive modules to help students master operational procedures. The third stage, Decision Prompts, employed multiple-choice questions

accompanied by strategic hints to guide students through initial decision-making processes. To ensure understanding is reinforced, the Feedback and Revision stage provided immediate, personalized responses that facilitate error correction. Finally, the process culminated in Internalization and Transfer, where students were presented with novel contexts to encourage the flexible application of learned strategies to new challenges. This structure was designed to reduce cognitive load and strengthen procedural execution (Chen et al., 2011; Huang et al., 2012).

In contrast, the strategic scaffolding group focused on higher-order thinking and self-regulation, consisting of three core stages. As shown in Table 1 and Table 2, the educational framework detailed in the sources focuses on three core stages to enhance strategic financial decision-making: Strategy Activation, Reflection and Adjustment, and Internalization and Transfer. During the Strategy Activation phase, students were introduced to diverse financial thinking paths—such as risk-based, goal-oriented, and time-oriented approaches—to help them engage more effectively in strategic planning and decision-making. This was followed by Reflection and Adjustment, which utilized metacognitive questioning to prompt students to evaluate different options and outcomes, thereby supporting a deeper reflection on their reasoning and strategy adjustments. Finally, the process of Internalization and Transfer involved the gradual fading of external support, placing students in open-ended decision-making scenarios to encourage the independent application of strategies and the integration of these concepts into their personal thinking models (Alanazi et al., 2024; Belland et al., 2013; Zheng, 2016).

Both videos followed a “Task–Interaction–Feedback” design loop but differed in their scaffolding emphasis: procedural scaffolding aimed at clarifying operational processes and building task skills, while strategic scaffolding focused on developing flexible thinking and transferable strategies. Leveraging interactive video as the instructional medium, this study examined how each scaffolding approach supported learners in constructing knowledge and navigating financial decisions. The instructional design served as the foundation for analyzing the differential impact of scaffolding strategies on learning outcomes, offering both theoretical insight and practical guidance for future digital financial education.

Table 1
Interactive Video and Procedural Scaffolding Design

Procedural Scaffolding	
Task-oriented guidance	Introduce a financial scenario based on a monthly income of NT\$30,000 and set a financial task (e.g., creating a budget or savings plan).
Step-by-step breakdown	Teach the 50/30/20 budgeting method and basic bookkeeping practices.
Decision cues	Present a decision situation in which NT\$5,000 remains at the end of the month.
Feedback and correction	Display different financial outcomes based on the learner’s choices (e.g., successful saving vs. overspending).

Table 2
Interactive Video and Strategic Scaffolding Design

Strategic Scaffolding	
Strategy guidance	Present the same scenario: “How should a monthly income of NT\$30,000 be managed?”
Reflective adjustment	Introduce three budgeting strategies (aggressive, stable, conservative).
Strategy guidance	Present the same decision situation (“You have NT\$5,000 left at the end of the month”) for allocation decisions.
Reflective adjustment	Display the decision outcomes and illustrate the reasoning pathway, followed by reflective questions.

Experimental Design and Procedure

This study adopted a quasi-experimental design to examine the effects of procedural and strategic scaffolding integrated with interactive video on college students’ financial literacy learning outcomes. A total of 80 undergraduate students from non-finance and non-accounting majors were randomly assigned to two groups: the procedural scaffolding group (control group, $n = 40$) and the strategic scaffolding group (experimental group, $n = 40$). Both groups received the same instructional content and duration, with the only difference being the scaffolding strategy, ensuring consistency in the instructional intervention and enabling clear evaluation of the scaffolding type’s effect on learning outcomes.

The experiment was conducted in three distinct stages to evaluate the effectiveness of the instructional intervention. In the pre-test stage, researchers measured students’ prior knowledge and conceptual structures using a financial literacy assessment and a concept mapping task. During the subsequent instructional intervention, students engaged with interactive videos featuring tasks and strategy prompts that aligned with their specific scaffolding conditions. The process concluded with a post-test stage, which involved re-administering the initial assessments alongside a context-based performance assessment and a learning feedback questionnaire to comprehensively analyze students’ decision-making, strategy application, and reflections.

To comprehensively evaluate the impact of scaffolding design on learning processes and outcomes, four specialized instruments were employed. The Financial Literacy Scale, which was validated through expert review to ensure content validity and item discrimination, utilized a 5-point Likert scale to measure cognitive gains in areas such as fundamental financial concepts, saving and investment decisions, risk awareness, and resource allocation strategies. To examine internal cognitive organization, the Concept Mapping Task analyzed nodes, hierarchies, and logical links to provide insights into changes in students’ knowledge structures, depth of understanding, and strategic thinking processes. Complementing this, the Context-Based Performance Assessment presented students with realistic financial decision-making tasks, using a rubric focused on reasoning quality, strategy use, and the justification of decisions to capture applied learning behaviors in everyday contexts. Finally, the Learning Feedback Questionnaire gathered subjective perceptions through closed-ended items regarding learning engagement, video acceptance, and the frequency of strategy usage, while open-ended questions explored students’ reflective thoughts and personal experiences with the provided scaffolding support.

In sum, the four instruments triangulated data across cognitive, structural, behavioral, and affective dimensions, enabling a comprehensive assessment of learning outcomes. This approach not only evaluated the instructional effectiveness of each scaffolding strategy but also provided deeper insights into their practical applications and impact within digital financial learning environments (Belland et al., 2013; Shao et al., 2023).

Expected Results

This study aims to identify differences in students' learning processes and decision-making behaviors following the integration of two distinct types of scaffolding—procedural scaffolding and strategic scaffolding—into interactive video-based instruction. Given the consistent instructional content and learning time across groups, the type of scaffolding support will serve as the primary variable influencing students' learning performance. A variety of data collection tools, including pre- and post-tests, performance-based assessments, interaction process analysis, and learning feedback questionnaires, will be employed to comprehensively capture changes in students' knowledge acquisition, strategy use, and learning experiences.

At the knowledge level, students' performance before and after the intervention will be compared using a financial literacy scale and concept mapping tasks. These measures are expected to provide insights into whether the combination of interactive video and scaffolding design contributes to varying degrees of conceptual understanding and knowledge construction. Through the analysis of concept maps, we can observe how students' structure financial concepts and track the progression of their underlying cognitive schemas.

In terms of learning processes, the study will also examine students' behavioral patterns and decision-making strategies as they interact with the videos. Procedural scaffolding is expected to result in a more linear and stable learning trajectory due to clear operational cues. Conversely, strategic scaffolding may lead to more diverse and nonlinear learning paths by encouraging information evaluation and reflective thinking. Subjective data from questionnaires will clarify students' receptiveness to these designs and their impact on motivation. Whether the different scaffolding strategies affect students' sense of engagement, learning motivation, or perceived strategy use is one of the key aspects this study seeks to examine. This study expects to map the varying influences of scaffolding designs on learner performance, offering an unbiased analysis of the diverse cognitive pathways and performance patterns they elicit. The results will likely yield evidence-based insights necessary for the development of adaptive instructional designs, specifically informing how personalized support can be integrated into digital financial literacy programs.

Conclusion

This study investigates the impact of integrating different scaffolding designs with interactive videos on financial literacy, learning processes and decision-making behaviors. Through a quasi-experimental design and the use of multiple assessment tools, the research intends to objectively examine how different scaffolding strategies may influence various aspects of learning, including knowledge construction, task execution, strategy application, and learning engagement.

Preliminary frameworks suggest that procedural scaffolding supports task efficiency and reduces cognitive load, while strategic scaffolding facilitates reflective judgment in open-ended contexts. These findings will provide an empirical basis for future instructional design in digital financial education. During the instructional process, the use of interactive video as a medium is expected to further enhance student engagement and the feedback loop, potentially interacting with the type of scaffolding employed and influencing students' learning trajectories and performance patterns.

Overall, although the experiment has not yet been conducted, the study—grounded in a clear instructional framework and theoretical rationale—lays a foundation for analyzing the possible roles and effects of different scaffolding strategies in digital financial learning environments. The insights gained may serve as a theoretical and practical basis for future empirical research and instructional development in learner-centered financial education.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The author declares that an AI-assisted writing tool was used in proofreading and refining the language of this manuscript. The usage was limited to correcting grammatical errors, ensuring consistency between Chinese and English sources, and rephrasing statements for academic clarity according to the IAFOR guidelines. The author further declares that no AI or AI-assisted technologies have been used to generate content in writing the manuscript. The idea, design, procedure, findings, analyses, and discussion are originally written and derived from careful and systematic conduct of the research.

References

- Alanazi, A. A., Osman, K., & Halim, L. (2024). Effect of scaffolding strategies and guided discovery on higher-order thinking skills in physics education. *Eurasia Journal of Mathematics, Science and Technology Education*, 20(9), em2496.
- Azevedo, R., Johnson, A., Chauncey, A., & Burkett, C. (2010). Self-regulated learning with MetaTutor: Advancing the science of learning with MetaCognitive tools. In *New science of learning: Cognition, computers and collaboration in education* (pp. 225–247). Springer.
- Belland, B. R., Kim, C., & Hannafin, M. J. (2013). A framework for designing scaffolds that improve motivation and cognition. *Educational psychologist*, 48(4), 243–270.
- Chen, N.-S., Teng, D. C.-E., & Lee, C.-H. (2011). Augmenting paper-based reading activity with direct access to digital materials and scaffolded questioning. *Computers & Education*, 57(2), 1705–1715.
- Dahlan, M. M., Halim, N. S. A., Kamarudin, N. S., & Ahmad, F. S. Z. (2023). Exploring interactive video learning: Techniques, applications, and pedagogical insights. *International Journal of Advanced and Applied Sciences*, 10(12), 220–230.
- Faber, T. J., Dankbaar, M. E., van den Broek, W. W., Bruinink, L. J., Hogeveen, M., & van Merriënboer, J. J. (2024). Effects of adaptive scaffolding on performance, cognitive load and engagement in game-based learning: a randomized controlled trial. *BMC Medical Education*, 24(1), 943.
- Gündüzalp, C. (2024). Interactive videos in web-based education: technology proficiency and digital literacy levels. *Journal of Theoretical Educational Science*, 17(3), 738–764.
- Haerawan, H., Cale, W., & Barroso, U. (2024). The effectiveness of interactive videos in increasing student engagement in online learning. *Journal of Computer Science Advancements*, 2(5), 244–258.
- Hannafin, M., Land, S., & Oliver, K. (2013). Open learning environments: Foundations, methods, and models. In *Instructional-design theories and models* (pp. 115–140). Routledge.
- Huang, H.-W., Wu, C.-W., & Chen, N.-S. (2012). The effectiveness of using procedural scaffoldings in a paper-plus-smartphone collaborative learning context. *Computers & Education*, 59(2), 250–259.
- Kaldaras, L., Wang, K. D., Nardo, J. E., Price, A., Perkins, K., Wieman, C., & Salehi, S. (2024). Employing technology-enhanced feedback and scaffolding to support the development of deep science understanding using computer simulations. *International Journal of STEM Education*, 11(1), 30.
- Kim, J., Glassman, E. L., Monroy-Hernández, A., & Morris, M. R. (2015). RIMES: Embedding interactive multimedia exercises in lecture videos. Proceedings of the 33rd annual ACM conference on human factors in computing systems.

- Li, T., Fan, Y., Tan, Y., Wang, Y., Singh, S., Li, X., Raković, M., Van Der Graaf, J., Lim, L., & Yang, B. (2023). Analytics of self-regulated learning scaffolding: effects on learning processes. *Frontiers in Psychology, 14*, 1206696.
- Lusardi, A., Samek, A., Kapteyn, A., Glinert, L., Hung, A., & Heinberg, A. (2017). Visual tools and narratives: new ways to improve financial literacy. *Journal of Pension Economics and Finance, 16*(3), 297–323.
<https://doi.org/10.1017/S1474747215000323>
- Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational psychologist, 38*(1), 43–52.
- Moreno, R., & Mayer, R. (2007). Interactive multimodal learning environments: Special issue on interactive learning environments: Contemporary issues and trends. *Educational psychology review, 19*(3), 309–326.
- Nonthamand, N. (2024). Designing the video-based learning environments using workflow and scaffolding to enhance self-instructional video production ability of pre-service teacher. *Contemporary Educational Technology, 16*(1), ep492.
- Pan, G., Sen, S., Starrett, D. A., Bonk, C. J., Rodgers, M. L., Tikoo, M., & Powell, D. V. (2012). Instructor-made videos as a learner scaffolding tool. *MERLOT Journal of Online Learning and Teaching, 8*(4).
- Shao, J., Chen, Y., Wei, X., Li, X., & Li, Y. (2023). Effects of regulated learning scaffolding on regulation strategies and academic performance: A meta-analysis. *Frontiers in Psychology, 14*, 1110086.
- Staneviciene, E., & Žekienė, G. (2025). The Use of Multimedia in the Teaching and Learning Process of Higher Education: A Systematic Review. *Sustainability, 17*(19), 8859.
- Sun, L., Kangas, M., Ruokamo, H., & Siklander, S. (2023). A systematic literature review of teacher scaffolding in game-based learning in primary education. *Educational Research Review, 40*, 100546.
- Thomann, H., & Deutscher, V. (2025). Scaffolding through prompts in digital learning: A systematic review and meta-analysis of effectiveness on learning achievement.
- Vakilian, A., Ranjbar, E. Z., Hassanipour, M., Ahmadiania, H., & Hasani, H. (2022). The effectiveness of virtual interactive video in comparison with online classroom in the stroke topic of theoretical neurology in COVID-19 pandemic. *Journal of Education and Health Promotion, 11*(1), 219.
- Wang, F., Zhou, X., Li, K., Cheung, A. C., & Tian, M. (2025). The effects of artificial intelligence-based interactive scaffolding on secondary students' speaking performance, goal setting, self-evaluation, and motivation in informal digital learning of English. *Interactive Learning Environments, 1–20*.
- Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of child psychology and psychiatry, 17*(2), 89–100.

- Yin Yin, K., RAMDAN, M. R., YUSOF, R., & WEI, C. Y. (2023). Video learning enhances financial literacy: A systematic review analysis of the impact on video content distribution. *Journal of Distribution Science*, 21(9), 43–53.
- Zaini, M., Yulianto, R. T., Gusti, G. P., & Agustira, Y. (2022). The Influence of video tutorial learning media on improving financial literacy knowledge: a study for e-commerce user students. *Malaysian E Commerce Journal (MECJ)*, 6(2), 72–75.
- Zhang, D., Zhou, L., Briggs, R. O., & Nunamaker Jr, J. F. (2006). Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness. *Information & management*, 43(1), 15–27.
- Zheng, L. (2016). The effectiveness of self-regulated learning scaffolds on academic performance in computer-based learning environments: A meta-analysis. *Asia Pacific Education Review*, 17(2), 187–202.
- Zuo, M., Kong, S., Ma, Y., Hu, Y., & Xiao, M. (2023). The effects of using scaffolding in online learning: A meta-analysis. *Education Sciences*, 13(7), 705.

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