LEARN & TEACH
INSTITUTE FOR HUMAN REHABILITATION

TEACHERS' PERCEPTIONS OF METACOGNITIVE STRATEGIES AND ASSESSMENTS USED WITH D/DEAF AND HARD OF HEARING STUDENTS

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ABSTRACT

This qualitative case study investigated two teachers' use of metacognitive strategies during reading instruction and the types of metacognitive assessments used to assess students' metacognitive strategies. Data collection was performed using a case study methodology via two semi-structured interviews, observations of five reading instruction lessons, and two self-recorded question responses, known collectively as the experience sampling method (ESM). The data collected were coded based on three time periods: planning before reading, monitoring during reading, and evaluating after reading. The findings reveal that the two teacher-participants spent a substantial amount of time activating their students' prior knowledge and building vocabulary. In addition, both teachers only used think aloud assessments to examine the type of metacognitive strategies that their students used during reading sessions. There is a need to consider other metacognitive strategies, including evaluating strategies, and to utilize alternative methods of assessment alongside think aloud, such as interviews.
Keywords: *d/Deaf and hard of hearing students, metacognitive assessments, metacognitive knowledge/awareness, metacognitive regulation, metacognitive strategies*

Since the 1970s, research has demonstrated that metacognition is an essential contributor to students' reading comprehension and academic success (Baker & Brown, 1984; also, see Israel & Duffy, 2009; for d/Deaf and hard of hearing students, see Strassman, 1997; Trezek et al., 2011; Yan & Paul, 2021). With respect to d/Deaf and hard of hearing (d/Dhh) students, it has even been argued that much of their reading difficulty is due to issues with the executive or metacognitive function, not only with print-access skills such as decoding and word identification (Marschark et al., 2009). D/dhh students experience difficulty with a major metacognition strategy—comprehension monitoring—and are generally unaware of a range of effective strategies to use during reading. Previous research has suggested that reading comprehension is directly related to metacognition (e.g., Paul et al., 2013; Strassman, 1997; Trezek et al., 2011).

It is difficult to teach and assess metacognitive strategies (Flavell, 1979; Flavell et al., 1970; Myers & Paris, 1978; Pearson & Cervetti, 2017). Williams (1995) reported a limited amount of research investigating teachers' perceptions to understand and improve d/Dhh students' reading outcomes (as cited in Ewoldt et al., 1992; Luckner & Ayantoye, 2013). There is, to our knowledge, no existing research that

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has investigated teachers' perceptions of the assessment of d/Dhh students' metacognitive strategies. There is some research focused on teachers' perceptions of metacognitive strategies utilized by their d/Dhh students (Ewoldt et al., 1992; Reed, 2003; see also, the reviews of Strassman, 1997; Yan & Paul, 2021). Additional research is needed to explain teachers' perceptions and awareness of d/Dhh students' metacognitive strategies and the types of assessment employed in the classroom. In the ensuing sections, we cover strategies, assessment, and teachers' perceptions to provide the framework for the focus of the present study.

The Constructs of Metacognition: Knowledge and Regulation

Baker and Brown (1984) divided metacognition into two main areas: (a) metacognitive knowledge or awareness and (b) metacognitive control or regulation. Metacognitive knowledge is an individual's awareness of what they do and do not know. McCormick (2003) proposed that metacognitive knowledge has three components: (a) declarative, or what; (b) procedural, or how; and (c) conditional, or when and where.

Declarative knowledge addresses the extent of a reader's knowledge on the topic. Procedural knowledge is necessary to process and use metacognitive skills to achieve an overall learning goal such as learning to perform a task effectively and efficiently. For example, before they start reading, students may need to look at the pictures to understand the text, underline unfamiliar words, and consider the context clues. The third type, conditional knowledge, refers to knowing when, where, and why to use particular metacognitive strategies; it also is the ability to know how the reader is able to use a specific procedure or strategy to understand the text (Pressley & Harris, 2006; Schmitt, 2005).

Metacognitive regulation or control encompasses strategies associated with reading comprehension. Most research has focused primarily on metacognitive regulation strategies, which are important for improving students' reading comprehension skills (e.g., Israel, 2007; Pressley & Afflerbach, 1995; Schmitt, 2005). Research into metacognition regulation strategies can be divided into three categories: planning, monitoring, and evaluation (see Figure 1 below).
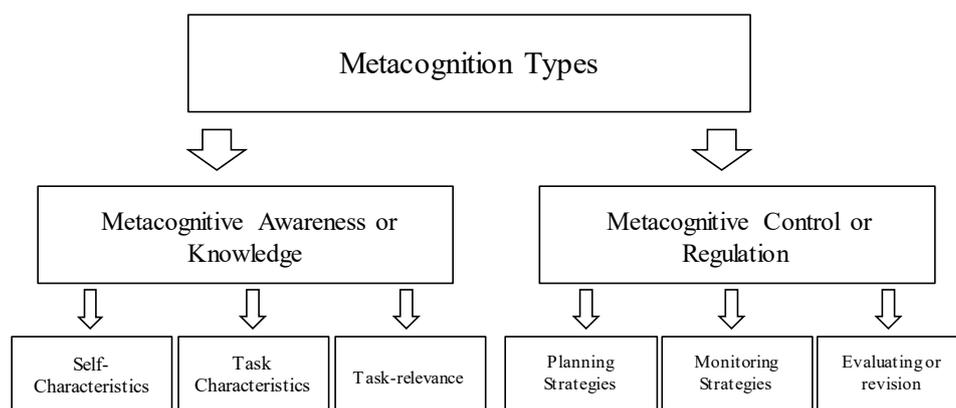
Note: Metacognition theory in relation to reading comprehension developed by Schmitt (2005), based on Baker and Brown's (1984) work.

Figure 1. Metacognitive Awareness and Regulation

Metacognitive Regulation Strategies

One of the main foci of the present study is on metacognitive regulation strategies. Many studies have found that metacognitive regulation is vital for learning, particularly for reading comprehension, and that it can be taught during instruction (Efklides & Misailidi, 2010; Hacker et al., 2009; Winne & Azevedo, 2014). Metacognitive regulation, particularly strategies for comprehension-monitoring, entails three main groups of categories, depending on whether they occur before (planning), during (monitoring), or after (evaluating) reading (Baker & Brown, 1984; Liang et al., 2005; Pressley & Afflerbach, 1995; Schmitt, 2005).

Metacognitive planning strategies involve strategies that occur before reading to activate prior knowledge. An example of a planning strategy is the reviewing of textual information to understand details before or while reading the text. Other examples that

activate and enhance prior knowledge include the use of a semantic or word map and other graphic organizers or the asking of prediction questions (Paul, 2009; Trezek et al., 2010). According to Schirmer (2003), prior knowledge can be divided into three components. The first is textual schema or the mental representations of the text's structure. For example, students may use their knowledge of structure and grammar to comprehend the text. The second component of prior knowledge is content schema, which concerns the readers' background knowledge about the content of the passage. Students may use prior knowledge and life experiences related to a topic to understand the text. The final component of prior knowledge involves vocabulary schema, which addresses readers' vocabulary knowledge.

Using monitoring strategies during reading is the most common metacognitive strategy in classroom settings. Two major monitoring strategies

recommended by the National Reading Panel (2000) are self-questioning and prediction. Student may develop, and possibly answer, their own questions while reading a passage (Rosenshine et al., 1996). While reading a story, students may also predict what happens next, and then either confirm their prediction as they read or revise it when it is not accurate. Students may also predict a word's meaning by either examining the context, re-reading sentences to determine the meaning, or looking at pictures.

The third type of regulation strategies is metacognitive evaluation strategies. These strategies are used after reading and are the most difficult strategies to employ because they require high-level skills such as evaluating, revising, and critiquing, for example, the text and author's writing style. Readers may also evaluate and critically review the passage, reading level appropriateness, grammatical errors, difficult concepts, and the type of language used (Israel, 2007). Readers, especially younger readers, rarely utilize evaluation strategies (Baker & Brown, 1984).

Metacognitive Assessment

Metacognitive assessment is another focus of the present study. Harris and Hodges (1995) and Paris and Flukes (2005) defined metacognitive assessment as an evaluation of the thinking process to assess one's reading ability and self-regulation (see also, Zimmerman, 1990). A number of researchers and scholars have asserted that metacognitive assessment strategies require a high level of cognitive skills, which are crucial for tasks such as problem solving and making inferences (Baker & Beall, 2009; Siegler, 1992). Metacognitive assessment is important because it provides an in-depth awareness for teachers on howto improve students' metacognitive strategies (Paris & Flukes, 2005). Teachers are able to support students' development and use of effective metacognitive strategies during reading.

For the successful incorporation of metacognitive assessment into instructional goals, it is important that teachers create appropriate instructional lessons and materials, and that they also identify the appropriate metacognitive assessment to be implemented before, during, and after instruction. Students' feedback on the assessment should be taken into consideration, and assessment results should be used to evaluate teachers' instructional goals.

Types of Assessments

According to Paris and Flukes (2005), there are three major types of research-based metacognitive assessments: interviews, surveys and inventories, and think-alouds. All three metacognitive assessments are valid and can be used with different individuals, including d/Dhh readers (e.g., Banner & Wang, 2011; Strassman, 1992, 1997; Yan & Paul, 2021). It is also possible to combine them; for example, an investigator can interview research participants using either think-

aloud methods or a survey. Discussion of these major types of assessment is based on the work of Israel (2007).

Interviews

Israel (2007) cited two reasons why using interviews is facilitative to assess students' metacognitive ability. First, when students answer open-ended questions, researchers can collect substantial information on a particular metacognitive strategy. The interviewer may obtain specific information about a student's ability to use planning strategies such as overviewing information before reading the passage, monitoring strategies such as using keywords to find the meaning, or even evaluation strategies, such as critiquing the author's writing. The second reason is that interviews may help to determine the most effective strategies that could be implemented to help individuals understand fiction and/or non-fiction texts.

Surveys or Questionnaires

According to Israel (2007), surveys and questionnaires are less time-consuming than other metacognitive strategy tools and are a useful and effective way to acquire information from large populations as well as smaller groups. Benefits of using questionnaires include the possibility of asking students questions and then read the answers for clarity in making an inference. This also allows teachers to ask students to read and then answer the questions in the questionnaire. Struggling readers might find it difficult to understand a survey; therefore, teachers need to meet with them and explain the meanings of words in the survey to encourage a more effective and confident response. Surveys and questionnaires can be more useful if combined with other assessment tools, such as interviews. However, teachers should ensure to explain the interview's purpose and also provide participants directions for the assessment to save time.

Think aloud

According to Ericsson and Simon (1993), the think-aloud approach is the most valid and effective method for assessing the student's inner cognitive processes. While using a verbal report, participants may reveal their metacognitive strategies and describe how and why they use them. Think aloud and the verbal protocol are the same procedure. When using verbal protocol, the participants think aloud and do not usually write responses. This method involves the researcher collecting verbal information (Krockow et al., 2016). Israel (2007) has argued that the verbal protocol is the most common method used to assess the dimensions of metacognition.

The think-aloud and interview methods are more commonly used to explain d/Dhh students' metacognitive strategies. Schirmer (2003) used a verbal protocol interview with d/Dhh participants to describe their thinking skills and asked about the metacognitive strategies they used while reading. Schirmer et al. (2004) replicated Schirmer's (2003) study using think aloud and interviews to assess d/Dhh students'

metacognitive controlling strategies. A good review of the various methods used with d/Dhh students can be found in Strassman (1997) and Yan and Paul (2021).

Metacognition for d/Dhh Students

There is a need for evidence-based research to identify and develop more effective reading instruction practices for individuals who are d/Dhh (Paul, 2009; Paul et al., 2013). Teachers may be the best source to help identify effective metacognitive strategies and instruction for developing literacy skills in d/Dhh students (Schirmer & Schaffer, 2010). This section reviews research on teachers of d/Dhh students' perceptions of metacognition and reading instruction.

Williams (1995) used an interview method to understand three preschool teachers' theoretical and pedagogical perspectives on language and literacy development in relation to their d/Dhh students. Williams found that teachers did indeed improve students' receptive language skills (e.g., listening/signs). The teachers also gained increased experience with metacognitive instruction and teaching methods as well as improving their fluency in sign language. Teachers can change their perspective regarding the use of specific instructional methods when they have gained more experience in teaching (Schirmer & Schaffer, 2010).

Teaching experience plays an important role in teaching students effectively, especially for those teachers who work toward determining the best metacognitive strategies to help students understand reading comprehension instruction (Reed, 2003). Reed found that itinerant teachers prefer to use different practices to develop their students' literacy skills depending on the students' literacy needs. Similar to the findings of other studies (e.g., Leko et al., 2018), teachers of young children who are d/Dhh need to focus more on decoding instruction before transitioning to other reading skills. Therefore, teachers need to help young d/Dhh students master early literacy skills; then, they can progress to other reading skills with students in upper grades and focus more on reading to learn skills.

Watson and Swanwick (2008) compared the perceptions of parents with teachers' perceptions of d/Dhh children between the ages of three and five. The researchers interviewed two groups of families; one of these groups used British Sign Language (BSL) during literacy events and the other used spoken language. The parents in the latter group focused on information in the text and used phonemic awareness strategies among other strategies, such as pointing out vocabulary and grammar when reading with their children. The parents also asked children questions about the text so that the children could reflect on their prior knowledge in the context of the passage's message. The teachers placed with the families using BSL shared the same phonemic awareness strategies and asked children about information in the text. According to Watson and Swanwick (2008), teachers who used spoken language with families, who also used spoken language, created an engaging environment. While reading, the use of expressions and body language along with spoken language was found to improve students' ability to understand the text.

The BSL group, however, focused more on textual meaning rather than on other literacy skills like phonemic awareness (Watson & Swanwick, 2008) using books that can be shared with Deaf children who prefer to read fairy stories and fables. Some metacognitive strategies such as prediction can help Deaf students in the reading process to understand not only the structure of the story, but also its components. Children must learn to use some metacognitive strategies; for example, looking at pictures and considering context is a particularly useful metacognitive strategy to help children understand a passage.

Despite the importance of using metacognitive instruction to understand d/Dhh students' metacognitive strategies, there is limited research on teachers' perceptions (Browder et al., 2006; Hollenbeck, 2013; Fenty & Brydon, 2017; Watson & Swanwick, 2008). Researchers need to study the perceptions of teachers on teaching metacognitive strategies to their d/Dhh students. These findings also call for more research on the assessments used to measure teachers' perceptions of developing and assessing their d/Dhh students' metacognitive strategies.

Assessment of Teachers' Perceptions

Fives and Gill (2014) argued that researchers in their earlier works struggled to find a valid assessment of teachers' perceptions. In addition, Fives and Gill (2014) proffered the following research methods to assess and explain teachers' perceptions in detail: questionnaires, interviews, observations, self-reflecting writing, tests and exams, vignettes, scaled responses, portfolios, and classroom artifacts. Two of these research methods are used in the present qualitative research study:

- Interviews. Researchers have designed interviews for their participants and asked teachers' questions that identify their perceptions and beliefs. Such a detailed assessment helps researchers obtain a deeper understanding of the teachers' responses. The use of interviews enables researchers to ask teachers to clarify their responses, elaborate on an observation made, and provide further information related to a specific question to allow inferences to be made. In the present qualitative case study, the researchers used semi-structured interviews at the beginning and end of the study, as discussed in the methodology. The data from the interviews were used to clarify the observation data.
- Observation. Researchers have observed teachers while they taught and recorded interactions and engagement in and/or outside the classroom during activities. They have also compared teachers' actual interactions with students to their responses made in questionnaires and in interviews. In the present qualitative case study, we observed teachers to deduce whether they

ask students directly about the metacognitive strategies they utilize during reading. The present study also assessed through observation whether teachers use metacognitive instruction with d/Dhh students in the classroom and sought to explain the types of instruction used.

The Present Study

The present qualitative case study explored teachers' use of metacognitive strategies and assessments. The present study attempted to answer two major questions: (a) What metacognitive strategies do teachers of d/Deaf and hard of hearing students encourage their students to use before, during, and after reading? and (b) How do teachers assess their d/Deaf and hard of hearing students' use of metacognitive strategies?

METHODOLOGY

Participants

The present study involved d/Deaf and hard of hearing students at a middle-school level in a school district in the midwestern area of the US. Two deaf teachers served as participants. One teacher teaches 7th grade d/Deaf and hard of hearing students with additional disabilities. Their reading grade levels ranged from 2nd grade to 5th grade. The second teacher works with 8th graders, whose reading levels range from 5th grade to 6th grade. Students' hearing losses in both classrooms were in the moderately severe to profound range.

Two different grade levels were selected to examine how students' age, reading level, and other factors influence teachers' perceptions of metacognitive instruction, assessments, and teaching materials used with their d/Dhh students. Specific information was collected, including demographics (age, teaching experience, etc.) to explore ways in which these factors might influence teachers' perceptions about metacognitive strategies and metacognitive assessments.

Research Design

The research design was a multiple case study with multiple data collection methods involving observations, semi-structured interviews, and ESM (Experience Sampling Methodology). Figure 2 illustrates the sequence of data collection.

However, teachers may use additional different strategies that may not fall within any of the above categories—and these were also documented.

Procedures

Observations. The first investigator conducted five different observations of the two teacher-participants, with each observation lasting about 30 minutes. During the observations, a checklist was used to document the types of metacognitive strategies and assessments teachers used when instructing d/Dhh students (see **Appendices A, B, & C**). Appendix A illustrates the types of metacognitive strategies that were targeted during observations; Appendix B documents the type of metacognitive strategies that teachers used during reading instruction; and Appendix C was used to check the type of metacognitive assessments that teachers used during reading instruction.

Semi-structured interviews. Teachers were asked to answer interview questions at the beginning and the end of the observations. Each interview took approximately an hour, was audiotaped with permission, and took place at each teacher's convenience.

The first interview was conducted following the initial observation. Depending on the events of the observation stage, additional follow-up questions could be added, or the original questions may be changed or modified. The first semi-structured interviews solicited information on the backgrounds of the teachers (see **Appendix D**). The use and understanding of metacognitive strategies were also included in the interview, including the following questions: What activities/strategies do you use before reading (planning strategies)? What activities/strategies do you use during reading (mentoring strategies)? What activities/strategies do you use after reading (evaluating strategies)? Several follow-up questions requested examples of these strategies.

The next group of questions concerned the teaching and assessing d/Dhh students' metacognitive strategies. These questions were: How do you know your students are using specific strategies during reading? Do you monitor this situation? How do you monitor the use of these strategies?

The second interview was conducted at the end of the observations. During this interview, the participants were asked again about their perceptions on metacognition and reading instruction and metacognitive assessments; however, these questions were follow-up questions based on the first interview, ESM (see below), and observations.

Initial Observation > Initial Interview > Observation > Observation & ESM > Observation > Observation & ESM > Final Interview

Figure 2. The Sequence of Data Collection

The data collected were coded into three categories: planning or before reading, monitoring or during reading, and evaluating or after reading strategies.

These questions examine the reasons these teachers focused on such strategies and assessments and why they never used certain strategies or assessments.

Finally, the teachers were asked questions about their beliefs on using metacognitive assessments. At this point, the term metacognition was defined and teachers were asked to respond to: What do you believe about the role of metacognition in reading comprehension?

Experience Sampling Method (ESM). The ESM was used after the third observation and at the end of the last (fifth) observation. By using the ESM, researchers can ensure that the data were consistent with the interviews and observations. The teachers were directed to record (audio and/or written) their answers to the following questions, immediately after the third and fifth observations:

1. Did you use metacognitive strategies with your students? Describe them.
2. Did you think these strategies were helpful? How and why?
3. Did you assess your students' use of these metacognitive strategies? How?
4. What are the challenges with teaching metacognitive strategies?
5. What are the challenges with assessing metacognitive strategies?

Data Analysis

The present study took place over a period of a month. At any time during this period, the teachers could ask to review their responses and review field notes from observations. The teachers could make suggestions for the final report, clarify their responses, and offer further insight into the types of metacognitive strategies they focused on with their d/Dhh students as well as the types of metacognitive assessments they used.

In the first stage of coding and analysis of the data, the first researcher reviewed the data collected during the initial observation to ascertain if there would be problematic questions during the interviews. The second stage involved collecting all the data from field notes taken during the observations, interviews, and ESM. This stage was also a time to review and code all data (notes, ESM, and interviews). During the third stage, all the coded data were reviewed and compiled from the previous stages. In this stage, multiple data were checked and compared to establish the trustworthiness with regard to the analyses and interpretations of the findings.

As mentioned previously, the data were categorized based on Baker and Brown's (1984) three main categories of metacognitive strategies: planning or before reading, monitoring or during reading, and evaluating or after reading. Additional categories were developed if the collected information did not fall into any of the three categories.

Trustworthiness

The construct of trustworthiness addresses the issues of reliability and internal and external validity (Bassey, 1999). Trustworthiness in a qualitative study is achieved through the following processes: credibility, transferability, dependability, and confirmability (Amankwaa, 2016).

Credibility. This can be achieved through a process known as triangulation. In the present study, we triangulated multiple data collection methods to document teachers' perceptions and use of strategies and assessments. Furthermore, the first investigator observed classroom and virtual settings, recorded the teachers' responses during interviews, and took field notes during the classroom observation process. We analyzed the collected data and compare the findings to those of previous research on metacognitive strategies. The coding and data analysis were confirmed via interobserver agreement. Differences were resolved verbally.

Transferability. In qualitative research, transferability is analogous to what is known as "external validity" in quantitative research (Lincoln & Guba, 1985). In the present study, sufficient information regarding the procedures and other details that included the participants and the timeframe was provided. This information should facilitate replication to assess the generalizability of findings to similar settings or individuals.

Confirmability. Confirmability is also known as the neutrality of the researcher; it refers to the ability to ensure that the findings of the case study provide genuine reflections of the participants' responses and is not shaped by influences such as researcher bias, motivation, or interest (Amankwaa, 2016; Lincoln & Guba, 1985). In the present study, we "listen[ed] to data" and "report[ed] them as directly as possible" (Hays & Singh, 2012, p. 201).

Dependability. In qualitative research, dependability refers to the consistency of the data, specifically to ensure that it remains consistent over time (Lincoln & Guba, 1985). For example, when the first investigator examined the teachers' responses to ESM questions, it was necessary to ascertain whether their responses were consistent. Evaluating the consistency of responses is particularly important if there is a possibility of the inquiry being repeated with the same subject matter or in a similar context.

The present study was approved by the Institution Review Board associated with the researchers' university.

RESULTS

This qualitative case study identified the metacognitive strategies and assessments that two teachers used with their students. The information in this Results section is organized as follows: 1) first, we provide some background information on the teachers and their classrooms; 2) then, we discuss the findings with respect to the two research questions: (a) What metacognitive strategies do teachers of d/Deaf and hard of hearing students encourage their students to use before, during, and after reading? and (b) How do teachers assess their d/Deaf and hard of hearing students' use of metacognitive strategies?

Background Information about Teachers and Their Classrooms

Carmen and her Classroom

Carmen (pseudonym) is deaf and has two degrees, including a bachelor's degree (licensure) in learning disabilities and a master's degree (licensure) in d/Deaf education. Carmen has taught d/Dhh students for 10 years. She has been teaching d/Dhh students in different settings. For instance, she stated, "I had a two-hour commute both ways to attend a self-contained classroom from 3-12, then I mainstreamed in my hometown's public schools with an interpreter." Carmen also said, "American Sign Language (ASL) is my mode of communication when I teach."

Carmen's students are seventh and eighth graderswith moderately severe to profound hearing losses; their reading levels range from first to fourth grade. She spends a substantial amount of time providing her students with the necessary prior knowledge before they start reading the required passages. Carmen believed that developing students' linguistic (language) knowledge and vocabulary knowledge could be the most effective method for teaching reading. Her students possess insufficient knowledge of both English and ASL. They have more challenges due to their additional disabilities.

Sarah and her Classroom

Sarah (pseudonym) graduated from Gallaudet University in 1989 with a bachelor's degree (BA) in secondary mathematics education; she also received a master's degree (MA) in the education of d/Deaf and hard of hearing students from Lewis and Clark College in 1991. She started teaching in the fall of 1991 and has taught for 29 years.

Sarah teaches middle-school students with moderately severe to profound hearing losses (grades 6–8) in mathematics and others in reading at the fifth and sixth grade levels. In contrast to Carmen's students, Sarah sees her students as good readers. She said, "My students are the top readers in middle school and some consider themselves bookworms!" She continued, "I have the highest level, which is challenging and fun." Sarah teaches reading through specific content areas (e.g., mathematics, science, etc.).

Metacognitive Strategies

In the ensuing sections, we provide the findings associated with each teacher's use of metacognitive strategies before reading (planning), during reading (monitoring), and after reading (evaluative). These findings are based on data collected and coded from interviews, observations, and the ESM.

Metacognitive Planning Strategies

Both teachers used several metacognitive planning strategies related to the activation of prior knowledge and the development of language skills, for example, building vocabulary, providing an overview of information in the text, and focusing on specific difficult sentence structures.

Overview of The Vocabulary in The Texts. Carmen. Carmen began the lesson by providing an overview of the new vocabulary for a particular passage. For example, Carmen showed pictures and conducted a vocabulary review. Then, she asked her students to look at the words and spell them via the use of fingerspelling (i.e., handshapes corresponding the letters of the alphabet).

The data collected also indicated that Carmen helped her students think about these words. She explained the meaning of the new vocabulary by demonstrating the signs for the words. She spent time ensuring that her students could spell and sign new vocabulary.

Sarah. Sarah also focused on a vocabulary pre-review as a before-reading strategy. For example, Sarah specifically taught her students new vocabulary selected from the passage prior to the reading session. In Sarah's classroom, students did not spend time spelling the words; alternatively, Sarah focused on the meanings and a strong understanding of the signs for new words.

Overview of the Information in the Text. Carmen. Carmen started her reading class by discussing general information related to the passage. She spent a good amount of time asking questions and having a conversation about the topic with her students. She mainly asked her students to think about the topic and encouraged them to access any prior knowledge about the topic.

Sarah. Sarah also spent time activating her students' prior content knowledge of the readings. Similar to Carmen, Sarah started with a conversation with her students about the reading topics. Sarah asked her students to look at the title. She also asked her students to think about the topic and connect the passage to their experiences.

Sarah then asked the students to discuss the passage before reading it. This endeavor can be labeled "thinking together." Although typically used before reading, Sarah often used this strategy during reading as well, asking her students to think together during the session.

Overview of the Sentence Structures in the Text. Carmen. Carmen encouraged her students to think about the words in sentences and the functions of those words. For instance, she asked her students about the word "blue." She stated that this word is an adjective used to describe a noun.

Sarah. Sarah did not put much emphasis on teaching spelling, grammar, and sentence structure. Sarah focused more on morphological knowledge when teaching grammar; this was particularly for prefixes and suffixes. She asked students to think of examples related to their experiences and encourage them to think about these structures in different contexts connected to their real-life experiences.

Metacognitive Monitoring Strategies

The monitoring strategies used by both teachers include the think-together strategy, which was used along with other strategies, such as self-questioning, prediction, summarization, and graphic organizers. The teachers also focused on strategies such as using context clues, rereading, categorizing, underlining words, and using other resources such as a dictionary. Another important strategy was the translation of English sentences into American Sign Language. A few of these strategies are discussed below.

Think Together. Carmen. Carmen's students have additional disabilities, and she worked with them individually. She encouraged her students to think together and work in a group. During thinking-together activities, Carmen prompted her students to think aloud and share experiences with others. When students think together, they shared their experiences from different contexts that are related to their cultural or prior knowledge. This strategy facilitated students' understanding of the texts because it encouraged them to learn about topics via ongoing interactions.

Sarah. Sarah encouraged her students to use this strategy before reading, during reading, and after reading. For example, prior to reading, when she was doing vocabulary reviews, she asked her students to discuss the meanings and the signs of the words. She also presented the title of the topic, and then asked her students to think together about the topic. By creating social group discussions/dialogues, the students shared their experiences with their peers. Sarah also got involved in the dialogues to ensure that the discussion was relevant and useful for students.

Prediction. Carmen. Carmen asked students to predict ideas that will be discussed in a particular passage. She then directed her students to keep reading and check their predictions; students could confirm their predictions or revise them if they were incorrect.

Sarah. Sarah found that her students enjoyed the prediction strategy when she combined it with the thinking together strategy. Her students discussed the story and predicted events or items in the story.

Summarization. Both teachers used this strategy during and after reading—combining it with graphic organizers and retelling. For example, Carmen read a passage with the students and asked them to retell what they learned. She also asked her students to look back at the passages, if necessary, and to look at the pictures, for support in the retelling process. Both teachers asked students to retell the story via signs/voice without writing it. Finally, both teachers stated summarization is challenging for d/Dhh students because it requires time and effort to locate the important information and other supporting details.

Re-reading Sentences and Paragraphs. Carmen. Carmen implemented this strategy along with the self-questioning strategy. She encouraged students to ask questions and then motivated them to reread the sentences and locate important information that would help them answer their questions. Carmen always asked her students to reread each sentence if they made any mistake when they signed a word in the sentence. She corrected her students' errors by signing the sentence or the word; then she asked them to re-sign the word or the sentence.

Sarah. Sarah did not correct the students if they signed words incorrectly; instead, she prompted them to reread the sentence and ensured that they gave the correct sign for each word. Sarah used the re-reading strategy to encourage her students to think about an idea in a particular sentence.

Read in English and Translate into ASL. Carmen. Carmen reported that she always asks her students to read and sign the sentence in English then come back and translate in American Sign Language (ASL). The students signed the sentence word by word using Signing Exact English (SEE), which she interpreted to mean the students read the sentences by using ASL in an English order and then they explained the sentence in ASL. So, when students explained the sentences in ASL, Carmen could see if they really understood the sentence. Carmen maintained that she used this strategy to help her students develop their English morphological and syntactic knowledge.

Sarah. Similar to Carmen, Sarah also used this strategy often during her reading sessions. Sarah claimed that the reading in English and signing in ASL is the most beneficial strategy that students can use when they read narrative passages. Sarah argued that reading word by word is not a good strategy because students cannot understand the text. Therefore, Sarah stated that she is encouraging students to use this strategy to strengthen their English and ASL skills.

Metacognitive Evaluating Strategies

Two evaluating strategies were promoted by both teachers: 1) refection on the reading and 2) vocabulary review. One teacher reported the use of graphic organizers as an evaluating strategy.

Reflection on the Reading. Carmen. Carmen always asked her students to summarize and reflect on the information in the passage. Carmen dialogued with her students about the passage and asked them how it related to their experiences. Most students remarked that the passages were interesting or enjoyable; one student told Carmen that a specific passage was a little challenging.

Sarah. Sarah also encouraged her students to reflect on the information in the passage and report what messages they obtained from their reflection—that is, the "take-aways" or "take home points." After reading, Sarah constantly motivated her students to discuss the topic with their peers and think together about the weaknesses and strengths of the passage.

Vocabulary Review. Carmen. When the students completed reading the passage, Carmen used flashcards with words. These flashcards contain nouns, verbs, and adjectives. Carmen required her students to use these flashcards to build sentences and then encouraged them to think about whether the

sentences were meaningful or not. Carmen also asked her students to reread the sentences and directed them to identify the function of each word in the sentence. She also prompted the students to find the noun, verb, adjective, and subject in each sentence.

Sarah. Sarah also used vocabulary review before, during, and after reading. She also did each review by using flashcards and then asked her students if they had any questions. After reviewing the vocabulary, she gave her students a quiz, especially a fill-in-the blank activity. In this activity, the students were required to choose the correct word to fill in the blanks. The students also were asked to explain words according to their own experiences and understanding.

Graphic Organizers. Sarah is the only teacher who used and reported that graphic organizers are an evaluating strategy. By creating graphic organizers after they have read the passage, she helped students to remember and organize their ideas.

Metacognitive Assessments

Both teachers only used the think-aloud method as a metacognitive assessment. They also explored the idea of providing students a list of metacognitive strategies and teaching a few of these strategies in the future.

Think Aloud. Carmen. Carmen asked her students about strategies they used to help them with comprehension. Carmen tried to understand the process of students' thinking or the strategies that they used. This occurred in three areas: 1) when students made errors while reading, 2) when they could not understand part of a sentence, or 3) when they failed to answer comprehension questions.

When students struggled to sign or to express the meaning of a word, Carmen started a dialogue to uncover strategies that they could use. For example, Carmen asked her students to look at pictures if they were unsure about the sign or meaning for a word.

Carmen remarked that she uses think aloud to collect information regarding her students' metacognitive strategies before, during, and after reading. This also means that she used think aloud to obtain information regarding her students' planning, monitoring, and evaluating strategies. She remarked that students do not know the names of strategies that they have used, but could show by example or explain what they did.

Sarah. Sarah also encouraged her students to think aloud when they struggled to understand a word or a sentence. That is, Sarah directed students to think aloud and discuss the strategies that they used. Sarah also believed that students may not know the strategy by name, but they can demonstrate the strategy when explaining to their peers what they did (i.e., the nature of the strategy).

The types of metacognitive strategies used by the two teachers can be found in **Appendix E.** The comparison of the teachers' use of metacognitive strategies and assessments can be found in **Appendix F**.

Challenges of the Study

This section is not directly related to the research questions; however, it provides an overview of the challenges that needed to be addressed in the present study. In general, the challenges can be divided into two types: 1) challenges faced by the researcher, and 2) challenges faced by the participants.

Researcher Challenges

This study was conducted during the COVID-19 pandemic. The first investigator started the first two in-person observations and then the school was closed due to the coronavirus guidelines. This necessitated brainstorming about different methods to collect data and to conduct this study in a virtual setting. We had to reschedule observations, interviews, and ESMs. It became clear that a virtual setting is different from an in-person setting, especially for students who are d/Deaf and hard of hearing. For example, in an in-person setting, it is possible to observe the whole class, but in a virtual setting, the first investigator could only see the faces of the participants within a small "signing" area in front of them.

The D/dhh students used signing as their major mode for receptive and expressive communication. The Zoom screen did not always show the students, particularly when the teachers were doing screen shares. The teachers and the first investigator had to deal with this issue while attempting to observe the students' responses. When students and teachers signed at the same time, it was also difficult to see both of them signing. Due to these challenges, it was critical to confirm and verify the data via the use of interviews and ESM with the teachers.

Participants' Challenges

Carmen worked with d/Dhh students with additional disabilities. She stated that she needed to ensure that her students were not interrupted by any distractions in their home environments. The following information provides an example of her challenges with a virtual classroom setting.

"It is very challenging to provide support for a low-vision student who cannot see print very clearly. When I try to use screen share, it makes me look much smaller, and the students cannot see my signs. Therefore, I don't use screen share, but I have my teaching assistant hold up the print for my students to see me (signer) and the print at the same time. They need to associate print and sign at the same time to know its meaning." Carmen stated, "My big concern is how to keep my students focused."

Carmen also explained that her students cannot use the technology effectively due to their additional disabilities. Therefore, she needed to ensure that their parents were there to assist. She stated, "Strategies are limited when it comes to teaching virtually. It is challenging for students to provide more input when they are not taught how to use devices."

Sarah. Sarah also faced challenges when the in-person classroom was changed to a virtual classroom. "At first, many students and I were struggling with logging on to Zoom, finding the story in the reading website, and doing worksheets from their devices (iPad, Chromebook, laptop, etc.). They are getting better at it now after six weeks. I seemed to be chasing them to turn in their work online, whereas in school I usually saw their worksheets right there in their notebooks or textbooks. The other thing was their schedules—they often missed their Zoom meetings in the morning because they were sleeping. Luckily the reading session is at 12:30, and most students had just woken up. Sigh!" Sarah also remarked that some of her students lived out of state, and the time differences made it difficult for students to join a lesson.

Sarah encountered other challenges. She said that participation was not steady for the students. "My students for whatever reason are not focused on the task; sometimes I try my best to grab their attention, sometimes they rarely participated, and sometimes we did great together." On the subject of virtual learning, Sarah also indicated that screen sharing had the associated issue of preventing her from seeing her students fully. Her students often forgot to mute their microphones, resulting in distracting background noises that were not apparent to them due to their deafness.

DISCUSSION

Interpretation of Findings: Cross Case Analysis

First Research Question: What metacognitive strategies do teachers of d/Deaf and hard of hearing students encourage their students to use before, during, and after reading?

Metacognitive Planning Strategies. Both teachers spent time teaching students' vocabulary as well as developing their students' linguistic knowledge (semantics and syntax). Additionally, most of their before-reading activities did not rely predominantly on teaching students via print. The teachers created activities within an ongoing social interaction environment; these activities include discussions about the new vocabulary and other topics to activate students' prior knowledge and facilitate their inferential skills.

Vocabulary played a crucial role with the focus not only on teaching word meanings and related aspects such as orthography and morphology, but also for the activation of students' prior knowledge. The teachers believed that vocabulary knowledge is important for reading comprehension and for the utilization of metacognitive strategies. Interestingly, both teachers believed that students could not learn words by themselves (via reading) so they needed to spend more time teaching new words by using different examples in various contexts. Similar to the results of other studies (e.g., LaSasso & Davey, 1987; Schirmer, 2003; see also, the reviews in Paul, 2009; Paul et al., 2013; Yan

& Paul, 2021), the teachers' perceptions supported the assertion that students without sufficient vocabulary knowledge are not able to use the metacognitive strategies effectively for reading comprehension.

Both teachers agreed that students needed to learn the functions of words (e.g., noun, adjective, verb) with respect to their usage in sentences—that is, syntactic structures. Carmen spent a substantial amount of time on activities in this domain, more often than Sarah. The teachers' perceptions are in line with the work of previous researchers. For example, Erickson (1987) argued that linguistic knowledge is important for metacognition and reading comprehension for d/Dhh readers. D/dhh students need to reach satisfactory levels in all components of language such as phonology, morphology, syntax, semantics, and pragmatics to develop advanced reading skills (Paul, 2009; Paul et al., 2013). Both teachers, particularly Carmen, emphasized semantic and syntactic knowledge.

Hoffmeister and Caldwell-Harris (2014) argued that the essential success of learning through social interaction is the triangulation of contexts. The emphasis here is on the use of students' experiences in a social interactive setting. Both teachers in the present study believed that learning vocabulary in isolation is not completely adequate. The words needed to be linked to students' experiences. The teachers created ongoing social interactions to discuss the new vocabulary and improve students' inferential skills. They also believed that students needed to discuss new words with their peers in different contexts. Both teachers believed that students couldn't learn language from print effectively. In addition to providing examples for the use of the words, the teachers also encouraged their students to come up with their own examples to ensure they understood the meanings of the words and sentences.

Metacognitive monitoring strategies. This category was the most commonly used throughout the present study. Several of the teachers' strategies aligned with the findings of previous works, including Banner and Wang (2011) and Silvestri and Wang (2018). However, there were three strategies that were not discussed predominantly in previous investigations on d/Dhh students and metacognition: think aloud together, read in English and translate into ASL, and metacognitive strategies for mathematics.

Think together. In the present study, the teachers prompted students to think about the information in the passages and did not interfere unless students needed help. The teachers, particularly Sarah, permitted the students to discuss their thoughts and tried to guide their conversations to ensure that students remained focused and arrived at productive findings. This corresponds with the work of Aukerman (2015), who argued that instructors should encourage students to question and offer ideas through dialogues with their teachers and peers. These dialogues should help students create meaning and enhance their understanding of the passages. Think aloud together occurred mostly via a social interactive context, described previously.

Read in English and translate into ASL. In general, this metacognitive strategy is often a part of ASL-English bilingual programs—but has not been discussed much in the literature on metacognition and deafness (e.g., Paul, 2009; Yan & Paul, 2021). However, it is a specific strategy for facilitating the understanding of English sentences in passages. For example, the teachers attempted to facilitate the students' development of vocabulary knowledge in both English and ASL. Students were also directed to translate English sentences into ASL to enhance their understanding of the sentences.

Mathematics metacognitive monitoring strategies. The data collected from the second interview revealed that both teachers used similar metacognitive monitoring strategies for reading and mathematics, including word problems. Carmen remarked that she needed to spend more time explaining technical terms in mathematics. Sarah maintained that students could use think-together (or think aloud together) strategies to solve a mathematics problem. For example, during dialogues, individuals would think about the problem and make judgments concerning how to solve the problem.

Metacognitive Evaluating Strategies. Silvestri and Wang (2018) found that d/Dhh students with high-achieving reading levels were able to use more evaluating strategies than d/Dhh students who had low-achieving reading levels. In the present study, this was also the case. Sarah was able to encourage the use of evaluating strategies (e.g., reflection on the reading and graphic organizers) more often than Carmen. Similar to the findings of Silvestri and Wang, the reading skills of students in Sarah's classroom were higher than those in Carmen's classroom; Carmen's students had additional disabilities. The students in Carmen's classroom also engaged with passages that were easier than the ones used by Sarah.

Second Research Question: How do teachers assess their d/Deaf and hard of hearing students' use of metacognitive strategies?

The finding of this study revealed only one type of metacognitive assessment that was used with d/Dhh students: think-aloud. Teachers also remarked about the possible use of a second type in the future; that is, showing students a list of strategies and asking them about the strategies that they used.

Think aloud. Both teachers depended heavily on think-aloud assessments to ascertain their students' metacognitive strategies. For example, teachers asked students about the strategies they used when they made errors—students were encouraged to "think aloud" in explaining or demonstrating the strategy. Carmen asked her students to use the pictures in the text as part of their explanation or demonstration.

The teachers in the present study remarked that the think-aloud strategy was the most valid metacognitive assessment that they used during classroom instruction. The validity of the think aloud approach has been supported by other researchers. For example, Gormley (1982) found that think-aloud could be used with second grade d/Dhh students to improve their metacognitive strategies. Ericsson and Simon (1993) asserted that a think-aloud approach could be used to assess students' inner mental processes. Teachers could have ongoing conversations with students to understand their metacognitive strategies and describe why and the way they use them. Finally, Israel (2007) stated that the think-aloud technique could be used with students in different grades and asserted that it is an informal effective assessment because teachers can design their instruction and give immediate feedback to their students.

Metacognitive Strategies

With respect to strategies, the findings of the present study revealed the most commonly used ones were metacognitive monitoring strategies, follow by the planning strategies. The evaluating strategies were used the least—with the only form being the think aloud approach. Based on these findings, we recommend that teachers rethink how to implement the use of metacognitive evaluating strategies, especially with the use of passages with headings. We suggest the following evaluation strategies: encourage the students to think and evaluate the writing style, writing quality and grammar, and difficulties of the texts. Student should be able to reveal their enjoyment of or struggles with the text and share their opinions and ideas with the teacher or with their peers. These activities can be implemented using the think together approach in social interactive contexts, which was effective in the present study.

Finally, teachers need to implement more metacognitive assessments. This study found that both teachers focused only on the think-aloud approach despite the fact that they could have utilized other metacognitive assessment such as an interview, as is explained in previous works. Teachers may combine think-aloud with other metacognitive assessments; that is, during either a formal or informal interview, teachers may ask their students to read and think aloud to explain the metacognitive strategies they use.

RECOMMENDATIONS FOR FUTURE RESEARCH

There is still a need for additional research on metacognitive strategies and assessments with d/Dhh students. To increase our understanding of the effects of metacognition, researchers need to investigate a number of factors that affect the reading comprehension skills of d/Dhh students such as language factors, prior knowledge, and inferential ability. Future researchers should examine the relationships between language knowledge and the use of metacognitive strategies. For example, future researchers can explore how an improvement in vocabulary knowledge can assist students in using metacognitive strategies. It is also important for future researchers to explore the use of metacognitive strategies and assessments within the

context of the teacher-student relationship because a teacher's choice of strategy or assessment is most likely driven by the language/cognitive abilities of a student. More research should also be conducted on how to teach specific metacognitive strategies to d/Dhh students to enable them to use these strategies independently.

Researchers may desire to replicate the present study, involving more teachers and extending the timeframe (i.e., longer than a month). Metacognitive studies should also be undertaken with a younger group of d/Dhh students, particularly at the upper elementary level. There is also a need for future research on metacognition strategies to target d/Dhh students with additional disabilities (e.g., see the discussion in Luckner & Ayantoye, 2013).

LIMITATIONS

One limitation of this study was the short timeframe. It is possible that utilizing a longer timeframe would have captured a greater breadth of information regarding the improvement of reading comprehension through the use of metacognitive strategies. This study was conducted with only two teachers at the middle school level. Thus, the findings of this study cannot be generalized to all teachers at this level.

Although the first investigator acted as a non-participant, his presence during the classroom observation—either during the brief in-person situations or the virtual learning mode—could have influenced the behavior and attitudes of the teachers and students. For example, the teachers were aware of the focus on examining metacognition—and this may have influenced their teaching strategies or perceptions because they became even more aware of the importance of metacognition in developing reading comprehension. The inquiry about the limited use of metacognitive evaluating strategies may have prompted or, perhaps, encouraged the discussion of using a list of metacognitive strategies in the future with their students.

Finally, as this study was conducted during the COVID-19 pandemic, the participating teachers had to teach students virtually using Zoom; this created a number of challenges. As this was the teachers' first experience using a synchronous virtual mode as the primary avenue of instruction for d/Dhh students, they were not sufficiently prepared to teach their students via Zoom. The students also had no previous experience with using Zoom. In essence, the effects of the pandemic might have influenced teachers' perceptions and students' interactions.

CONCLUSION

There has been limited research on the effects of metacognition on English reading comprehension for d/Dhh children and adolescents. The extant literature has documented that metacognition has a positive impact on reading comprehension for typical literacy learners and, in the limited research, on d/Dhh literacy learners. The present study documented the need for more instruction and additional research on the use of metacognitive strategies and assessments. In essence, there needs to be more research to delineate evidence-based teaching strategies. The delineation and eventual instruction of effective metacognitive strategies should contribute to the improvement of reading comprehension skills of d/Dhh children and adolescents.

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Appendix A. Observation Checklist on Teachers' Metacognitive Strategies

Planning (before reading)	Monitoring (during reading)	Evaluating (after reading)
• Activating prior knowledge (vocabulary knowledge, text structure knowledge, content knowledge) • Overviewing, reading other materials, and previewing • Skimming before reading • Looking at the title and preparing to read more information about the topic • Time considerations • Think about reading level of the text	• Self-questioning • Prediction • Making inferences • Summarization • Graphic organizer • Looking for important information • Categorize the information • Connect to the main ideas • Looking at illustration or picture • Looking at title • Re-read the same sentences, paragraphs • Using other resources, such as a dictionary • Asking for help • Underline the words, and keep reading; then come back later • Peer tutoring (working with peers/ thinking with peers)	• Thinking about the text like the author (provide feedback to the authors) • Evaluating the text, writing style, writing quality, grammar, difficulties of the text, and reveal their enjoyment, struggle with the text, surprise, confusion, or their satisfaction • Anticipating how the knowledge is useful • Students are able to report awareness of author's bias

Note: This observation checklist is divided into three categories, planning, monitoring, and evaluating. Each category includes different types of metacognitive strategies (Baker & Brown,1984; Israel, 2007; Pressley & Afflerbach,1995; Schmitt, 2005).

Appendix B. Documentation of Teachers' Metacognitive Strategies

Data and place Teacher's code	Time of the observation Length of the observation				
Metacognitive strategy category	First observation	Second observation	Third observation	Fourth observation	Fifth observation
Planning strategies (before reading)					
Monitoring strategies (during reading)					
Evaluating strategies (after reading)					
Other strategies					

Note: This table will be used to record the type of metacognitive strategies that teachers use during reading instruction.

Appendix C. Observation Checklist for Teachers' Metacognitive Assessments

Data and place Teacher's code	Time of the observation Length of the observation		
Type of assessment	When (before reading, during reading, after reading)	Descriptions of assessment and activity	Number of times during activities
Think aloud			
Interview			
Other type of assessment			

Note: This observation checklist has divided metacognitive assessments into three types: think aloud, observations, and interviews. Also, it includes an additional row if teachers use different types of assessments (see also, Israel, 2007).

Appendix D: First Round of Interview Questions

Topic	Questions
Teachers' Backgrounds	• Could you give me a brief overview about your educational background? • What is your current educational level? When and where did you earn your degree, and what was your major? • Are you licensed to teach d/Dhh students? What teaching license do you have at the national/state level? • How did you become interested in teaching d/Dhh students?
Teachers' Employment	• What do you do in a typical day in your job/in your position? • How long have you been teaching d/Dhh students? • How long have you been teaching reading? • What subjects do you teach to your d/Dhh students? • What is your students' grade level? • Have you taught d/Dhh students in different educational settings (e.g., total communication, oral, bilingual-bicultural)?
Communication	• What is your students' communication preference (e.g., American Sign Language, spoken English, signed English, etc.)? • When your students sign English, do they speak and sign simultaneously? • What is their home language?
Reading instruction and comprehension	• What do you think makes for effective reading teaching? • How did you come to that conclusion? • How would you describe your d/Dhh students as readers (e.g., reading on grade or age level)? • How do you assess your students' reading comprehension?

Appendix E: Types of Metacognitive Strategies and Assessments

	Types of metacognitive planning strategies/ before reading strategies	Assessment	Common strategies
Teacher one	• Teaching vocabulary • Activate students' experiences • Teaching grammar • Prediction	Think-aloud	Focus heavily on the vocabulary
Teacher two	• Vocabulary review • Activate students' experiences • Prediction • Think together	Think-aloud	Activate students' experiences
	Types of metacognitive monitoring strategies/during reading strategies	Assessment	Common monitoring strategies
Teacher one	• Think together • Self-questioning • Prediction • Summarization • Graphic organizer • Looking at the title headings • Looking for important information • Using context clues to figure out sentences or words' meanings. • Categorizing the information.	Think aloud	• Looking at illustrations or pictures. • Re-reading the same sentences, paragraphs
Teacher two	• Looking at illustrations or pictures. • Re-reading the same sentences, paragraphs • Using other resources, such as a dictionary • Underlining the words, continuing to read; coming back later • Read in English and translate into ASL	Think aloud	• Read in English and translate into ASL • Think together • Using context clues to figure out sentences or words' meanings
	Types of metacognitive evaluating strategies/after reading strategies	Assessment	Common evaluating strategies
Teacher one	• Reflect on the reading • Vocabulary review	Think aloud	Vocabulary review
Teacher two	• Graphic organizers (Teacher two only)	Think aloud	Vocabulary review

Note: This table shows metacognitive strategies and assessments used by both teachers. This table also shows the most common strategies in each category.

Appendix F: Comparison of Teachers' Use of Metacognitive Strategies and Assessments

		Teacher one					Teacher two				
		1	2	3	4	5	1	2	3	4	5
Planning strategies/ Before reading	Vocabulary review	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Overview of the sentence structure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Overview of the information in the text	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitoring Strategies/ During reading	Think together	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Self-questioning		✓	✓		✓		✓	✓	✓	
	Prediction		✓	✓	✓	✓	✓	✓	✓	✓	
	Summarization		✓	✓	✓	✓	✓	✓	✓		
	Graphic organizers		✓		✓	✓		✓	✓		✓
	Looking at the title headings	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Looking for important information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Using context clues to figure out sentences' or words' meanings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Categorizing the information	✓	✓	✓	✓	✓	✓		✓		✓
	Looking at illustrations or pictures	✓	✓	✓	✓	✓	✓		✓		✓
	Re-reading the same sentences and paragraphs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Reading in English and translating into ASL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Using other resources, such as a dictionary							✓		✓	
	Underlining the words, continuing to read, and coming back later	✓	✓		✓		✓		✓		✓
Evaluating Strategies/ After reading	Reflecting on the reading		✓	✓	✓	✓	✓	✓	✓	✓	✓
	Reviewing vocabulary	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Using graphic organizers	✓		✓	✓		✓	✓	✓		✓
Metacognitive assessment	Think-aloud	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Students' grade levels		7th graders d/ Dhh students with additional disabilities					8th graders d/Dhh students				
Students' reading levels		Reading grades ranged from 2nd grade to 5th grade					Reading levels range from 5th grade to 6th grade				

Note: Similarities and differences regarding metacognitive strategies and assessments are determined from the analysis of the data collected during a one-month period.