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The Psychology of Delegated Thinking: How Generative AI Shapes Memory Offloading, Cognitive Effort, and Problem-Solving Persistence among Generation Z

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ABSTRACT

Generative artificial intelligence (GenAI) is creating a new cognitive environment in which tasks such as remembering, retrieving information, drafting, planning, reasoning, and problem-solving can increasingly be supported or performed by AI systems. This development raises an important psychological question: when cognitive tasks are delegated to AI, does technology simply facilitate human cognition, or can it also change how people engage with and develop their cognitive abilities? This article explores this question through the concept of delegated thinking, defined here as the conscious or unconscious transfer of some cognitive tasks to generative AI. The issue is particularly relevant to Generation Z, not because this generation is psychologically homogeneous, but because many of its members have grown up in highly digital information environments and increasingly encounter GenAI in education and everyday life. Research suggests that cognitive offloading can be an adaptive strategy that reduces task demands, although its consequences depend on how, why, and to what extent cognition is externalized (Gilbert et al., 2023; Richmond & Taylor, 2025).

The study examines the potential implications of GenAI for Generation Z in relation to memory offloading, cognitive effort, metacognition, critical thinking, and persistence in problem-solving. It adopts an interpretivist, exploratory qualitative design based exclusively on documentary and secondary sources, including peer-reviewed studies, theoretical scholarship, educational literature, and authoritative reports on cognition, digital externalization, GenAI, and human–AI interaction. No experiments, surveys, psychological assessments, or participant-based data collection were conducted, and no statistical analyses were performed. The qualitative synthesis identifies five interconnected patterns. First, GenAI can function as an external cognitive and memory resource, extending cognitive offloading beyond reminders, search engines, and digital storage by generating and organizing information. Second, delegation can reduce the effort required for some activities while shifting effort toward prompting, verification, evaluation, and integration. Recent research also suggests that GenAI may redistribute, rather than simply replace, critical-thinking work. Third, educational reviews indicate that GenAI can support higher-order thinking, self-directed learning, and problem-solving, but excessive reliance may reduce opportunities for independent thinking when generated solutions are accepted without critical evaluation.

Fourth, the literature suggests that the cognitive implications of delegation are context-dependent. Task complexity, user intentions, prior knowledge, confidence, metacognitive awareness, and reliance on AI may influence whether the system functions as a scaffold or a substitute for human cognition. Finally, productive human involvement appears to depend on retaining responsibility for judgment, reflection, verification, and intellectual autonomy. The study therefore argues that memory offloading should not automatically be equated with memory loss, and reduced immediate effort should not automatically be interpreted as reduced learning. The central psychological issue is the balance between support and substitution: GenAI may augment human thinking when users remain cognitively engaged, whereas excessive reliance may reduce opportunities to remember, reason, and persist through challenging tasks. The article concludes that delegated thinking should be understood neither simply as technological progress nor as cognitive decline, but as an evolving relationship between human cognition, metacognition, and AI.

Introduction

Generative artificial intelligence (GenAI) is becoming increasingly integrated into activities that have traditionally required substantial human cognitive effort, including information retrieval, summarization, writing, brainstorming, explanation, planning, reasoning, and problem-solving. Whereas many earlier digital systems primarily supported the storage and retrieval of information, contemporary systems can generate, interpret, reorganize, and transform information through dialogue. This development raises a psychological question about how individuals allocate cognitive effort between themselves and intelligent technological systems. This article uses the term delegated thinking to describe the transfer of aspects of memory, reasoning, information processing, planning, or problem-solving to an external computational system. Delegation is not inherently beneficial or harmful. Rather, it represents an evolving relationship between human cognition and technological support, in which efficiency, intellectual engagement, learning, and autonomy may interact in complex ways.

Delegated thinking is related to the psychological literature on cognitive offloading: the use of external actions, representations, or tools to reduce the cognitive demands of a task. External cognitive support has long been part of human activity, from written notes and calendars to calculators, maps, search engines, mobile phones, and digital storage. Research on intention offloading indicates that people may use external tools to support prospective memory and that metacognitive judgments can influence these choices (Gilbert et al., 2023). Generative AI extends this pattern because it can retrieve, summarize, organize, explain, compare, and create information in response to users' immediate needs. The distinction is therefore not simply between using and not using technology, but between using external support to assist cognition and allowing it to replace internal cognitive activity. Memory offloading should not be confused with memory loss. The relevant question is whether changes in the location of cognitive work affect what users encode, retrieve, understand, and practise independently.

A second dimension of delegated thinking concerns cognitive effort. Attention, working memory, retrieval, evaluation, mental effort, and reflection all contribute to learning, reasoning, and problem-solving. GenAI may reduce the effort required for particular tasks, but reduced effort does not have a single meaning. It may represent useful cognitive efficiency when technology removes routine demands and allows users to focus on higher-order thinking. Conversely, it may reduce opportunities to practise cognitively valuable processes if learners no longer engage in retrieval, analysis, or solution generation. Recent research on knowledge work with GenAI illustrates this ambiguity: users may expend less effort on some activities while devoting more effort to verification, response integration, and oversight (Lee et al., 2025). The important question is not whether AI always saves effort, but when it supports or constrains cognition.

A further issue is persistence in problem-solving. Difficult problems often require sustained attention, trial and error, tolerance of frustration, strategy generation, error correction, reflection, and a willingness to delay immediate resolution. GenAI can provide rapid feedback, hints, explanations, alternative strategies, or complete solutions. Such support may help users overcome obstacles and continue working, but it may also change the amount and nature of independent problem-solving practice. Research on digital externalization recognizes its potential benefits while raising questions about learning when information processing is transferred to external systems (Skulmowski, 2023). The issue is therefore not whether AI support eliminates persistence, but how the timing and extent of support influence users' willingness and ability to continue working through cognitively challenging problems.

These questions are particularly relevant to Generation Z. For many members of this generation, learning, communication, information-seeking, and decision-making take place in environments shaped by smartphones, search engines, social media, recommendation systems, digital learning platforms, and conversational technologies. GenAI adds another layer to this digitally mediated environment. However, Generation Z should not be treated as a homogeneous psychological group. Educational background, socioeconomic circumstances, digital and AI literacy, motivation, task demands, prior knowledge, and metacognitive awareness may all influence how individuals interact with technological systems. This study therefore examines Generation Z as a population situated within varied social and educational contexts, rather than assuming that its members share a uniform cognitive profile.

These developments also create an opportunity to reconsider the relationship between human and AI cognition. Under some conditions, GenAI may function as an external cognitive resource or scaffold for thinking; under others, it may replace parts of the thinking process. These possibilities can be examined through the perspectives of cognitive offloading, extended and distributed cognition, metacognition, self-regulated learning, and reliance on automation. The psychological implications are likely to depend not merely on whether the technology is used, but also on how and why it is used and whether users engage critically with its outputs. Recent research suggests that GenAI can redirect critical-thinking activity toward verification and integration, while confidence in AI may influence users' perceived need to think independently (Lee et al., 2025).

Research on cognitive offloading, digital externalization, AI-assisted learning, cognitive load, critical thinking, automation dependence, and GenAI adoption is expanding, but these areas are often examined separately. A more integrated conceptual

approach is needed to understand how memory offloading, mental workload, problem-solving persistence, and metacognitive regulation interact in human–AI engagement. This study addresses that need by exploring how GenAI may function as cognitive scaffolding, strategic support, or a substitute for aspects of human cognition. It focuses not only on cognitive outputs, but also on how contemporary scholarship understands the boundary between internal cognitive activity and delegated technological work.

The study adopts an exploratory, qualitative, interpretivist, and documentary approach based on secondary evidence. Rather than experimentally measuring cognitive outcomes, it synthesizes psychological, cognitive-science, educational, and human–AI research to interpret recurring concepts, patterns, tensions, and explanations. Four research questions guide the study: How does existing scholarship conceptualize GenAI as a mechanism of memory and cognitive offloading? What does the research suggest about the implications of GenAI for cognition? How might AI assistance affect persistence in problem-solving and independent thinking? Under what conditions does GenAI function as a cognitive scaffold rather than a cognitive substitute? These questions frame delegated thinking as an evolving psychological interaction, rather than simply as cognitive deterioration or technological advancement.

Literature Review

Generative AI and Cognitive and Memory Offloading

Cognitive offloading is not unique to artificial intelligence; it is a longstanding feature of human cognition in which people use external resources to reduce internal cognitive demands. Risko and Gilbert (2016) define cognitive offloading as the use of physical actions or external tools to change the information-processing requirements of a task. Examples include using a calculator, writing reminders, navigating with external information systems, and searching external sources of information. More recent research by Gilbert and colleagues (2023) shows that people make strategic decisions about whether to remember information themselves or rely on external resources, and that these decisions are influenced partly by metacognitive judgments about their memory capacity. This research cautions against treating reliance on external resources as evidence of cognitive deficiency. Offloading can be adaptive because human cognitive capacity is limited.

The relationship between cognition and external support may change with the development of generative AI. Traditional external memory systems are generally used to store or retrieve information, whereas GenAI can generate, reorganize, summarize, explain, compare, and transform information interactively. The external resource is therefore no longer simply a repository; it can also participate in constructing and reshaping cognitive content. From the perspectives of extended and distributed cognition, this raises questions about where cognitive processing takes place and how responsibility for remembering and reasoning is shared between people and technological systems. Memory offloading should not be equated with memory loss. The important distinction is between using an external system to support cognition and surrendering cognitive activities that may be important for learning. The literature does not establish that GenAI necessarily reduces memory, nor does it show that externalization is cognitively neutral. What matters is which tasks are delegated, why they are delegated, and which cognitive activities remain with the individual.

AI-Assisted Cognition and Cognitive Effort

This relationship is important in light of cognitive load theory, which recognizes the limited capacity of working memory and the role of learning processes in connecting new information with knowledge stored in long-term memory (Sweller et al., 2019). Research on cognitive load and self-regulated learning also emphasizes the importance of monitoring and regulating effort to support effective learning, rather than simply maximizing or minimizing it (de Bruin et al., 2020). From this perspective, GenAI may reduce cognitive load and free mental resources for more complex tasks. However, removing effort is not automatically educationally beneficial. The value of reduced effort depends on the cognitive processes involved and on the learning goals.

This distinction is particularly relevant to tasks such as retrieval, comparison, explanation, drafting, and reasoning, some of which may be delegated to GenAI. A recent human–AI interaction study by Lee et al. (2025) found that knowledge workers reported shifts in critical-thinking activity toward verifying information, integrating AI-generated responses, and overseeing tasks. Greater reliance on AI was associated with lower reported critical-thinking effort in the context examined. These findings do not prove that GenAI reduces cognition in general; rather, they illustrate how cognitive work may be redistributed. The literature therefore points to a tension between cognitive efficiency and cognitive engagement. AI may reduce unnecessary demands, but it may also encourage learners to outsource activities through which understanding is developed. Delegated thinking is best understood as a question of cognitive allocation: which tasks are transferred to AI, which remain with the user, and whether the user remains sufficiently engaged to evaluate and understand the generated information.

Generative AI, Problem-Solving, and Persistence

Problem-solving involves more than remembering information. It requires people to construct representations of problems, develop strategies, test alternatives, identify errors, and adjust their approaches when difficulties arise. Uncertainty and occasional failure are part of this process, and working toward a solution can itself be an important learning experience. GenAI may provide useful scaffolding through explanations, examples, alternative approaches, feedback, or hints. Systematic reviews in education have highlighted opportunities for AI to support learning, provide personalized feedback, and promote self-regulated learning, suggesting that AI can serve as a learning aid rather than merely as an answer generator (Guan et al., 2025; Lan & Zhou, 2025).

The relationship between AI assistance and productive struggle is more complex. When an AI system provides an apparently satisfactory solution immediately, users may have less incentive to develop or investigate a solution independently. However, this does not necessarily mean that AI reduces persistence. Timely assistance may also reduce unproductive frustration, clarify misunderstandings, and help learners return to problems that initially seemed too difficult. The distinction between scaffolding and substitution is therefore important. Scaffolding provides assistance while leaving the learner responsible for reasoning; substitution occurs when the external system performs a substantial part of the reasoning that the learner would otherwise need to practise. Research on GenAI in higher education also suggests that its effects vary across contexts rather than producing a uniform cognitive outcome (Chen & Cheung, 2025). Immediate task completion should not, therefore, be treated as equivalent to deeper cognitive engagement or learning.

Metacognition, Autonomy and Human–AI Dependence

Metacognition provides an important link between cognitive offloading and dependence on AI. Decisions to offload cognitive tasks are influenced by what individuals believe they can remember, how difficult they perceive a task to be, and whether they consider external assistance necessary. Gilbert et al. (2023) highlight the role of metacognitive judgments in offloading decisions, while other research examines how confidence and task-specific judgments influence these choices (Sachdeva & Gilbert, 2024). This perspective suggests that two people using the same GenAI system may engage in different cognitive processes because of differences in goals, prior experience, confidence, monitoring, and information-checking habits.

These issues become particularly important when users interact with systems that communicate fluently and confidently. Human–AI interaction may involve productive collaboration, strategic delegation, or uncritical trust. Automation bias occurs when users rely on technological outputs without adequately evaluating them. By contrast, metacognitively regulated use requires users to recognize when assistance is needed, evaluate the quality of AI-generated information, and decide when and how much independent thinking is necessary. Recent research on AI-supported self-regulated learning also identifies learner autonomy and metacognition as important factors in determining whether AI is used to support learning or simply to obtain answers (Lan & Zhou, 2025). Delegated thinking should therefore not be treated as a property of AI technology alone. It is a relational process shaped by system capabilities, task characteristics, user intentions, prior knowledge, confidence, and metacognitive regulation.

Generation Z, Cognitive Scaffolding, and Responsible AI Use

Many members of Generation Z have grown up in environments shaped by smartphones, search engines, social media, digital platforms, and algorithmically mediated learning and information-seeking systems. GenAI represents a further development in this environment, making conversational cognitive assistance increasingly accessible. Research on AI literacy among Generation Z examines the relationship between AI knowledge, technology use, and educational experiences, although findings are context-specific and should not be generalized to the entire generation (Singh & Vasishta, 2025). Generation Z should therefore be understood as a diverse population, not as a homogeneous psychological group. Differences in educational background, socioeconomic status, digital and AI literacy, motivation, prior knowledge, metacognitive awareness, and task requirements may influence individuals' interactions with GenAI.

This contextual perspective also changes how responsible AI use should be understood. GenAI can provide cognitive scaffolding by helping users organize information, obtain explanations and feedback, consider alternative perspectives, or overcome temporary obstacles. It can also function as an external memory resource or a problem-solving partner. These functions become problematic when assistance replaces users' judgments instead of supporting them. Recent educational reviews identify both the potential of GenAI to support self-regulated learning and the risk of excessive dependence, highlighting the need for learners to regulate their use of these systems (Guan et al., 2025; Lan & Zhou, 2025). Responsible use does not require rejecting technology or delegation altogether. It requires retaining human responsibility for questioning, verification, reflection, judgment, and learning.

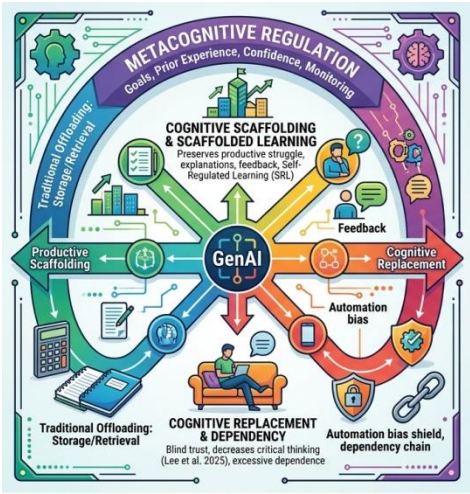


Figure 1: Theoretical Conceptual Framework: Human-AI Cognition & Delegation Continuum

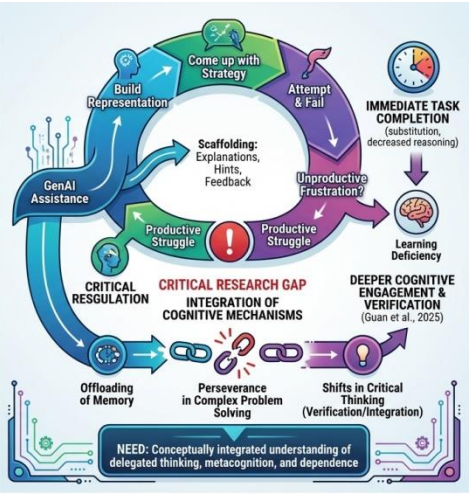


Figure 2: Problem-Solving Feedback Loop & Critical Research Gap

Critical Research Gap

The literature provides substantial knowledge about cognitive offloading, external memory, cognitive load, AI-supported learning, critical thinking, problem-solving, metacognition, self-regulated learning, automation dependence, and human–AI interaction. However, these research strands are often disconnected. Cognitive-offloading research shows that externalization can be adaptive and metacognitively regulated, but much of this foundational work predates the widespread use of generative systems. Research on GenAI in education often focuses on learning outcomes and pedagogical constructs rather than on the psychological processes involved in delegated thinking. Meanwhile, human–AI interaction research has begun to show that AI can shift critical-thinking activity toward verification and integration. The relationship between this shift, memory offloading, and persistence in complex problem-solving remains conceptually underdeveloped (Lee et al., 2025).

The gap is therefore not an absence of research on AI and cognition, but a lack of conceptual integration across these research traditions. More attention is needed to delegated thinking as a complex process involving the offloading of memory and higher-order cognitive activities, alongside problem-solving persistence, metacognitive regulation, and possible dependence on AI. This is particularly important when studying Generation Z without assuming that it has a uniform psychological profile. The present study addresses this underexplored intersection through an interpretivist, exploratory qualitative analysis of documentary and secondary evidence. It synthesizes the literature to examine the conditions under which GenAI may function as cognitive scaffolding, strategic support, or cognitive substitution. The central concern is not simply the measurement of cognitive output, but how contemporary research explains the boundary between human cognition and delegated technological work.

Research Methodology

Research Paradigm and Philosophical Approach

This study adopts an interpretivist paradigm because delegated thinking is not merely a measurable technological effect; it is a context-dependent process through which cognitive work may be distributed between people and generative AI. An interpretivist approach is appropriate for examining the meanings, interpretations, contexts, and competing theoretical explanations associated with memory offloading, cognitive effort, problem-solving persistence, metacognition, autonomy, and dependence on AI. The aim is not to make universal claims that AI inevitably transforms the human mind, but to develop a coherent interpretation of how contemporary scholarship explains changes in human cognitive activity in AI-supported environments.

Research Design

The study uses an exploratory qualitative research design based on documentary and secondary evidence. Documentary research is suitable for an emerging field such as GenAI and cognition, where relevant knowledge is distributed across cognitive psychology, educational psychology, cognitive science, human–AI interaction, learning sciences, and technology research. The study does not generate primary psychological data. Instead, it critically analyzes existing documentary sources to identify conceptual patterns, tensions, assumptions, areas of convergence, and differences. This design is consistent with the interpretivist aim of exploring how delegated thinking is constructed and discussed in the current literature.

Sources of Evidence and Principles of Evidence Selection

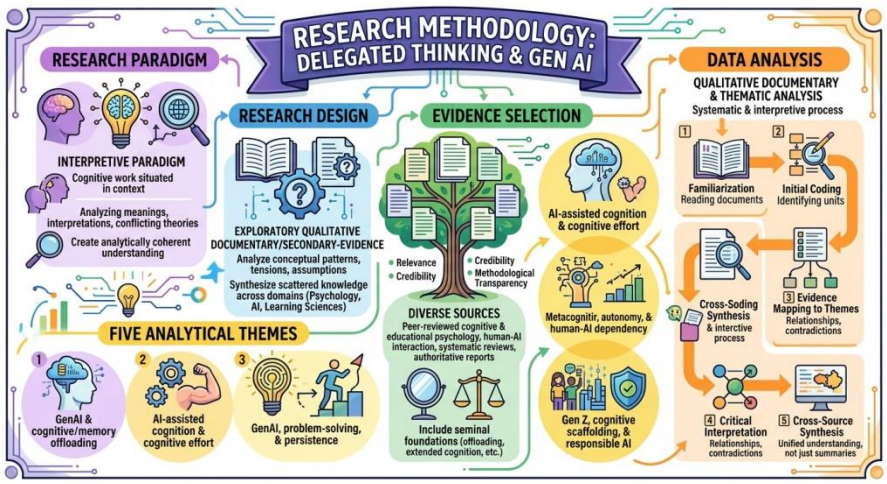
The evidence base comprises peer-reviewed research in cognitive psychology and cognitive science, educational psychology literature, human–AI interaction studies, research on GenAI and learning, systematic and scoping reviews, theoretical and conceptual publications, and selected authoritative institutional reports. The review gives particular attention to scholarship published between 2020 and 2026, a period during which GenAI developed rapidly. Seminal publications are also included where they provide foundational theories of cognitive offloading, extended cognition, cognitive load, metacognition, and distributed cognition.

Documents were selected according to their relevance, scholarly credibility, conceptual significance, methodological transparency, and contemporary importance, rather than to meet a predetermined numerical target. Particular attention was given to evidence relevant to the five analytical themes identified in the literature review: (1) GenAI and cognitive or memory offloading; (2) AI-assisted cognition and cognitive effort; (3) GenAI, problem-solving, and persistence; (4) metacognition, autonomy, and human–AI dependence; and (5) Generation Z, cognitive scaffolding, and responsible AI use. Because the study is a conceptual synthesis rather than a statistical representation, no numerical sample size was predetermined.

Data Analysis

Qualitative documentary analysis and thematic analysis were used to examine the selected material. Documentary analysis enables the examination of arguments, concepts, theoretical assumptions, and patterns across different textual sources. Thematic analysis provides a systematic and interpretive method for organizing patterns in the evidence. It is appropriate for this study because it accommodates different theoretical frameworks and supports the identification, organization, interpretation, and reporting of themes (Nowell et al., 2017). The analysis does not focus on counting frequencies or producing quantitative measures; instead, it identifies patterns that are analytically meaningful across the documentary evidence.

The analytical process involved five connected stages. First, the researcher became familiar with the material by reading and rereading relevant documents and identifying recurring concepts, arguments, theoretical positions, tensions, and disagreements. Second, initial coding was used to identify meaningful textual and conceptual units relating to memory offloading, cognitive effort, problem-solving, persistence, metacognition, autonomy, dependence, and AI-assisted cognition. Third, the coded evidence was organized into five analytical themes, which were refined in light of the documentary material. Fourth, critical interpretation examined relationships among concepts, including similarities, contradictions, contextual differences, theoretical assumptions, and competing explanations. Fifth, cross-source synthesis brought together evidence from multiple sources to develop an integrated interpretation of delegated thinking rather than presenting a series of isolated study summaries. This iterative process involved moving repeatedly between the data, codes, and developing themes.



Methodological Architecture: A visual overview of the research paradigm, exploratory qualitative design, source-selection criteria, and five-stage thematic analysis used to examine delegated thinking in GenAI and human cognition.

Findings and Discussion

The qualitative synthesis of the reviewed documentary evidence indicates that generative artificial intelligence (GenAI) is changing the conditions under which cognitive work is performed, but it does not necessarily produce the same psychological outcomes for everyone. Five interrelated patterns emerge from the literature: cognitive and memory offloading, cognitive effort,

persistence in problem-solving, metacognitive regulation, and the digital-learning context of Generation Z. Together, these patterns suggest that delegated thinking may be understood as a continuum between cognitive scaffolding and cognitive substitution. The psychological significance of this continuum depends on what is delegated, why it is delegated, the extent of continued user engagement, and the degree to which human judgment remains involved.

Theme 1: Generative AI and the Offloading of Cognitive and Memory Tasks

The first key finding is that GenAI can function as an external cognitive and memory resource. Previous research defines cognitive offloading as performing an action or using a representation outside the cognitive system to reduce the demands of a task (Risko & Gilbert, 2016). Studies of intention offloading have also shown that people incorporate external tools into prospective-memory strategies and that their choices are influenced by metacognitive judgments about their own cognitive abilities (Gilbert et al., 2023).

The reviewed literature suggests that GenAI represents an important form of cognitive externalization. Whereas notes, calendars, search engines, and digital storage primarily preserve or retrieve information, GenAI can retrieve, synthesize, reorganize, explain, transform, and generate information in response to a user's request. Delegation therefore involves more than storing a memory cue; it may transfer some information-processing activities to an external system. From the perspectives of distributed and extended cognition, this makes the boundary between internal cognitive processes and external technological support less distinct.

This does not mean that memory offloading is evidence of memory loss. Externalization can be a useful strategy because it frees limited cognitive resources for other activities. The psychologically important distinction is between strategic external support and cognitive substitution. Delegation may function as scaffolding when AI provides reminders, descriptions, explanations, or organization while the user remains responsible for interpreting and evaluating the information. If the system routinely performs remembering and reasoning without meaningful user involvement, the relationship may move toward substitution. The issue is not whether people should ever offload cognitive tasks, but whether delegation preserves meaningful opportunities for internal learning and independent judgment.

Theme 2: AI-Assisted Cognition and Cognitive Effort

The second theme concerns the redistribution of cognitive effort. Cognitive Load Theory recognizes the limited capacity of working memory and the importance of managing cognitive load to support learning (Sweller et al., 2019). From this perspective, reducing unnecessary effort can be beneficial. The literature therefore challenges the assumption that cognitive effort is always valuable simply because a task requires it. The educational significance of effort depends on the type of activity and the learning objective.

GenAI may reduce the effort required for activities such as information retrieval, drafting, comparison, explanation, and solution generation. In a study of knowledge workers, Lee et al. (2025) reported that confidence in GenAI was associated with perceived reductions in critical-thinking effort when working with information. The study also examined perceived effort involved in integrating information and overseeing tasks. Although this evidence concerns knowledge workers generally rather than Generation Z specifically, it illustrates the broader question: AI may redistribute cognitive effort rather than simply eliminate it.

The significance of reduced effort depends on which activities are delegated. When GenAI removes repetitive demands while leaving conceptual analysis, evaluation, reflection, and decision-making to the user, it may improve cognitive efficiency. However, the same efficiency may become less productive if it removes the processes through which understanding is developed. The reviewed evidence therefore supports a conditional interpretation: depending on task complexity, learning goals, prior knowledge, metacognition, verification practices, and the level of human involvement, reduced effort may either support cognitive economy or weaken meaningful cognitive engagement.

Theme 3: Generative AI, Problem-Solving, and Persistence

The third theme concerns the relationship between GenAI and persistence in problem-solving. Recent educational publications describe GenAI as a tool that can assist with information searching, strategy generation, feedback, explanation, and problem-solving. For example, a 2026 systematic review of 73 studies identified problem-solving as a prominent learning activity supported by GenAI tools, alongside information searching and feedback. The review also emphasized that engagement with GenAI depends on both individual and environmental conditions.

This evidence supports interpreting GenAI as a potential scaffold for problem-solving. When learners encounter difficulty, they can request a hint, an explanation of a concept, an alternative approach, or feedback on an attempted solution. Such assistance

may help them continue working, particularly when temporary confusion or frustration might otherwise interrupt the process. A reduction in frustration should not automatically be interpreted as a reduction in persistence.

However, the ready availability of complete solutions creates a competing possibility. If users routinely request full answers before attempting to develop their own solutions, AI may replace rather than support problem-solving activity. The distinction is between completing a task and developing the deeper learning needed to solve similar problems independently. Rapidly solving a problem with AI does not necessarily mean that a learner has acquired the reasoning skills required to solve it alone. By contrast, strategic use of AI after an initial attempt may preserve active participation while providing feedback and alternative perspectives.

The available evidence is therefore insufficient to support a deterministic claim about GenAI's effect on persistence. Instead, it suggests a conditional relationship shaped by task requirements, the timing of assistance, the learner's intentions and prior knowledge, and the amount of independent work the learner continues to perform. The central issue is where to draw the boundary between productive assistance and premature delegation of cognitive work.

Theme 4: Metacognition, Autonomy, and Human–AI Dependence

The fourth theme concerns the relationship between delegated thinking and metacognitive regulation. Cognitive-offloading research emphasizes the judgments people make about their own cognitive abilities and task demands when deciding whether to externalize information or actions (Risko & Gilbert, 2016; Gilbert et al., 2023). In the GenAI context, metacognition is especially important because users must decide not only whether to delegate a task, but also whether to trust, verify, revise, or reject the system's output.

Recent research on GenAI-supported cognition reinforces this point. Lee et al. (2025) found that GenAI can shift critical-thinking activity toward verification and integration, and that users' confidence in AI may influence their engagement in critical thinking. Reviews of AI and self-regulated learning likewise emphasize monitoring, evaluation, feedback, and learner regulation in GenAI-supported environments.

The synthesis suggests a continuum ranging from strategic cognitive delegation to collaborative human–AI reasoning and, potentially, dependence on AI. This should not be interpreted as an inevitable progression. The risk arises when users lose sight of the limits of AI assistance and accept generated outputs as accurate without verification. Human judgment remains important because generative systems can produce incomplete, inaccurate, contextually inappropriate, or overconfident responses. The relevant psychological question is not whether users should trust or distrust AI categorically, but how they can learn when AI assistance is useful and when independent cognition is necessary.

Theme 5: Generation Z, Cognitive Scaffolding, and Responsible AI Use

The fifth theme situates delegated thinking within the broader digital environment in which Generation Z learns and communicates. Generation Z should be treated as a diverse population rather than a psychologically homogeneous group. Digital familiarity, educational environment, AI literacy, socioeconomic status, motivation, prior knowledge, task demands, and metacognitive awareness may all influence individuals' experiences with GenAI. The evidence reviewed here does not support the claim that Generation Z has weaker memory, lower persistence, or greater dependence on technology than other generations.

GenAI may serve several roles in digitally mediated learning: as an external memory resource, a cognitive scaffold, a feedback mechanism, a problem-solving partner, an information organizer, or, in some circumstances, a substitute for independent cognitive work. Recent systematic reviews suggest that GenAI can be used across several stages of self-regulated learning, including goal-setting, resource searching, strategy development, monitoring, evaluation, and feedback. They also identify individual and environmental factors that influence engagement in self-regulated learning. This supports examining GenAI use not only as a technological issue but also as a psychological and educational one.

Deliberate AI use by Generation Z does not require eliminating delegation. Rather, it requires the ability to decide which tasks to delegate and which to undertake independently. In education, AI literacy therefore extends beyond technical competence. Learners also need skills in questioning, verification, reflection, source evaluation, metacognitive monitoring, and independent reasoning. The goal is not to remove technological support, but to preserve learners' cognitive autonomy while using it.

Integrative Interpretation

The central interpretive finding across the five themes is that delegated thinking does not simply diminish cognition; it redistributes cognitive activity. GenAI can support remembering, organizing information, generating possible solutions,

explaining concepts, and assisting decision-making. However, the reviewed literature does not establish that such delegation inevitably causes cognitive decline or dependence. Instead, outcomes appear conditional on purpose, task demands, user competence, metacognitive monitoring, verification, learning goals, and the degree of reliance on AI.

This interpretation brings together several areas that have often been studied separately, including memory offloading, cognitive effort, problem-solving persistence, metacognition, and human–AI dependence. The concept of delegated thinking offers an integrative perspective on their intersection. Rather than viewing human and AI cognition solely as competing alternatives, this perspective recognizes that interaction may extend human thinking in some circumstances while replacing cognitively valuable activity in others.

For students and educators, the implication is not simply to maximize or minimize AI use. Learning environments should support meaningful delegation while preserving opportunities for retrieval, reasoning, reflection, verification, and independent problem-solving. The evidence points to an evolving cognitive environment in which people remain responsible for deciding how to allocate cognitive effort, with GenAI serving as one component. Delegated thinking should therefore be understood neither as cognitive enhancement nor as cognitive decline in itself, but as an evolving human–AI relationship shaped by how cognitive responsibility is distributed and regulated.

This section also establishes an important methodological boundary: the statements presented are interpretations of documentary evidence, not measurements of Generation Z. The systematic-review evidence is useful for understanding cognitive scaffolding and self-regulated learning, while the cited CHI study provides an example—within its particular research context—of how GenAI may redistribute cognitive effort.

Table 1

Qualitative Synthesis of Evidence on Delegated Thinking Generative AI and Cognitive Processes

Analytical theme	Synthesized finding from the reviewed literature	Psychological interpretation	Cognitive scaffolding versus substitution	Implication for Generation Z and learning
Generative AI and cognitive/memory offloading	GenAI can externalize remembering, retrieving, organizing, summarizing, and processing information, extending conventional forms of cognitive offloading.	Externalization may reduce immediate cognitive demands without necessarily representing memory loss; its psychological significance depends on what cognitive activity is transferred.	**Scaffolding:** AI provides reminders, explanations, organization, or retrieval support while the learner interprets and evaluates. **Substitution:** AI routinely performs remembering or reasoning that the learner would otherwise need to undertake.	Learners can use AI as an external cognitive resource while retaining responsibility for understanding, interpretation, and independent judgment.
AI-assisted cognition and cognitive effort	GenAI may reduce some effort associated with searching,	Cognitive effort should not be treated as inherently beneficial or harmful; the	**Scaffolding:** AI removes unnecessary or repetitive demands while	Appropriate AI use may support cognitive efficiency, but learners need

	drafting, organizing, and processing information while simultaneously shifting effort toward verification, integration, evaluation, and decision-making.	educational value of reduced effort depends on which mental processes are reduced or preserved.	preserving productive reasoning and reflection. **Substitution:** AI eliminates cognitive activity that is itself necessary for learning or conceptual development.	opportunities to perform cognitively productive activities independently.
Generative AI, problem-solving, and persistence	GenAI can provide explanations, hints, alternative strategies, feedback, and solutions that may help learners continue working through challenging problems.	Reduced frustration does not necessarily indicate reduced persistence; however, immediate access to complete solutions may reduce opportunities for independent problem construction and reasoning.	**Scaffolding:** AI supports an initial attempt or provides targeted assistance that enables continued engagement. **Substitution:** AI generates solutions before meaningful learner reasoning occurs.	Productive use requires learners to remain actively involved in problem formulation, reasoning, evaluation, and revision rather than merely accepting completed answers.
Metacognition, autonomy, and human–AI dependence	The consequences of delegation are closely connected with users' judgments about when to rely on AI, when to verify its output, and when to resume independent cognitive work.	Delegated thinking is partly a metacognitive process involving monitoring, evaluation, trust calibration, and regulation of cognitive responsibility.	**Scaffolding:** Users critically monitor, verify, revise, and selectively accept AI assistance. **Substitution:** Reliance becomes excessive when AI outputs are accepted without sufficient evaluation or independent judgment.	AI literacy should incorporate metacognitive monitoring, verification, source evaluation, and awareness of the limits of AI-generated information.

Generation Z, cognitive scaffolding, and responsible AI use	Generation Z should be understood as a diverse digital-learning population rather than a psychologically homogeneous generation. GenAI can function as an external memory resource, learning scaffold, feedback mechanism, problem-solving partner, or source of excessive delegation.	The effects of AI use are shaped by prior knowledge, motivation, learning environment, AI literacy, task demands, socioeconomic conditions, and metacognitive awareness rather than generational membership alone.	**Scaffolding:** AI complements learner activity and supports independent development. **Substitution:** AI becomes the primary source of cognitive work, reducing opportunities for independent engagement.	Responsible AI use involves deciding **when to delegate, what to delegate, and what cognitive work should remain human-led**, while preserving learner autonomy and critical engagement.

Note. *The table represents a qualitative synthesis of documentary/secondary evidence and does not constitute a measurement of psychological effects among Generation Z. The distinction between cognitive scaffolding and cognitive substitution is used as an interpretive framework emerging from the synthesis. Relevant conceptual foundations include Clark and Chalmers (1998), Hutchins (1995), Risko and Gilbert (2016), Sparrow et al. (2011), Sweller (1988, 2020), Lee and See (2004), Kasneci et al. (2023), and UNESCO (2023).*

Conclusion

Generative AI is changing not only how information is accessed and created, but also how cognitive work is distributed between people and technological systems. This qualitative synthesis suggests that delegated thinking is a useful conceptual framework for examining this evolving relationship. The reviewed scholarship does not establish that GenAI universally improves or weakens cognition. Rather, it indicates that memory, cognitive effort, problem-solving, and evaluative activities may be transferred from internal human processes to an external AI-supported environment. The psychological significance of this transfer depends on what is delegated, why it is delegated, and how much meaningful cognitive participation the user retains.

Across the themes examined, cognitive and memory offloading, changes in cognitive load, persistence in problem-solving, and metacognitive regulation appear to be interconnected rather than isolated processes. Delegating some cognitive tasks may create more time for higher-order activities. However, when delegation replaces essential processes such as retrieval, reasoning, evaluation, or reflection, opportunities for meaningful cognitive engagement may narrow. The key issue is therefore not simply whether AI can answer a question, but whether users continue to ask questions, consider alternatives, tolerate uncertainty, and work through problems. Depending on the circumstances, GenAI may function either as cognitive scaffolding or as cognitive substitution.

The overall conceptual principle is one of balance. GenAI is not inherently beneficial or harmful to cognition. Its implications depend on the task, learning goals, task difficulty, the cognitive work retained by the user, and the user's capacity for metacognitive monitoring and critical verification. Scaffolding extends human capabilities through AI support while preserving appropriate reasoning and reflection. Substitution occurs when AI replaces cognitive activities that learners need to practise to develop understanding, memory, or competence. This distinction matters in education because completing a task and achieving lasting learning are not necessarily the same outcome.

The concept of delegated thinking connects topics that have often been examined separately: cognitive offloading, memory, cognitive effort, problem-solving, metacognition, autonomy, and reliance on AI. This synthesis does not establish delegated thinking as a validated psychological theory. Instead, it offers a conceptual framework for examining processes that may become increasingly important as generative AI systems develop.

The lesson for students and educators is not simply to reduce or expand AI use, but to develop the ability to decide what to delegate, what to retain, and when to use AI support. AI literacy should therefore include more than technical skills; it should also involve verification, reflection, metacognitive awareness, and recognition of excessive reliance. Learning environments can use AI to support inquiry while preserving opportunities for independent thought.

Several limitations qualify these conclusions. The study relies on secondary data, and research on GenAI is developing rapidly. Definitions of cognitive offloading and dependence are not fully consistent across the literature, and direct evidence focused specifically on Generation Z remains limited. A documentary synthesis cannot establish psychological causal effects, and the researcher's interpretation inevitably influences the analysis.

Future research should include empirical and longitudinal studies examining different levels and forms of AI delegation among students in varied educational settings. The future of AI-assisted cognition will be shaped not only by the availability of GenAI, but also by people's informed, intentional, critical, and metacognitive decisions about which cognitive tasks to delegate.

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