“I Get It Now”: Insights from Implementing Metacognitive Strategy Instruction Through an Asynchronous Gradual Release of Responsibility Framework

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Abstract
This study explores the impact of explicit metacognitive instruction delivered through the Gradual Release of Responsibility framework on graduate students’ metacognitive moves while reading. Conducted over multiple iterations, the research examines how explicit instruction in metacognitive strategies affects students’ engagement with academic texts through asynchronous social annotation using iterative thematic coding. Findings from the latest iteration indicate that while the Gradual Release of Responsibility framework supports more varied and strategic reading behaviors, factors such as text complexity and instructional approach significantly influence students’ application of these strategies. For instance, graduate students in a digital literacies course demonstrated a greater use of questioning and critical reflection compared to their peers in a phonics-focused course, where monitoring was the predominant strategy. Despite explicit instruction, results across all iterations underscore three ongoing challenges: (1) even graduate students may not inherently possess strong metacognitive reading skills, (2) isolated metacognitive instruction in one course is insufficient for long-term development, and (3) students exercise significant agency in choosing how they engage with texts. These findings suggest the need for sustained cross-curricular integration of metacognitive instruction to foster reflective, adaptable readers. This study supports a deeper understanding of metacognitive strategy development in graduate education, raising important implications for instructional design and teacher preparation.

Keywords: Metacognitive strategies, gradual release of responsibility, social annotation, graduate education, instructional design

Wilson, N., Stevens, E., Baumann, J., Dussling, T., Adams, B., Smetana, L.(2026) “I get it now”: Insights from implementing metacognitive strategy instruction through an asynchronous gradual release of responsibility framework. *Online Learning 30*(2), 302-330. https://doi.org/10.24059/olj.v30i2.4996

As teacher educators, it is our aim to prepare teachers who not only read about effective comprehension pedagogies but ensure that our candidates have the metacognitive comprehension moves to serve as good models for their students. We take a cognitive constructivist view of comprehension in which the reader actively constructs meaning by going beyond linking background knowledge to monitor the development of meaning and use strategies and "metacognitive insights" to assure that meaning is being built (Dewitz & Graves, 2021, p. S132). We sought to examine the metacognitive moves through a series of student case studies to compare strategies of Literacy Master's of Education (MSED) students.

This study examines the efficacy of an asynchronous Gradual Release of Responsibility (GRR) framework in improving graduate students' metacognitive moves when reading and annotating assigned course texts. Metacognitive moves provide insight into how readers manage and interpret text while engaging with learning materials. Understanding these moves is critical, as they reveal the ways in which students comprehend and engage with academic content. This research represents the fourth phase in an ongoing exploration of how graduate students interact with academic texts through social annotation.

Social annotation involves multiple students reading and commenting on a shared digital text file, a process that facilitates both individual reflection and group discourse (Glover et al., 2007). Tools like Perusall, which we used in this study, allow for access to the same text and enable asynchronous interactions among users. As constructivist educators, we value how social annotation frames literacy as a social activity, highlighting the collective interpretation of texts. In particular, we are interested in what social annotation reveals about users' metacognitive and reading comprehension moves. By observing how students annotate, we can gain valuable insights into their interpretations and approaches to the texts.

Our initial research within a previous iteration (Adams et al., 2023; see Table 2 in Methods) was confined to a single program at one institution in the northeastern U.S., where we found that annotations by certified teachers studying literacy education were largely focused on text-to-self connections. However, moves such as synthesis and critique, both more complex strategies, were less frequent. These findings prompted us to replicate the study across different institutions and programs within our research group with iterations two and three, with the number of participating institutions and programs differing each time, to verify whether our observations held true in other settings. We found in iteration two (Wilson et al., 2024; see Table 2 in Methods), a cross-comparison of five institutions, that student annotations rarely demonstrated the types of metacognitive strategies identified as essential for comprehension. For example, Dewitz and Graves (2021) explain that effective readers engage in active meaning-making by setting purposes, asking questions, making inferences, monitoring understanding, and synthesizing ideas. However, our data revealed that students were not consistently enacting these behaviors. Instead, annotations often focused on surface-level reactions or personal connections, with limited evidence of inferencing, purposeful questioning, or summarizing. This discrepancy suggests that even graduate students have difficulty independently applying the full range of metacognitive strategies needed for deeper comprehension (Lei et al., 2010), a pattern that challenged our assumptions and informed the design of our later, more explicit instructional interventions. In response (iteration 3; Stevens et al., 2025), we refined our intervention to provide more explicit and systematic instruction in metacognitive moves, specifically tailored to

reading comprehension, through an asynchronous GRR framework deployed at two universities (see Table 2 in Methods). This paper evaluates the effectiveness of this enhanced intervention.

Literature Review

Metacognitive reading comprehension strategies are essential for students navigating complex academic texts, particularly at the graduate level. This review explores the theoretical foundations and instructional practices that inform the development of these strategies, with a specific focus on the GRR framework. By examining the role of metacognition, reading comprehension strategies, and the role of the teacher in explicit instruction, this section highlights key insights from prior research that inform the present study. Additionally, social annotation fosters collaborative and reflective reading practices (Adams & Wilson, 2020), offering a lens through which we can observe real-time metacognitive engagement. These insights form the foundation for evaluating how our asynchronous GRR intervention impacts graduate students' reading comprehension and metacognitive development.

Reading Comprehension and Metacognition

Reading comprehension is a complex cognitive process that involves internal mental activities, making it challenging to assess and instruct effectively (Pearson & Cervetti, 2017; Adams et al., 2023). At the core of this study is the premise that readers actively construct meaning through metacognitive strategies. Metacognition, defined by Flavell (1979) as the awareness and control of one's cognitive processes, plays a crucial role in enhancing comprehension. It enables readers to engage in practices such as questioning, making inferences, and monitoring their understanding during the reading process (Duke et al., 2011). Metacognitive strategies are the hallmark of proactive learners who can effectively manage their own learning (Ward & Butler, 2019; Young & Fry, 2008).

Despite the recognized importance of metacognition, research has shown that students exhibit varying levels of metacognitive awareness (Karpicke et al., 2009; Ku & Ho, 2010). Some students demonstrate effective management of their learning across contexts, while others may not yet demonstrate self-awareness and regulation during reading (Young & Fry, 2008). Key comprehension strategies, such as questioning, activating prior knowledge, and monitoring comprehension (Duke et al., 2011; National Reading Panel, 2000; Ness & Kenny, 2016) are essential for extracting meaning from texts. Strategic readers adjust their approaches according to the demands of the text and the task (Almasi & Fullerton, 2012), while also recognizing and addressing comprehension breakdowns (Artis, 2008; Thomas & Barksdale-Ladd, 2000; White, 2004). Recent research has called into question the assumption that US graduate students inherently possess strong metacognitive and reading comprehension skills (Adams et al., 2023; Wilson et al., 2024; Lei et al., 2010). It is worth noting that during the time the students in the study received direct instruction in reading comprehension, students more than likely did not experience cumulative literacy learning with differentiation between skills and strategies (Dewitz & Graves, 2021). While it is beyond the scope of this study to analyze how their past reading instruction plays into how graduate students in the MSED program teach literacy, it may have shaped how they engage with text.

Monitoring comprehension is central to the metacognitive reading process. It allows students to evaluate their understanding (e.g., complete, partial, or incomplete) and identify

strategies to resolve any gaps in comprehension (Baker, 1979; Soto et al., 2023). This process of self-regulation is key to successful reading, as students learn to recognize comprehension failures and apply appropriate strategies to improve their understanding (Soto et al., 2023).

Prior knowledge, or the information a reader brings from previous experiences, also plays a critical role in reading comprehension (Hattan, 2024). This type of knowledge includes concepts, experiences, and text structures (Brody, 2001), enhances comprehension by enabling readers to make connections and ask relevant questions during reading (e.g., Gaultney, 1995; Recht & Leslie, 1988; Tarchi, 2010). Without sufficient background knowledge, readers may have difficulty with comprehension and be less aware of the gaps in their understanding (Kendeou et al., 2019; Neuman, 2019).

Research indicates that when students have explicit instruction focused on metacognitive and comprehension strategies that are integrated into learning, students' reading improves (Dewitz & Graves, 2021). Instructors are encouraged to integrate explicit metacognitive instruction into their teaching practices to support students' comprehension development (Jiang et al., 2016; Zohar & Lustov, 2018). Ultimately, metacognitive strategies are invaluable in promoting reading comprehension, as they provide students with the tools to monitor their engagement with texts. By revealing how students apply knowledge, monitor their understanding, and self-regulate, social annotation provides critical data on their reading practices (Pintrich, 2000).

Role of the Teacher in Explicit Instruction and Building Metacognition

Duke and colleagues (2011) describe students learning to read effectively as a journey, where teachers serve as guides, helping students to stay on course, pausing to appreciate the landscape of understanding, and inviting some detours down interesting byways. Teachers play a pivotal role in explicit comprehension instruction and building students' metacognition. As such, teachers must be prepared to be proficient and flexible (Williams & Atkins, 2009) when it comes to comprehension instruction, specifically teaching comprehension strategies, within the GRR framework (Duke et al., 2011, 2021; Pearson & Gallagher, 1983).

It is well established in the literature that teachers matter when it comes to building students' comprehension (e.g., Snow et al., 1991; Taylor et al., 2003; Tivnan & Hemphill, 2005). Snow and colleagues (1991) found students made more progress in reading when they had strong teachers of reading comprehension. This finding also applies to explicit comprehension strategy instruction. The National Reading Panel (2000) report concluded that strategy instruction, where teachers and students interact over text, was highly successful. More recently, Mahdavi and Tensfeldt (2013) reported positive effects of comprehension strategy instruction in the primary grades. Okkinga et al. (2018) later concluded multiple-strategy instruction was effective in grades 3-12. Duke and colleagues (2021) stated, "Many benefit from explicit instruction in how to think before, during, and after reading; how to monitor their understanding; and how to help themselves when meaning breaks down" (p. 667). Overall, explicit strategy instruction from teachers who are highly knowledgeable is supportive of students' learning as they read.

Effective teachers of reading comprehension guide their students on the journey as they develop into metacognitive readers by teaching them why, how, and when to apply strategies (Duke & Pearson, 2002). It is recommended (Duke et al., 2011) that teachers teach

comprehension strategies through a GRR framework (Pearson & Gallagher, 1983). The historical and conceptual genesis of GRR (Pearson et al., 2019) was a result of Durkin's (1978) study which found little reading comprehension instruction was occurring in classrooms; rather, students were completing assignments such as question-response activities without developing comprehension skills. Since its genesis, GRR is a framework utilized across disciplines.

Gradual Release of Responsibility

There are six stages of GRR (Baumann & Schmitt, 1986; Duke et al., 2011; Pearson & Gallagher, 1983; Pearson et al., 2019; see Table 1). The first stage includes explicit description, where the teacher directly teaches what, how, when, and why to use the strategy. Second is the teacher-modeling stage where the teacher walks students through the strategy using a think-aloud or explicit instruction. During a think-aloud, teachers demonstrate or model their thinking or application of strategies (Duke & Pearson, 2002). Modeling makes the thinking process visible, showing students how to be strategic, metacognitive readers (McKeown & Beck, 2009). Third is collaborative use. In this stage, the teacher invites students to collaboratively use the strategy in action. Fourth is the guided practice stage where the teacher facilitates students' interactions with the text as they apply what they learned with gradual release of responsibility. Duke and colleagues (2011) emphasized the importance of the middle stages (collaborative use and guided practice) because teachers can provide explicit instruction and then inadvertently release responsibility before students are ready to practice independently. Fifth is the independent use stage, where students are tasked to use the strategy on their own. Sixth is reflection, when the teacher and students reflect on their performance to decide the next steps for instruction. Pearson and colleagues (2019) recently identified reflection as an essential phase of GRR, for both teachers and students.

Table 1

Stages of GRR (Pearson et al., 2019)

Stage	Description	Teacher's Role	Student's Role
1. Explicit Description	The teacher explicitly describes the skill or strategy.	Explains when and how it should be used.	Observes and listens to the teacher's explanation.
2. Teacher Modeling	The teacher demonstrates or models application of the skill or strategy	Models thinking aloud, shows the skill or strategy in action.	Observes and listens to the teacher's modeling or demonstration.
3. Collaborative Use	Students work together with teacher and peer support.	Reminds students of skill or strategy modeled and invites students to try it in action. Facilitates discussion, encourages peer interactions.	Tries skill or strategy with the support of others. Engages in discussions, shares ideas, and supports peers.

4. Guided Practice	The teacher guides students through practice with support.	Provides prompts, scaffolds learning, and gives feedback.	Participates, asks questions, and practices with assistance.
5. Independent Use	Students apply the skill or strategy on their own.	Observes, provides minimal guidance, and assesses learning.	Practices independently, applies knowledge, and self-monitors.
6. Application & Reflection	Students transfer learning to new contexts and reflect.	Encourages application to real-world tasks and metacognition.	Applies learning in novel situations and reflects on understanding.

Despite the list of stages above, GRR is both a nonlinear and recursive framework. Teachers and students may move through the stages of GRR in a nonlinear way. For instance, if teachers teach a unit of inquiry from a constructivist lens, they may have the students participate in independent use or guided practice before providing explicit instruction or modeling (Pearson et al., 2019). The non-linear nature of GRR is also important as teachers consider increasingly complex tasks, texts, and learning contexts (Webb et al., 2019). Teachers and students can "move back and forth between each of the components as they master skills, strategies, and standards" (Fisher, 2008, p. 2). Students may reach the fifth stage, independence, with a strategy and cycle back to stage one, two, three, or four needing explicit instruction, modeling, collaborative use, or guided practice depending on the complexity associated with the text. The duration of the steps may vary as some students may need more modeling or guided practice.

For teachers to be skillful and strategic in their instruction, they need a strong understanding of metacognition and the strategies and frameworks that support their teaching of metacognitive students (Williams & Atkins, 2009). Wilson and Bai (2010) found teachers' understanding of metacognition was related to the strategies they understood to be effective in supporting students' metacognition. Williams and Atkins (2009) asserted, "Only when teachers are aware of what their own comprehension entails will they be able to monitor their students' reading and provide the right instruction for them" (p. 40). As such, scholars call for building teachers' understanding of metacognition and reading comprehension, in coursework and professional development opportunities (Williams & Atkins, 2009; Wilson & Bai, 2010). This study seeks to uncover if the addition of explicit instruction using the GRR framework supported strategic reading through the application of varied metacognitive comprehension strategies.

Methods

This case study is part of an ongoing project, now in its fourth iteration, which explores how graduate students engage with academic texts through social annotation. Social annotation tools like Perusall allow students to read and annotate texts asynchronously, promoting collaborative meaning-making (Glover et al., 2007). While earlier iterations focused on students' metacognitive behaviors, the current study seeks to understand how explicit instruction within the GRR framework supports metacognitive comprehension through strategic reading. The goal of each iteration is to further understand the quintain (Stake, 2006) to guide future research.

This case study utilizes grounded theory (Glaser & Strauss, 1967) to understand the nature of students' responses to readings with and without explicit instruction using the gradual release of responsibility model. The theory has been developing throughout each iteration of the study. Early iterations focused on creation of the code book. Later iterations worked with the code book to determine if there are variables that impact students' interactions with text. In this iteration the variable was explicit instruction in reading comprehension strategies using the gradual release of responsibility model. Previous iterations assumed strategy usage (Adams et al., 2023), provided implicit strategy instruction (Wilson et al., 2024), and provided explicit one time strategy instruction (Stevens et al., 2025).

Table 2

Previous Iterations

Iteration	Goals of the Study	Number of Institutions	Location of Institutions	Number of Participants Evaluated
1 (2022)	Learn about Metacognitive and social practices during reading	1 course	Northeast	12 students
2 (2023)	Learn about the comprehension and metacognitive practices novice teachers use through social annotation	1 (1 course)	Northeast	3 students
3 (2024)	Compare the comprehension and metacognitive strategies observed through social annotation, at different institutions	5 (6 courses)	Northeast (3) Northwest (1) Midwest (1) South (1)	18 students
4 (2025)	Evaluate how direct instruction in metacognitive strategy use for social annotation through Gradual Release of Responsibility support student comprehension	2 (2 courses)	Northeast	2 instructors

The primary tool for data collection for this study was Perusall, which is an online social annotation tool. Readings are uploaded to the tool and students work asynchronously to engage with text through the online platform. Unlike reading an electronic text (e.g., eBook, PDF file) independently, Perusall allows for readers to interact. For instance, if one reader clarifies the definition of a word used in the article, other readers can see the comment clarifying the definition. Perusall has been used for each iteration of this work. When completing assigned readings, students exercise agency in how closely they choose to read and when they choose to comment on what they read. Though there are expectations to demonstrate close reading, what that means is determined by the individual. Previously, studies in the project revealed that graduate students primarily engaged in text-to-self connections while annotating texts, even after additional instruction on metacognitive moves (Adams & Wilson, 2022; Adams, et. al, 2023;

Wilson, et. al. 2024). The consistency of these findings across institutions prompted the introduction of explicit, guided instruction following the similar procedures and slide deck in the current iteration. This phase builds on prior findings by using the GRR framework in an effort to scaffold students' metacognitive reading strategies, such as questioning and synthesizing information, while reading academic texts (Pearson & Gallagher, 1983).

Instructional Design

The instructional design for this study was developed within the GRR framework, which structures learning around six stages: explicit description, teacher modeling, collaborative use, guided practice, independent use, and reflection (Pearson & Gallagher, 1983; Pearson et al., 2019). This design-based approach aimed to scaffold graduate students' metacognitive reading skills by providing systematic, structured support at each stage of the learning process.

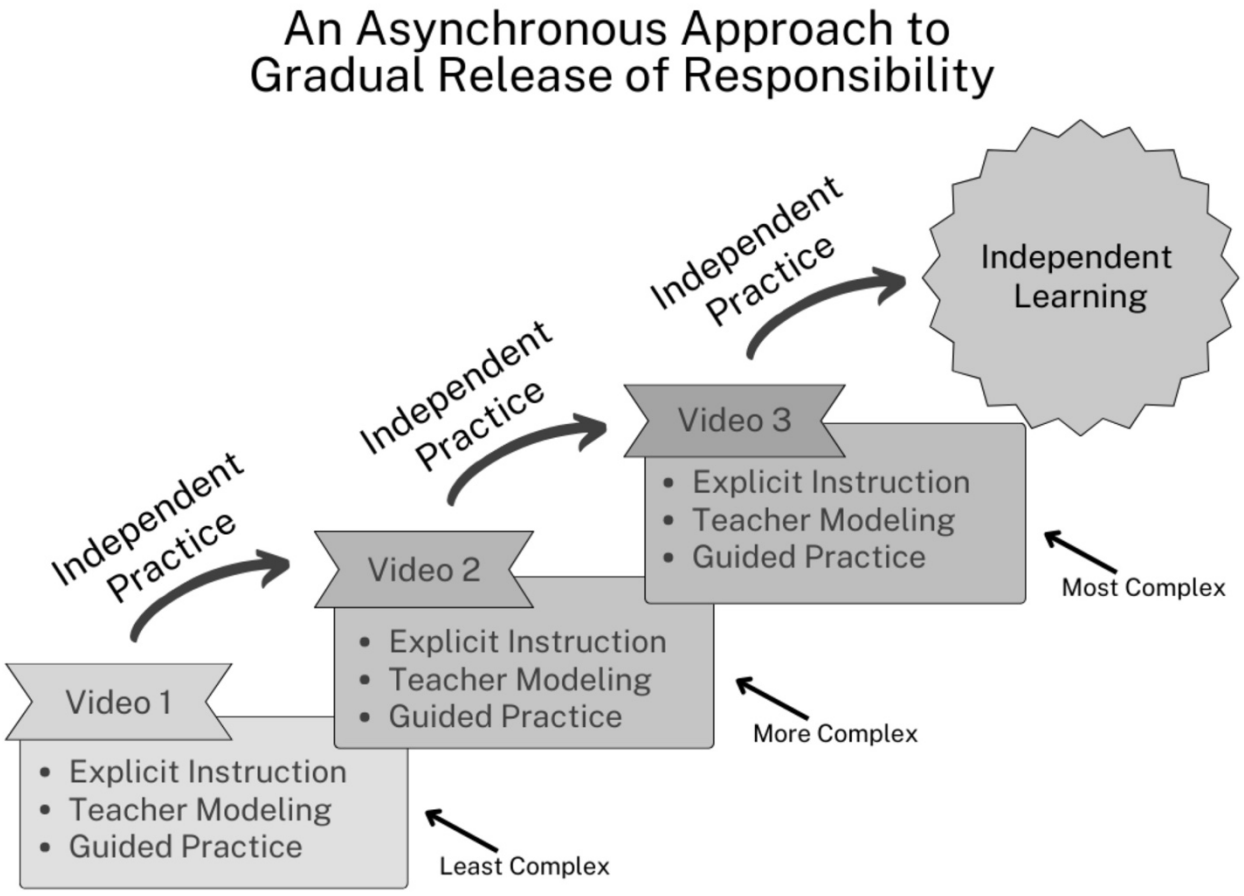
To foster metacognitive comprehension and strategic reading, the design incorporated social annotation through Perusall. The integration of social annotation into the GRR framework was grounded in constructivist principles, emphasizing that learning is a social process, especially when engaging with complex academic texts (Vygotsky, 1978; Glover et al., 2007). By designing activities where students could apply strategies like questioning, summarizing, and making connections in a collaborative online environment, the intervention sought to promote both individual metacognitive growth and collective meaning-making.

In alignment with the principles of design-based research, the instructional design was iterative, evolving through multiple cycles of refinement based on data from previous iterations (Reinking & Bradley, 2008). The approach was designed to be flexible, allowing for adaptation based on contextual needs, such as the course content, institutional setting, and the specific backgrounds of the graduate students. Instructors from two institutions, Wilson and Stevens, collaborated to align their course materials and deliver instruction that adhered to the GRR framework. It was determined that these institutions would be the focal points for this iteration as both instructors were working with students new to Perusall that semester, both were teaching asynchronous classes, and both were teaching content required by Literacy Master's degrees.

The explicit instruction phase involved creating video presentations that detailed key comprehension strategies, such as monitoring understanding, making connections, and questioning during reading. Each video was accompanied by slide decks, which were designed to ensure consistency in instructional delivery across both courses. Slide deck/video 1 focused on monitoring and summarizing, introducing the idea of interactive reading to produce comprehension. Slide deck/video 2 focused on connections and inferencing while slide deck/video 3 focused on criticality and questioning. The modeling phase included think-alouds where instructors demonstrated the application of metacognitive strategies while engaging with academic texts (McKeown & Beck, 2009). In the guided practice phase, students applied these strategies to a text within Perusall, allowing for interaction and feedback. The guided phase also included collaboration as students were working together within Perusall. Independent use allowed students to continue using these strategies on their own, while the reflection stage provided opportunities for students to evaluate their learning and refine their metacognitive skills (Pearson et al., 2019).

Figure 1

Asynchronous Gradual Release of Responsibility Model



This iterative design ensured that the intervention was grounded in theory while being responsive to the unique needs of the students and the online learning environment. The inclusion of explicit metacognitive instruction in asynchronous courses aimed to provide a structured yet flexible approach to developing the metacognitive moves necessary for engaging with complex academic texts.

Data Collection and Participants

Data collected included student annotations made in Perusall. All graduate students (n=32) in both settings, representing multiple years (first year and second year graduate students) in their trajectories, were invited and agreed to participate; leaving a total of over 5,000 data points to be analyzed. A data point was a single comment on a single reading during the semester. The two settings were located in teacher education colleges in the suburban northeast, though all the students were online students they were located throughout the northeast. To manage the volume of data, analysis was limited to three participants per course (n = 6 total) and three texts per course, following methods from previous iterations (Adams & Wilson, 2022). Stake (2006) posits that a strategic and focused approach to data selection is crucial for uncovering meaningful insights and maintaining clarity. All participants had earned an A in the course, which is the most common grade for students in these courses, less than 5% of the

students earned a grade less than an A. The decision of choosing students who achieved an A is related to the idea that those students were more likely to attend carefully to the GRR videos and instruction to guide their reading. The three participants were based on specific criteria to serve as cases. Since about ½ of all participants were part-time students, at least one part-time student (taking fewer than six credits) was included through random assignment. To represent the remaining half of the students, one full-time student (taking six or more credits) was included. The third participant was randomly selected to ensure a comprehensive perspective (Stake, 2006).

Participant demographics and selection reflected the populations served by the colleges; that is, while the class makeup varied minimally in terms of race/ethnicity, those selected for study were white females. No students registered for the two foci classes did not identify as white females, which matches the gender/racial make-up of the teaching force (National Center for Education Science, 2023).

This approach was designed to provide insights into the readers' metacognitive comprehension strategies during reading of high-performing students, in line with previous research on comprehension and metacognition (Mulcahy-Ernt & Caverly, 2018). Although demographic data were not collected, participant selection considered professional obligations by including both full- and part-time students, all of whom were certified teachers pursuing a master's degree in literacy education. Demographic data was not collected because the study took place during the normal process of asynchronous classes and collection of this data would have been inappropriate for an instructor to ask their students. The IRB did not approve the collection of this type of information.

Participants were assigned readings in Perusall, with one week given to complete each task. The readings differed by course: in Wilson's class, the focus was on digital literacies, while in Stevens' class, the readings centered on assessing and remediating foundational reading skills. Each author's class was a distinct data set. Both instructors/authors used the same slide decks for each instructional video, but adapted examples based on their course content. No specific number of annotations was required per reading.

For the instructional videos, a total of 96 minutes were analyzed for their efficacy to the gradual release of responsibility model (Stevens et. al., 2025) prior to analyzing the student annotations. Using the purposeful selection of readings, one from the beginning of the semester, one from the middle of the semester, and one from the end of the semester, we were left with a total of 382 student annotations across six readings down from the original 5,000. This was done because using all data points for a case study is often impractical, inefficient, and can undermine the research's focus and rigor (Stake, 2006).

Data Analysis

Annotations were coded ten months after the semester concluded, using a pre-established codebook developed in earlier iterations of the project (Adams et. al., 2023; Table 5). The coding scheme (White & March, 2006) was developed based on reading behaviors, transactions that occur during reading called comprehension strategies. The six reading comprehension strategies were identified based on a review of the literature (e.g., Gersten et al., 2001; Kamil, 2003; Snow,

2002), and operationalized as inferencing, summarizing, questions, connecting, monitoring, and synthesizing (e.g., Tompkins, 2017). Prior to this iteration, the codebook was shared multiple times with external researchers to establish reliability (Adams & Wilson, 2022). The research team ensured inter-rater reliability through practice coding and multiple rounds of review, achieving a reliability rate of over 95% (Creswell & Poth, 2016). The reliability came from first coding as a group 25% (96) of the responses, then coding with research partners the remaining 75% (286) of the responses. The full research team then came together to check the reliability of the coding, noting each time codes did not match, only n=19 times. These codes were discussed and then recoded through a final agreement with the full research team. Coding focused on identifying key metacognitive and comprehension strategies (metacognitive moves), such as questioning, summarizing, and making connections (Mulcahy-Ernt & Caverly, 2018; Soto et al., 2023). The primary goal was to evaluate whether the instructional videos effectively supported students' metacognitive moves during reading, which refer to a student's conscious decision to show their thinking. The strategy we identify is what we infer that the reader did when they chose to annotate at that point. The annotation is purposeful and thus a metacognitive move.

Findings

This section examines the impact of explicit metacognitive instruction using the GRR framework by comparing findings across different iterations and analyzing differences between the two courses under investigation. In all iterations the same two courses were foci of the research. Though both courses are part of literacy graduate programs that prepare literacy specialists, they differ significantly in content focus. Wilson's course on digital literacies explores the evolution of print versus online reading, media literacy, and critical comprehension in digital contexts, while Stevens' course on foundational reading skills addresses phonics, phonemic awareness, and the instruction of basic reading components. Both programs teach the same content, examining two different courses in the programs allows for the examination of the gradual release model. Prior research does not address content differences in this framework. The data for 2021 was coded and published prior to this work (Adams et. al., 2023). The data for 2023 was coded using the pre-existing codebook thus allowing for some comparison. Given the differing demands of these courses, they provide an opportunity to examine how instructional design, text complexity, and domain knowledge shape graduate students' use of metacognitive reading strategies.

The first part of this section compares findings from the 2023 iteration to previous versions of the study to assess whether explicit GRR instruction influenced students' metacognitive engagement. The second part examines how metacognitive strategy use differed between the two courses, highlighting how content and pedagogical context affected the application of specific reading strategies.

Comparing 2023 Findings to Previous Iterations

Prior research on graduate students' metacognitive reading behaviors (Adams & Wilson, 2022) found that students primarily engaged in text-to-self connections when annotating academic texts. While making connections is a valuable reading comprehension strategy, these earlier findings suggested that students were not engaging in higher-order metacognitive moves such as questioning, synthesizing, or monitoring. In the current iteration, we wanted to see if

explicit strategy instruction using the GRR framework would expand students' use of questioning and monitoring strategies compared to previous studies (Adams et al, 2023).

To further understand this, both the 2021 and 2023 datasets were analyzed using a consistent coding framework, with percentages adjusted to account for differences in the number of readings per iteration. It is appropriate to use percentages because these are observations that exist for data points. Since the number of participants is small, we used percentages to see if there is any relationship between the types of strategies exhibited with no explicit instruction in GRR, and then with explicit instruction in GRR. Since the purpose of this research is formative, the percentages are appropriate for gathering a snapshot of the strategies used. The goal here was to uncover a quintain (Stake, 2006). Because the 2021 study examined only two readings, we excluded Reading 3 from the 2023 dataset to ensure comparability. The analysis revealed several key differences. First, whereas the 2021 dataset showed an over-reliance on making connections, the 2023 data reflected a broader distribution of metacognitive strategies, including a noticeable increase in questioning and monitoring (See Table 3). This shift suggests that students exposed to explicit metacognitive instruction diversified their reading strategies beyond surface-level connections. Second, the nature of connections changed: While text-to-self connections dominated in 2021, students in 2023 engaged in more text-to-text connections, indicating that they were synthesizing ideas across multiple sources rather than merely relating content to personal experiences.

Table 3

Total Strategy Usage Comparison from 2021 to 2023

	Wilson, 2021	Wilson, 2023	Stevens, 2021	Stevens, 2023
Connecting	45.90%	42.19%	67.65%	36.73%
Inferring	3.28%	5.47%	2.94%	0.68%
Questioning	4.92%	17.19%	5.88%	7.48%
Monitoring	34.43%	27.34%	23.53%	53.06%
Summarizing	6.56%	2.34%	0.00%	1.36%
Synthesizing	4.92%	5.47%	0.00%	0.68%

Taken together, these findings support the initial conclusion that explicit instruction in metacognitive reading behaviors encouraged a wider repertoire of strategies, enabling students to engage more critically and reflectively with academic texts. However, while questioning and monitoring increased, the frequency of synthesis remained lower than anticipated, suggesting that additional scaffolding may be needed to help students integrate and apply information across texts.

Explicit Instruction and Metacognitive Development

In this iteration, the GRR framework (Pearson & Gallagher, 1983; Pearson et al., 2019)—incorporating explicit description, modeling, collaborative use, guided practice, independent use, and reflection—was adopted to enhance students' metacognitive moves beyond the connections observed in earlier iterations. Explicit strategy instruction provided through the recorded videos increased the likelihood that student annotations would reflect those modeled strategies, as evidenced by their more varied use of metacognitive moves. These findings suggest that explicit instruction in metacognitive reading behaviors did support students' engagement with strategies such as questioning and monitoring. However, the extent of this impact varied depending on both course content and instructional approach, with some students demonstrating greater flexibility in strategy use than others (Stevens et al., 2025). The unique nature of each course could have impacted the strategy use by students, thus comparing the courses using inferential statistics would not be appropriate.

Findings Related to Instructional Intervention

After coding all data using the pre-existing codebook (see Appendix), we analyzed the 2023 dataset to identify patterns and trends in strategy usage aligned with the GRR video instruction in these cases. The GRR framework incrementally introduced different metacognitive strategies: The first video focused on introducing metacognition and monitoring; the second emphasized making connections, especially text-to-text; and the third focused on questioning and criticality.

The findings indicate that students responded to explicit instruction by increasing their use of modeled strategies. Table 3 presents the percentage of overall annotations for each metacognitive move, across the two courses taught by Wilson and Stevens. The data seems to reveal patterns that align closely with the instructional focus of each video. For example, monitoring was prominent in the codes for Reading 1, making up 39% (numbers have been rounded for clarity) of annotations in Wilson's course and 63% in Stevens' course, consistent with the first video's emphasis on monitoring. Similarly, connections dominated Reading 2 for both courses, reflecting the second video's focus on making explicit connections.

Table 4

Strategies from Readings 2023

Strategy	Wilson, Reading 1	Stevens, Reading 1	Wilson, Reading 2	Stevens, Reading 2	Wilson, Reading 3	Stevens, Reading 3
Connecting	39.29%	28.97%	54.48%	60.53%	50.00%	49.02%
Inferring	7.14%	0.93%	4.83%	0.00%	3.49%	0.00%
Questioning	7.14%	4.67%	10.34%	15.79%	17.44%	13.73%
Monitoring	39.29%	63.55%	26.21%	21.05%	22.09%	37.25%
Summarizing	5.36%	0.93%	0.69%	2.63%	1.16%	0.00%
Synthesizing	1.79%	0.93%	3.45%	0.00%	5.81%	0.00%

In Reading 3, questioning increased noticeably in Wilson's course, rising from 10% in Reading 2 to 17% in Reading 3, aligning with the instructional video's focus on questioning. However, connecting remained a substantial strategy, holding at 50% of codes in Reading 3. In

Stevens' course, monitoring remained a dominant strategy across readings, particularly in Reading 3, where it made up 37% of the codes.

Interpretation of the Findings

The alignment between the explicit instruction provided in the videos and the strategies used in the annotations suggests that the GRR framework had a meaningful impact on students' metacognitive reading behaviors. The focus on monitoring in the first video resulted in a high percentage of monitoring annotations in the corresponding reading, while connections and questioning increased when they were emphasized in subsequent videos. However, the persistence of monitoring as the dominant strategy in Stevens' course suggests that some students may require additional instruction and opportunities for practice before they can transition to more flexible metacognitive strategy use.

The difference in strategy use between the two courses points to a key consideration: while explicit instruction is an effective intervention, it may not be sufficient as a standalone approach, particularly for students engaging with content-heavy, technical readings. The students in Stevens' course, despite exposure to the same metacognitive framework, continued to rely on monitoring, which suggests that they may not yet feel confident in applying strategies such as questioning and synthesis. Rather than reflecting a failure of explicit instruction, this finding indicates that sustained and reinforced instruction may be necessary to help students move beyond comprehension monitoring and toward higher-order engagement with texts.

Wilson: Digital Literacies

The content of Wilson's course, focusing on digital literacy, required students to question and engage critically with the text. Wilson's instructional videos stressed the importance of critical reading and responding to texts to become better readers and teachers. A key instructional move was the deliberate pausing in the videos to allow students to reflect and process information, alongside quizzes that reviewed key terms discussed in the videos.

The impact of these instructional strategies is clear in the students' annotations. In the first recorded video, which focused on monitoring, student annotations showed a balance between monitoring and connecting strategies. Previously, connecting had been the most common strategy (Adams & Wilson, 2022). However, after explicit instruction on monitoring, the percentage of annotations coded for monitoring was equal to those for connecting. This shift highlights the role of targeted instruction in encouraging a wider use of metacognitive strategies.

In the second recorded video, Wilson focused on making connections and inferences, encouraging students to go beyond simple text-to-self connections. For example, one student wrote, "This parallels Leu's comments about how we critique media evolving as rapidly as digital spaces are," demonstrating a deeper text-to-text connection. This level of engagement contrasts with prior iterations, where text-to-self connections were far more common, such as, "I think my life would be different if I had grown up with social media." By promoting text-to-text connections, Wilson encouraged richer, more analytical thinking in the annotations.

In addition to connecting, questioning also increased in Reading 2, likely due to Wilson's focus on using questioning to guide connections. One notable student annotation asked, "I want

to think about this in terms of teaching. How can we leverage all our students' knowledge and have them share what they know? We should position them as capable and collaborative as described in Johnston (2023)." This kind of questioning demonstrates a deeper engagement with the material and a move toward more critical reflection, which was encouraged through explicit instruction in the videos.

Stevens: Phonological Awareness and Assessment

Stevens' course focused on assessment-driven instruction of reading foundational skills, with the students using the same text (Kilpatrick, 2016) throughout the course. Despite having prior knowledge of the content from a previous foundational course, many students expressed uncertainty and anxiety about their understanding of the vocabulary and concepts. For example, one student noted, "I have read this about 5 times, and I'm still trying to make sense of it." Another student similarly reflected, "I always had a hard time differentiating between phonological awareness and everything else under its umbrella." This is of particular importance regarding understanding the candidates' metacognitive moves because,

> Ultimately, the construction–integration model provided a more complete description for how readers use textual information and their background knowledge to construct several increasingly refined mental models of the text, including a text base that was literal and fleeting and a situation model that was interpretative and stable (Dewitz & Graves, 2021, p. S133).

The students' lack of confidence and confusion around the concepts in the class demonstrate a lack of background knowledge regarding the specifics of the course content.

These insecurities were observed within the students' annotations, with much of their focus on monitoring their own understanding. While Stevens' instructional videos included enactments and modeling of strategy application, opportunities for student practice were less frequent than in Wilson's course. In the first recorded video, which focused on summarizing and monitoring, students were explicitly encouraged to avoid simple text-to-self connections. Stevens told students, "I am trying to release responsibility to you now that I have modeled," clearly demarcating the shift toward independent use.

However, many students had difficulty moving beyond monitoring their basic understanding of the course concepts. One student commented, "I think I now understand the difference between phonological awareness and phonemic awareness," (Reading 2) reflecting the cognitive effort required to grasp the foundational knowledge. As a result, monitoring remained the dominant strategy throughout the readings, indicating that the students were still working through essential content comprehension rather than engaging in deeper questioning or connections.

Discussion

This iteration of the study, which incorporated explicit instruction within the GRR framework, produced more varied metacognitive comprehension strategic reading compared to

previous iterations. However, differences emerged between the two courses, likely influenced by the nature of the texts assigned and the instructional moves made by each author.

Wilson's focus on digital literacy introduced texts that encouraged critical engagement and questioning. Research shows that the complexity and genre of texts can affect students' metacognitive engagement, with expository texts often demanding more monitoring and inferential strategies, while narrative or more open-ended texts may encourage greater connections and critical reflection (Kintsch, 1998; McNamara, 2004). The explicit emphasis on questioning as a strategy, coupled with opportunities for students to practice, likely contributed to the increase in questioning annotations and the deeper, more varied connections observed in the 2023 data. By contrast, Stevens' course on reading foundational skills relied on a text that was more content-heavy and less conducive to critical questioning. Consequently, the students' annotations reflected a focus on monitoring their comprehension, which is consistent with findings that content-heavy texts require greater monitoring to manage comprehension (McNamara, 2004).

While both courses used the same GRR-based slide decks, the primary difference lay in how the content was modeled. The GRR framework has been shown to effectively scaffold student learning by gradually shifting responsibility for strategy use from the teacher to the student (Pearson & Gallagher, 1983; Fisher & Frey, 2014). Wilson provided more opportunities for practice and reflection, with quizzes used to assess understanding at the end of each video. In contrast, Stevens' videos featured more teacher modeling with fewer explicit prompts for student engagement during the lesson (Stevens et al., 2025). As a result, the students in Wilson's course demonstrated greater variety in their use of metacognitive strategies, while students in Stevens' course remained more focused on literal comprehension and monitoring.

These findings align with research that suggests explicit instruction within the GRR framework can support metacognitive development, but that the students' background knowledge, type of text, and small differences with instructional approach (Stevens et al. 2025) could influence the depth and variety of strategy use (Pearson & Gallagher, 1983). Further iterations should explore how to better scaffold students who are working with content-heavy texts, with which they have little background knowledge, and how to encourage the use of more varied strategies beyond monitoring.

Limitations

While this study provides valuable insights into the impact of explicit metacognitive instruction using the GRR framework, several limitations should be considered when interpreting the findings. These limitations primarily relate to instructional variability between the two courses, sample size constraints, and data collection methods. The use of percentages to compare the data is appropriate for this initial case study, however a larger study using inferential statistics should be considered for making definitive conclusions.

Although both courses followed the GRR framework and provided explicit metacognitive instruction, the way each instructor implemented the model varied. The digital literacies course incorporated structured self-assessment activities, such as quizzes and guided reflection prompts, while the foundational reading skills course relied more heavily on teacher modeling with fewer

explicit opportunities for structured independent reflection. These differences may have contributed to the observed disparities in metacognitive engagement across the two courses. While the study identifies instructional design as a key factor influencing metacognitive strategy use, it is difficult to isolate the effects of explicit instruction from the differences in presentation style between the two instructors. Future research should explore whether a standardized implementation of GRR, with consistent scaffolding across courses, yields different results.

Another limitation of this study is the small number of participants, which limits the generalizability of the findings. Because the study was conducted within two graduate courses, the sample size was constrained by course enrollment numbers. As a result, it is unclear whether these findings would hold across a larger, more diverse population of students. Future studies should examine larger sample sizes across multiple institutions to determine whether similar patterns of metacognitive engagement emerge in different educational settings. Additionally, examining student demographics, prior coursework, and reading backgrounds could provide further insight into how different factors influence metacognitive development.

This study relied on students' Perusall annotations as the primary measure of metacognitive strategy use. While this method provides a valuable window into students' reading engagement, it does not capture other forms of metacognitive processing, such as silent reflection, unrecorded thoughts, or strategy use that occurs outside the annotation platform. Some students may have engaged in questioning or synthesis while reading but did not record these moves in their annotations, potentially underestimating their true metacognitive engagement. Future research should incorporate think-aloud protocols, interviews, or reflective journals to gain a more comprehensive understanding of how students engage with metacognitive strategies beyond what is visible in their annotations.

Finally, it is possible that students' annotation behaviors were influenced by their understanding of instructor expectations. Students in the digital literacies course, for example, may have engaged in more questioning and synthesis because they recognized that these strategies were emphasized in instructional videos and quizzes. Similarly, students in the foundational reading skills course may have focused more on monitoring because they perceived comprehension checking as the most relevant strategy for engaging with technical material. Future research could explore whether explicit grading criteria or instructor expectations shape students' metacognitive engagement and how instructional framing influences students' selection of reading strategies.

Implications

The findings from this iteration highlight the importance of explicit metacognitive instruction in supporting students' use of reading strategies. While the GRR framework had a positive impact, data across all iterations of this research reveal areas for further attention. Two key concepts emerged that merit ongoing consideration for teacher educators: (1) graduate students' metacognitive skills and (2) the need for sustained instruction across courses.

Graduate Students' Metacognitive Skills

Across iterations, a consistent finding is that graduate students, even in literacy programs, are not necessarily metacognitive readers. Prior research shows that metacognitive skills do not

always develop alongside academic advancement, and even experienced educators may have difficulty engaging reflectively with texts (Pressley & Afflerbach, 1995; Schraw & Moshman, 1995). This challenges the assumption that graduate students arrive with well-developed metacognitive skills.

This finding is particularly important given the role of graduate students as future literacy specialists. If they do not consistently model strategic reading themselves, they may lack the confidence to teach it. Research suggest that K–12 comprehension instruction often falls short of evidence-based practice (Dewitz & Graves, 2021), which may contribute to gaps in educators' own metacognitive development. These findings suggest that teacher preparation programs should not only teach about comprehension instruction but also embed metacognitive strategy instruction as part of graduate coursework.

The Need for Sustained Instruction Across Courses

A second key implication is that one-time instruction is insufficient to support lasting metacognitive growth. Strategy development is gradual and requires repeated, scaffolded practice across different courses and contexts (Palincsar & Brown, 1984; Paris & Winograd, 1990). While explicit instruction improved students' use of questioning and monitoring, our findings suggest that these gains may not endure without reinforcement.

The contrast between the two courses reinforces this need. Students in the digital literacies course, who engaged in structured reflection, showed greater flexibility in applying strategies. Meanwhile, those in the foundational reading skills course, who did not receive consistent reflection prompts, primarily relied more on monitoring. This suggests that even with the same instructional framework, metacognitive development depends on consistent opportunities to apply and reflect on strategies across contexts. To support transfer and long-term growth, teacher educators should embed metacognitive strategy instruction across multiple courses, not as an isolated intervention but as an integral part of curriculum design. Doing so can help future teachers develop adaptable reading skills that extend beyond specific assignments or content areas and prepare them to teach these strategies with confidence in diverse classroom contexts.

Future Research

These findings suggest several key directions for future research. First, further study is needed to better understand why graduate students may have difficulty with metacognitive reading and how teacher education programs can better support their development in this area. Research on K–12 literacy instruction suggests that comprehension instruction has not always followed evidence-based practices (Dewitz & Graves, 2021), raising important questions about how educators' prior experiences with reading instruction shape their metacognitive skills in adulthood. Second, research should explore the long-term impacts of sustained, cross-curricular metacognitive instruction. Future studies should examine how embedding metacognitive strategy instruction across multiple courses affects students' ability to transfer and apply strategies in different academic contexts. Finally, future research should investigate the role of student agency in metacognitive engagement. Understanding how students choose and regulate their metacognitive strategies could inform instructional approaches that better support self-regulated learning and critical engagement with texts (Flavell, 1979; Schraw & Dennison, 1994).

Conclusion

This study offers important insights into how explicit metacognitive instruction, delivered through the GRR framework, can support graduate students' development as strategic readers. While instruction led to a broader range of strategy use, especially questioning and monitoring, the effectiveness varied depending on course content, student backgrounds, text complexity, and instructional approach (see Stevens et al., 2025). Findings across all four iterations of this research consistently point to three key challenges. First, graduate students, even those in literacy-focused programs, may not enter with strong metacognitive reading habits, challenging assumptions in teacher education (Pressley & Afflerbach, 1995; Schraw & Moshman, 1995). Second, metacognitive development requires more than a one-time intervention. It benefits from sustained, embedded instruction across multiple courses to support transfer and long-term use (Palincsar & Brown, 1984). Third, students exercise agency in how they engage with texts, suggesting that instruction must go beyond teaching strategies to support reflective decision-making about strategy use.

These insights carry implications for program design and the preparation of literacy educators. To foster truly strategic readers, teacher education programs must build metacognitive instruction into the curriculum in recursive, contextualized ways. In so doing, future educators will be better equipped to model and teach comprehension strategies in K–12 classrooms, supporting a more reflective and responsive literacy pedagogy.

Declarations

The authors have no competing interests to declare.

References

Adams B. & Wilson, N.S. (2020). Building Community in Asynchronous Online Higher Education Courses through Collaborative Annotation. *Journal of Educational Technology Systems*. 49 (2), 250-261. doi:10.1177/0047239520946422

Adams, B., & Wilson, N. S. (2022) Investigating students' during-reading practices through social annotation. *Literacy Research and Instruction*, *61*(4), 339-360.

Adams, B., Wilson, N. S., Dussling, T., Stevens, E. Y., Baumann, J., Van Wig, A., Yang, S., Mertens, G., Bean-Folkes, J., & Smetana, L. (2023). Literacy's Schrödinger's cat: Capturing reading comprehension with social annotation. Teaching Education, 34(4) 367-383.

Almasi, J. F., & Fullerton, S. K. (2012). *Teaching strategic processes in reading* (2nd ed.). Guilford.

Artis, A. B. (2008). Improving marketing students' reading comprehension with the SQ3R method. *Journal of Marketing Education, 30*(2), 130–137. https://doi.org/10,1177/0273475308318070

Baker, L. (1979). Comprehension monitoring: Identifying and coping with text confusions. *Journal of Reading Behavior, 11*(4), 363–74. https://doi.org/10.1080%2F10862967909547342

Baumann, J. F., & Schmitt, M. C. (1986). The what, why, how, and when of comprehension instruction. *The Reading Teacher, 39*(7), 640–646. https://www.jstor.org/stable/20199185

Brody, S. (2001). *Teaching reading, language, letters & thought* (2nd ed.). LARC Publishing.

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. –

Dewitz, P., & Graves, M. F. (2021). The science of reading: Four forces that modified, distorted, or ignored the research finding on reading comprehension. *Reading Research Quarterly*, *56*, S131S144. https://doi.org/10.1002/rrq.389

Duke, N. K., Pearson, P. D., Strachan, S. L., & Billman, A. K. (2011). Essential elements of fostering and teaching reading comprehension. In S. J. Samuels & A. E. Farstrup (Eds.), *What research has to say about reading instruction* (pp. 51–93). International Reading Association.

Duke, N. K., Ward, A. E., & Pearson, P. D. (2021). The science of reading comprehension instruction. *The Reading Teacher, 74*(6), 663–72. https://ila.onlinelibrary.wiley.com/doi/10.1002/trtr.1993

Duke, N., & Pearson, P. D. (2002). Effective practices for developing reading comprehension. In A. E. Farstrup & S. J. Samuels (Eds.), *What research has to say about reading instruction* (3rd ed., pp. 205–242). International Reading Association.

Durkin, D. (1978). What classroom observations reveal about reading comprehension instruction. *Reading Research Quarterly, 14*, 481–533. https://eric.ed.gov/?id=ED162259

Fisher, D. (2008). *Effective use of the gradual release of responsibility model*. Macmillan. http://srhscollaborationsuite.weebly.com/uploads/3/8/4/0/38407301/douglas_fisher.pdf

Fisher, D., & Frey, N. (2014). *Better learning through structured teaching: A framework for the gradual release of responsibility*. ASCD.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist, 34*(10), 906–11. https://doi.org/10.1037/0003-066X.34.10.906

Gaultney, J. F. (1995). The effect of prior knowledge and metacognition on the acquisition of a reading comprehension strategy. *Journal of Experimental Child Psychology, 59*(1), 142–163. https://doi.org/10.1006/jecp.1995.1006

Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of research. *Review of Educational Research, 71*(2), 279–320. https://doi.org/10.3102/00346543071002279

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory strategies for qualitative research.* Sociology Press.

Glover, I., Xu, Z., & Hardaker, G. (2007). Online annotation—Research and practices. *Computers & Education*, *49*(4), 1308–20. https://doi.org/10.1016/j.compedu.2006.02.006

Hattan, C. (2024). Supporting students' knowledge activation before, during, and after reading. *The Reading Teacher*. https://doi.org/10.1002/trtr.2322

Jiang, Y., Ma, L., & Gao, L. (2016). Assessing teachers' metacognition in teaching: The teacher metacognition inventory. *Teaching and Teacher Education, 59*, 403–413. https://doi.org/10.1016/j.tate.2016.07.014

Johnston, P. (2023). *Choice words: How our language affects children's learning*. Routledge.

Kamil, M. L. (2003). *Adolescents and literacy: Reading for the twenty-first century*. Alliance for Excellent Education.

Karpicke, J. D., Butler, A. C., & Roediger, H. L., III .(2009). Metacognitive strategies in student learning: Do students practise retrieval when they study on their own? *Memory*, *17*(4), 471–79. http://dx.doi.org/10.1080/09658210802647009

Kendeou, P., Butterfuss, R., Kim, J., & Van Boekel, M. (2019). Knowledge revision through the lenses of the three-pronged approach. *Memory & Cognition, 47*(1), 33–46. https://doi.org/10.3758/s13421-018-0848-y

Kilpatrick, D. A. (2016). *Equipped for reading success*: *A comprehensive, step-by-step program for developing phonemic awareness and fluent word recognition*. Casey & Kirsch Publishers.

Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. Cambridge University Press.

Ku, K. Y., & Ho, I. T. (2010). Metacognitive strategies that enhance critical thinking. *Metacognition and Learning*, *5*, 251–67. https://doi.org/10.1007/s11409-010-9060-6

Lei, S. A., Rhinehart, P. J., Howard, H. A., & Cho, J. K. (2010). Strategies for improving reading comprehension among college students. *Reading Improvement, 47*(1). https://eric.ed.gov/?redir=http%3a%2f%2fwww.projectinnovation.biz%2fri_2006.html

Mahdavi, J. N., & Tensfeldt, L. (2013). Untangling reading comprehension strategy instruction: Assisting struggling readers in the primary grades. *Preventing School Failure, 57*(2), 77–92. https://doi.org/10.1080/1045988X.2012.668576

McKeown, M. G., & Beck, I. L. (2009). The role of metacognition in understanding and supporting reading comprehension. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 7–25). Routledge/Taylor & Francis Group.

McNamara, D. S. (2004). *Reading comprehension strategies: Theories, interventions, and technologies*. Lawrence Erlbaum Associates Publishers.

Mulcahy-Ernt, P. I., & Caverly, D. C. (2018). Strategic study-reading. In R. F. Flippo & D. C. Caverly (Eds.), *Handbook of college reading and study strategy research* (3rd ed., pp. 191–214). Routledge.

National Center for Education Sciences. (2023). Characteristics of public school teachers. *Condition of Education*. U.S. Department of Education, Institute of Education Sciences. https://nces.ed.gov/programs/coe/indicator/clr.

National Reading Panel (U.S.) & National Institute of Child Health and Human Development (U.S.) (2000). [Report of the National Reading Panel] *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute of Child Health and Human Development. https://www.nichd.nih.gov/sites/default/files/publications/pubs/nrp/Documents/report.pdf

Ness, M., & Kenny, M.B. (2016). Improving the quality of think-alouds. *The Reading Teacher, 69*(4), 453–60. https://doi.org/10.1002/trtr.1397

Neuman, S. B. (2019). Comprehension in disguise: The role of knowledge in children's learning. *Perspectives on Language and Literacy, 45(*4), 12–17. https://reachoutandread.org/wp-content/uploads/2023/07/Comprehension_in_Disguise_The.pdf

Okkinga, M., van Steensel, R., van Gelderen, A. J. S., van Schooten, E., Sleegers, P. J. C., & Arends, L. R. (2018). Effectiveness of reading-strategy interventions in whole classrooms: A meta-analysis. *Educational Psychology Review, 30*(4), 1215–1239. https://doi.org/10.1007/s10648-018-9445-7–

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction, 1*(2), 117–75. https://doi.org/10.1207/s1532690xci0102_1

Paris, S. G., & Winograd, P. (1990). How metacognition can promote academic learning and instruction. *In B. F. Jones & L. Idol (Eds.), Dimensions of thinking and cognitive instruction* (pp. 15–51). Lawrence Erlbaum Associates.

Pearson, P. D., & Cervetti, G. N. (2017). The roots of reading comprehension. In S.E. Israel (Ed.), *Handbook of reading comprehension* (2nd ed., pp. 12–51). Guilford.

Pearson, P. D., & Gallagher, M. C. (1983). The instruction of reading comprehension. *Contemporary Educational Psychology, 8*(3), 317–344. https://doi.org/10.1016/0361-476X(83)90019-X

Pearson, P. D., McVee, M. B., & Shanahan, L. E. (2019). In the beginning: The historical and conceptual genesis of the gradual release of responsibility. In M. B. McVee, E. Ortlieb, J. Reichenberg, J., & P. D. Pearson, (Eds), (2019). *The gradual release of responsibility in literacy research and practice* (pp. 1–21). Emerald Group Publishing.

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. *In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), Handbook of self-regulation* (pp. 451–502). Academic Press. https://doi.org/10.1016/B978-012109890-2/50043-3

Pressley, M., & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively responsive reading*. Lawrence Erlbaum Associates.

Recht, D. R., & Leslie, L. (1988). Effect of prior knowledge on good and poor readers' memory of text. *Journal of Educational Psychology, 80*(1), 16–20.

Reinking, D., & Bradley, B. A. (2008). *Formative and design experiments: Approaches to language and literacy research*. Teachers College Press.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology, 19*(4), 460–75. https://doi.org/10.1006/ceps.1994.1033

Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology Review, 7*(4), 351–371. https://doi.org/10.1007/BF02212307

Snow, C. S. (2002). *Reading for understanding: Toward an R&D program in reading comprehension*. RAND Corporation.

Snow, C. E., Barnes, W. S., Chandler, J., Goodman, I. F., & Hemphill, L. (1991). *Unfulfilled expectations: Home and school influences on literacy*. Cambridge, MA: Harvard University Press.

Soto, C., Gutierrez de Blume, A. P., Rebolledo, V., Rodríguez, F., Palma, D., & Gutiérrez, F. (2023). Metacognitive monitoring skills of reading comprehension and writing between proficient and poor readers. *Metacognition and Learning*, *18*(1), 113–134. https://doi.org/10.1007/s11409-022-09317-8

Stake, R. E. (2006). *Multiple case study analysis*. The Guilford Press.

Stevens, E. Y., Wilson, N. S., Baumann, J., Adams, B., Dussling, T., Smetana, L., & Bean-Folkes, J. (2025). Exploring asynchronous implementation of the Gradual Release of Responsibility framework to support graduate students' metacognition when reading digital academic texts. Education Sciences.

Tarchi, C. (2010). Reading comprehension of informative texts in secondary school: A focus on direct and indirect effects of reader's prior knowledge. *Learning and Individual Differences, 20*(5), 415–20. DOI: https://doi.org/10.1016/j.lindif.2010.04.002

Taylor, B. M., Pearson, P. D., Peterson, D. S., & Rodriguez, M.C. (2003). Reading growth in high-poverty classrooms: The influence of teacher practices that encourage cognitive engagement in literacy learning. *The Elementary School Journal, 104*(1), 3–28.

Thomas, K. F., & Barksdale-Ladd, M. A. (2000). Metacognitive processes: Teaching strategies in literacy education courses. *Reading Psychology, 21*(1), 67-84. https://doi.org/10.1080/027027100278356

Tivnan, T., & Hemphill, L. (2005). Comparing four literacy reform models in high-poverty schools: Patterns of first-grade achievement. *The Elementary School Journal, 105*(5), 419–441. https://doi.org/10.1086/431885

Tompkins, G. (2017). *Literacy in the twenty-first century*. Pearson.

Vygotsky, L. S. (1978). *Mind in society*. Harvard University Press

Ward, R. T., & Butler, D. L. (2019). An investigation of metacognitive awareness and academic performance in college freshmen. *Education, 139*(3), 120–126. Quiet-Time-on-Social-Emotional-Learning.pdf

Webb, S., Massey, D., Goggans, M., & Flajole, K. (2019). Thirty-five years of the gradual release of responsibility: scaffolding toward complex and responsive teaching. *The Reading Teacher*, *73*(1), 75–83. https://doi.org/10.1002/trtr.1799

White, H. (2004). Nursing instructors must also teach reading and study skills. *Reading Improvement, 41*, 38–50. https://eric.ed.gov/?id=EJ703708

White, M. D., & Marsh, E. E. (2006). Content analysis: A flexible methodology. *Library Trends, 55*(1), 22–45.

Williams, J. P., & Atkins, J. G. (2009). The role of metacognition in teaching reading comprehension to primary students. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 26–43). Routledge/Taylor & Francis Group.

Wilson, N.S. & Bai, H. (2010). The relationships and impact of teachers' metacognitive knowledge and pedagogical understandings of metacognition. M*etacognition and Learning,* 5, 3, 269-288.

Wilson, N.S., Dussling, T., Adams, B., Stevens, E., Bauman, J., Yang, S., Smetana, L., Bean-Folkes, J., Van Wig, A. (2024). Still processing: What a multi-institutional collective case study of social annotation data reveals about literacy specialist candidates' reading practices. *Literacy, 58, 2.*

Young, A., & Fry, J. D. (2008). Metacognitive awareness and academic achievement in college students. *Journal of the Scholarship of Teaching and Learning, 8*(2), 1–10. https://www.researchgate.net/publication/228345722_Metacognitive_Awareness_and_Academic_Achievement_in_College_Students

Zohar, A., & Lustov, E. (2018). Challenges in addressing metacognition in professional development programs in the context of instruction of higher-order thinking. In W. Yehudith & L. Zipora (Eds.), *Contemporary pedagogies in teacher education and development* (Ch. 6). IntechOpen. https://www.researchgate.net/publication/327180952_Challenges_in_Addressing_Metacognition_in_Professional_Development_Programs_in_the_Context_of_Instruction_of_Higher-_Order_Thinking

Appendix

Codebook

		Level 1	Level 2	Level 3
Strategy	Definition/Examples	Lip Service	Surface	Strategy for Understanding
Inferencing	• Drawing on information from the text and background knowledge to understand what the text is about • Filling in details missing from the text • Elaborating on what is discussed in the text	When students are asked to name the strategy used, they reply with X, but we don't see the strategy	We see the strategy and would code without student identification, but we cannot tell how the strategy builds understanding of the content	We see the strategy and would code without student identification, and we can tell how the strategy builds understanding of the content
Summarizing	• Restating key ideas from some unit of text (e.g., chapter, page, section) • Determining what is most important to remember in a unit of text	When students are asked to name the strategy used, they reply with X, but we don't see the strategy	We see the strategy and would code without student identification, but we cannot tell how the strategy builds understanding of the content	We see the strategy and would code without student identification, and we can tell how the strategy builds understanding of the content
Questioning	• Asking questions of the text • Asking questions that extend the text • Challenging the text/disagreeing	Student asks a question, but not to the text (not asking as a reading strategy–asking to prof or peers)	Students ask a question of the text, but the question removes them from the main idea of the text	Student asks questions of the text that builds understanding of the reading and/or course in general
Connecting	• Making connections to prior knowledge • Making connections to praxis • Making text-to-text connections (includes academic learning experiences)	Student makes connections with no explanation	Student makes connections with citation or explanation, but it is unclear how it leads to understanding of the content (connection could even take away from the content)	Student makes connections with citations and/or explanations, and it is clear how the connection builds understanding of the text or course content

	• Making text-to-self connections (personal experience) • Making text-to-world connections (generalized experience)			
Monitoring	• Confirming or clarifying understanding of what is in the text • Looking up and defining words used in the text • Restating what is in the text • Generating questions about praxis	When students are asked to name the strategy used, they reply with X, but we don't see the strategy	We see the student is looking up a word or doing something, but what they are doing is not monitoring the text as a whole	The students is monitoring and making clear developments in concept formation
Synthesizing	• Making connections between multiple sources • Connection to a point earlier in text	When students are asked to name the strategy used, they reply with X, but we don't see the strategy	We see the strategy and would code without student identification, but we cannot tell how the strategy builds understanding of the content	We see the strategy and would code without student identification, and we can tell how the strategy builds understanding of the content
Community	Definition/Examples	Lip Service	Surface	Strategy for Understanding
Questioning	• Initiating a comment thread by asking a question • Asking questions of a peer or peers within a comment thread	"I wonder" with no connection to the readings or course	Looking for understanding, i.e., "What does this word mean?" without any follow up.	Probing classmates to think more deeply or make a connection. Asking a question directly related to the reading and/or previous readings with the connection explicit.

Restating	• Restating something another peer posted • Agreeing with comments posted by another peer or peers		[redacted]	
Additive	• Adding to or augmenting a comment made by a peer or peers • Challenging the ideas within another peer's comment(s)	Adding without augmenting	Challenging the ideas of a peer's comment	Challenging the ideas of a peer's comment to develop course understandings or conceptual understandings of literacy teaching and learning