How Do Deaf Signers of LSQ and Their Teachers Construct the Meaning of a Written Text?

D. A. Ducharme*, Isabelle Arcand
University of Ottawa

Received September 3, 2009; revisions received April 21, 2010; accepted April 23, 2010

Many studies have investigated why learning to read is so problematic for deaf individuals. However, we still know very little about how to teach reading to signing students. In this article, we report on an exploratory qualitative study of deaf LSQ (Langue des signes québécoise) signers learning to read with two teachers, in an effort to better understand what strategies might be most useful in constructing the meaning of a text. By videotaping reading sessions between each teacher and student, then conducting recall interviews, we found that both students and teachers used a number of strategies to construct meaning. The list of strategies observed was categorized as word attack or global meaning types. Developing readers showed different patterns of strategy use, with more global meaning strategies being used by the more independent reader. We also found that the deaf teacher and hearing teacher had different patterns of strategy use, although both favored global meaning types. Finally, our findings indicate that both teachers adapted their strategy use to the needs of the students, but with a different focus. Namely, the deaf teacher used more global meaning strategies with the weaker reader and less with the more independent reader, whereas the hearing teacher showed the opposite pattern.

Reading is an essential skill for hearing and deaf populations in order to function in today’s society. However, learning to read is a challenge for many deaf and hard-of-hearing individuals. The most recent statistics on their reading level reveal an average reading level equivalent to that of 8- or 9-year-old hearing students (Allen, 1986; Conrad, 1979; Karchmer & Mitchell, 2003; Qi & Mitchell, 2007). Although many studies have investigated why learning to read is so problematic for this population, we still know very little about how to teach reading to signing students. In this article, we report on an exploratory qualitative study of three deaf Langue des signes québécoise (henceforth LSQ) signers learning to read with two teachers, in an effort to better understand what strategies might be most useful to them in constructing the meaning of a text.

Most studies of deaf readers have shown them to have weaknesses in the subskills required for reading. In a review of the challenges faced by deaf readers, Paul (2003) noted the difficulties they have with two types of skills, which he divided along the lines of text- and reader-based skills. Text-based skills include word identification (Harris & Beech, 1998; Wauters, van Bon, & Tellings, 2006), vocabulary (Kelly, 1996; Marschark, 1993; Marschark, Lang, & Albertini, 2002; Paul, 1996, 1998), syntax (Kelly, 1996; King & Quigley, 1985), and figurative language (Fruchter, Wilbur, & Fraser, 1984; Iran-Nejad, Ortony & Rittenhouse, 1981; Orlando & Shulman, 1989; Payne & Quigley, 1987). Reader-based skills include working memory (Boutla, Supalla, Newport, & Bavelier, 2004; Lichtenstein, 1998; Marschark & Mayer, 1998), metacognition (Kelly & Mousley, 2001), and prior knowledge (Jackson, Paul, & Smith, 1997). The majority of the above-named studies of American Sign Language (ASL) signers learning to read in English have used a good and poor reader paradigm to uncover the skills that make a good reader good as opposed to a poor reader. We note a paucity of studies investigating the same skills in LSQ signers learning to read French, and we take a first step in adding to the body of knowledge about these readers’ strategies for constructing the meaning of a text with this exploratory qualitative study.
Implications for the Instruction of Reading

The research literature on the reading processes of deaf students generates implications for instruction, but relatively few studies have directly investigated instructional interventions with deaf readers (Schirmer & Williams, 2003). In a review of research on approaches to teaching reading, Schirmer and Williams divided the studies according to two periods of learning, namely emergent literacy and developmental reading instruction. These two periods reflect the general view in the reading development literature that children learn to read through stages (Chall, 1976; Ehri, 1999).

Emergent literacy (Schirmer & Williams, 2003) refers to young children’s reading and writing development, typically from birth to age 5, or to whenever children enter school and begin receiving formal literacy instruction. If instruction takes place during this period of learning, it is designed to support the child’s emergent reading behaviors and to extend initial concepts about print. In this article, we focus on the second period, called developmental reading instruction, which is viewed as the beginning of formal literacy teaching. Developmental reading instruction is designed to encourage the continuing development of reading abilities, as children move from novice to proficient readers. As we will see later in the Methodology section, all our participants were developing readers.

Schirmer (2003) and Schirmer, Bailey, and Schirmer Lockman (2004) used verbal reports to uncover deaf students’ use of different types of strategies in a reading task, which they grouped into three categories: constructing meaning, monitoring and improving comprehension, and evaluating comprehension. Within these categories, the authors proposed that there are two main areas involved in the reading process of deaf learners: word recognition and comprehension. These two areas are discussed in detail in the following sections.

Word Recognition

Schirmer and Williams (2003) named five strategies for “recognizing words” in print: phonics analysis, analogy, structural analysis, context, and sight word recognition. A number of researchers (Conrad, 1979; Daigle & Armand, 2008; Hanson, 1989; Hirsh-Pasek & Treiman, 1982; Kelly, 1993; Leybaert & Alegría, 1993; Schaper & Reitsma, 1993; Sutcliffe, Dowker, & Campbell, 1999; Transler, Leybaert & Gombert, 1999; Wang, Trezek, Luckner, & Paul, 2008) have been interested in the role of phonology in reading and particularly in the capability of young deaf readers to use phonology in word recognition. Results of studies of word recognition by deaf students have shown that some deaf readers do use phonological coding (Daigle & Armand, 2008; Hanson & Fowler, 1987) and some do not (Treiman & Hirsh-Pasek, 1983; Waters & Doehring, 1990). Furthermore, research that shows deaf readers are able to use phonological coding also shows they often do not, suggesting an important role for instructional strategies that promote its use.

Some researchers have explored other methods used by deaf readers for word recognition. These methods include fingerspelling (Hirsh-Pasek, 1987), initializing and chaining (Padden & Ramsey, 1998), as well as sign (Siedlecki, Votav, Bonvillian, & Jordan, 1990). Fingerspelling and initializing are often used by deaf people to communicate a noun or a word that is part of their vocabulary but for which no specific sign exists (Hirsh-Pasek, 1987; Musselman, 2000). Chaining is a teaching strategy used to help the child make associations between the signed word, the written word, and the fingerspelling of that same word.

Wauters, Knoors, Vervloed, and Aarnoutse (2001) found that word recognition improved when words were learned through speech and sign. Padden and Ramsey (1998), on the other hand, examined deaf and hearing teachers’ use of reading strategies with students who used only sign. Two categories of strategies, termed word attack and global meaning, were identified from their observations (Padden & Ramsey, 1998). In the word attack approach, attention is focused on decoding every word and on how each is constructed rather than the overall meaning of the sentence. In the global meaning approach, the student typically does a preliminary reading activity to browse through the pages of the text before he or she starts to sign. In this approach, the student is not constrained by sentence endings, punctuation marks, or words that he or she cannot decode. The student gives a meaning...
beyond the sentence or the paragraph even if he or she is unable to decode every single word.

Studies conducted in word recognition have focused on the role of strategies for achieving word recognition yet they do not provide a clear direction for instructional practice. Further research is needed to better understand how deaf children recognize words and which methods for word recognition can help deaf students learn to read. Furthermore, the majority of studies have been conducted with readers of English, not French, so there is an even greater need to establish basic knowledge about best practices for teaching French reading to LSQ signers.

### Comprehension

Research literature on the “comprehension” of deaf readers, according to Schirmer and Williams (2003), includes two major categories: prior knowledge of the reader (knowledge of syntax, background knowledge of topic, knowledge of text structure, and vocabulary) and cognitive strategies (metacognition and inference). With respect to the first area of prior knowledge, syntactic knowledge, researchers (Kelly, 1996; Miller, 2000; Stofen-Fisher, 1987–1988, among others) highlight the importance of instructional approaches that build syntactic and semantic abilities in deaf readers. Background knowledge has a direct influence on reading comprehension for hearing readers (Anderson, Spiro, & Anderson, 1978; Recht & Leslie, 1988) and deaf students (Garrison, Long, & Dowaliby, 1997; Jackson et al., 1997). And although few in numbers, intervention studies (Andrews, Winograd, & DeVille, 1994; Schirmer & Winter, 1993) on the effectiveness of approaches for teaching background knowledge have also shown that building and activating background knowledge helps the comprehension of deaf readers. With respect to developing knowledge of text structure, we know from the literature on hearing children that texts adhering to the expected predictable structure yield better text comprehension and recall (Fitzgerald, Spiegel, & Webb, 1985; Pappas & Brown, 1987). As in other areas of prior knowledge, the evidence is limited as to deaf readers’ ability to develop accurate story structure knowledge and to use it accurately (Griffith & Ripich, 1988; Schirmer, 1993; Yoshinaga-Itano & Downey, 1986). Finally, research on vocabulary has shown a direct relationship between vocabulary knowledge and reading comprehension for both hearing (Graves, 1986; Stahl & Fairbanks, 1986) and deaf readers (Garrison et al., 1997; LaSasso & Davey, 1987).

The second category found in the research literature on the comprehension of deaf readers, as stated above, is cognitive strategies. Research with deaf readers in this area has mainly been centered on metacognition in general and, one specific metacognitive skill, inference. We know from the hearing literature that good readers show metacognitive awareness and change their reading strategies as needed when reading, whereas poor readers do not, and that it is possible to improve comprehension by teaching the use of strategies (Paris, Lipson, & Wixson, 1983). Metacognition is defined as a reader’s awareness and control over his or her own comprehension processes (Raphael, Myers, Tirre, Fritz, & Freebody, 1981). One of the earliest studies of metacognition in deaf readers was conducted by Davey (1987) who found that deaf students were not even aware that they could improve their comprehension by looking back to find answers to questions. Other researchers have shown the importance of monitoring comprehension and activating strategies to improve comprehension in deaf students. For example, Ewoldt, Israelite, and Dodds (1992) found evidence that students self-monitored their comprehension, as well as evidence that their perceptions of text difficulty matched that of their teacher. They also found a mismatch between the teachers’ and students’ strategies for improving comprehension, such that the students recommended more independent strategies (e.g., rereading and using picture cues), whereas their teachers suggested more dependent strategies (e.g., asking for help). Andrews and Mason (1991) reported that deaf students relied most often on rereading and background knowledge as strategies, whereas Strassman (1992) found that deaf students focused on the skills they had been taught and did not use metacognitive knowledge. A review by Strassman (1997) synthesizing the literature linking metacognition and reading in children who are deaf suggested that current instructional practices did little to help them develop metacognitive strategies and that...
low-level reading material might actually deny them the opportunity to develop, practice, or use these strategies. Strassman also concluded that metacognitive strategy instruction could be beneficial to deaf students.

Just as there are few studies of metacognitive skills in general, only a few studies have been conducted specifically on deaf readers’ ability to make inferences (i.e., the ability to connect background knowledge with information in the text being read), but these have shown that deaf readers can develop these skills (Brown & Brewer, 1996; Walker, Munro, & Rickards, 1998a). Walker, Munro, and Rickards (1998b), for example, conducted an intervention study aimed at teaching deaf students inferential reading. They found that the intervention was effective in improving students’ ability to make inferences and their overall comprehension.

As with the studies on word recognition cited earlier, the results of studies on the comprehension of deaf readers offer little guidance for instructional practice. And we know even less about how to teach these strategies to achieve reading comprehension in French.

Schirmer and Williams (2003) suggested a great need for intervention studies with developing readers, to enhance the deaf reader’s capability to effectively and efficiently identify words in print through speech-based codes, sign codes, fingerspelling codes, and orthographic codes. Furthermore, Schirmer and Williams suggested the need for investigations that address techniques for teaching deaf readers better text comprehension, using knowledge of syntactic structures, background knowledge, knowledge of text structure, use of context, and use of strategies.

Our Study

Following Schirmer and Williams’ (2003) call for intervention research, we investigated the reading strategies of one type of developing reader, namely LSQ signing deaf adolescents whose reading proficiency (assessed by the Test de rendement pour francophones [TRF], which is further discussed in the Methodology section) was equivalent to that of 8- or 9-year-olds and who as such were still moving from novice to proficient reading. We focused on student–teacher interactions while reading a French text together. Our goal was to understand how these dyads constructed the meaning of the written text, using whatever strategies were available to them, generated either by the teacher or by the student. The outcome of our study was a list of strategies, for word recognition and text comprehension, which were used to achieve an understanding of what was read. All the dyads achieved their goal of understanding the text they read, and this was informally assessed with a question to the teacher and the student during their respective stimulated recall interviews (these interviews are described in more detail in the Procedures section of the Methodology section).

We wanted to understand how text comprehension was achieved by our participants, LSQ signers, and their teachers.

LSQ is the signed language used by deaf signers in Canada who are descendants of French Canadians, living in areas such as the provinces of Quebec, Ontario and New Brunswick. LSQ signers generally learn to read French, whereas ASL signers learn to read English. Just as French and English share similarities such as a common alphabet, ASL and LSQ share handshapes. However, they are distinct languages, with different lexical, grammatical, and pragmatic features. For instance, native signers of LSQ typically rely less on fingerspelling and use more mouthings than ASL users (Dubuisson, 1999). Therefore, it is important to establish a distinct body of research with respect to LSQ signers learning to read French.

In an earlier exploratory pilot study (Ducharme & Hurst, 2009; Hurst & Ducharme, 2006), we found that a single subject did indeed use a number of strategies to understand print. The strategies were categorized as word attack or global meaning strategies following Padden and Ramsey’s (1998) description of these two types of strategies. However, our earlier study was conducted with only one student, raising the question of whether the teacher’s strategy use might differ with other students of similar reading levels. Therefore, based on the research previously outlined, we proposed the following question, with respect to deaf LSQ signers learning to read in French: What is the on-task behavior of profoundly deaf LSQ signers and
their teachers when constructing the meaning of a text? Because this was an exploratory study, the term on-task behavior was used instead of “reading strategies” so as to remain open to other types of behaviors that might be observed.

Methodology

The research reported here is part of a larger study that included eight deaf students and two teachers (one deaf and one hearing) from a residential school offering an LSQ-French bilingual–bicultural program for deaf children. The larger project was an exploratory study aimed at understanding how deaf students learn to read and what specific strategies are most useful in fostering reading comprehension. In order to analyze how students learn to read, we were faced with the problem of first understanding what is done by students and teachers when reading a text. Therefore, this article presents an examination of the on-task behavior of profoundly deaf LSQ signers and their teacher when constructing the meaning of a text together. The current analysis is a necessary first step, which will later be followed by a further examination of the efficacy of strategies used by the participants.

The following paragraphs describe the methodology used to conduct our study. First, it addresses the choice of participants and outlines the assessment instruments used to establish their reading and signing abilities. Then, it describes the procedures used to collect and analyze data using the Noldus Observer XT software.

Participants

To examine the on-task behavior of profoundly deaf LSQ signers and their teacher when reading a text, three students were chosen, from the original sample of eight, based on their reading abilities, as measured with the reading comprehension subtest of the French version of the Canadian Achievement Test, the TRF (Sarrazin, 1996). The TRF is a battery of achievement tests measuring the individual’s functional level in reading, language, spelling, and math. The three students’ reading comprehension scores on this test placed them at grade 2, grade 3, and grade 4 levels, respectively. In the absence of any formal tool for assessing sign competence in LSQ, we relied on the participating teachers’ expert judgment to assess the competence of each student in sign. The deaf teacher was a native signer who had been at the school for many years and had been involved in extracurricular activities (e.g., deaf theater) with all the participants since their respective arrivals at the school. The hearing teacher had a near-native level of competency in LSQ, having previously obtained certification as an LSQ-French interpreter. She had been teaching at the school for more than 5 years and had taught French to the student participants of this study for a year using LSQ. More details are provided on the teachers’ respective profiles later in this section.

The three student participants of this study were male, profoundly deaf from birth, and had hearing parents. All had a hearing loss of more than 80 dB on the best ear (unaided), had normal nonverbal intelligence (WISC-R), and did not have additional known handicaps. Their primary language was LSQ, and their written mode of communication was French. This placed them in a double minority situation, being deaf in a hearing world and French in a predominantly English community. The student participants were given the pseudonyms, Justin, Dominic, and Richard.

Justin, the first student, was 14 years old at the time of data collection. His French teacher described Justin as a developing reader (Schirmer & Williams, 2003) who was dependent as he needed much support when reading a text, which is consistent with his TRF assessment placing him at a grade 2 level for reading comprehension. Justin learned to sign from his peers when he entered residential school at age 7. He has never been taught LSQ formally and his level of signing is not native-like (as reported by the teachers participating in this study), but this is his main means of communication. His speech is unintelligible.

Dominic, the second student participant, was 17 years old at the time of the study and, like Justin, had learned to sign in residential school. His reading level was assessed by the TRF as equivalent to grade 3. Similarly, his French teacher described him as a developing reader who needed some support to understand a text matched to his reading level. He communicates mainly in sign, although his level is not native-like (as
reported by the teacher participants in this study), and his speech is unintelligible.

Richard, the third student participant, was 18 years old when he took part in this study. He was the strongest reader of the three, although still considered a developing reader, with a reading level equivalent to fourth grade reading ability as indicated by the TRF. Correspondingly, his French teacher described him as the most independent reader of the three. Although he was a developing reader, he regularly read a tabloid newspaper, a format including fewer words and more pictures than daily newspapers. Although his parents were hearing, he was exposed to sign language prior to entering residential school by an older sibling who was also born deaf. His signing level was reported as native-like by his teachers and his speech was unintelligible.

The deaf and hearing teachers were also part of the analysis presented here. They both worked at the residential school attended by our three student participants and were chosen based on their interest, availability, and willingness to participate in this study. Their competencies in LSQ and French were ascertained when they were hired at the provincial school. The languages of instruction at the school were French and LSQ depending on the needs and abilities of the students. The teachers were given the pseudonyms Melissa and Carrie.

Melissa was a deaf teacher, whose teaching responsibilities included language arts. At the time of the study, she did not teach the participating students, but they knew her as a deaf teacher, having seen her many times in the halls and at school functions. Melissa was a native signer (LSQ) and had learned written French as a second language having been educated in a French residential school for deaf children. She had also obtained her teaching degree in French from a university where courses were taught in French with the assistance of an LSQ interpreter. As a native deaf signer, she had also taught LSQ courses to hearing students at the local deaf center.

Carrie was a hearing teacher. At the time of data collection, she taught French to all three students participating in this study, using LSQ. Justin, Dominic, and Richard were thus familiar with her teaching style, and she was familiar with their French and LSQ abilities, having interacted with them in LSQ on a daily basis for a year. Her mother tongue was French and she had learned LSQ as a second language, prior to training as an LSQ-French interpreter.

To answer our research question, we observed six dyads, that is, each of the three student participants interacting with both teachers on separate occasions, reading a different text each time. As further detailed below, for each dyad, a stimulated recall interview was conducted with both the student and the teacher.

Procedures

This study used a task similar to that used by Padden and Ramsey (1998) in a study of profoundly deaf ASL readers. In their study, Padden and Ramsey observed the reading strategies used by students in reading activities in which they had to read a text and then retell a story. Our participants were also asked to read and retell a narrative text. However, because these participants were all developing readers, the task was completed with the help of a teacher. A new never before read text was chosen by the student and his teacher, based on the student’s interests and reading abilities. The teacher suggested a number of texts, taken from graded readers, that were at an appropriate instructional level for the student based on the student’s prior achievement in French reading. This ensured that the reading activities had comparable levels of relative difficulty for each student. The students and teachers were told that the objective was to construct the meaning of the text through interaction. The student could (and was encouraged to) ask for help from the teacher and the teacher could (and was encouraged to) offer help if and when she thought it was needed.

Each dyad (student and teacher) was videotaped reading the story, signing “aloud,” and constructing its meaning through their interaction with the text and each other. Each reading activity lasted approximately 30 min and ended when the objective was achieved, that is, when the student and the teacher were satisfied that the text was understood. We did not test for text comprehension because it was understood that this objective was to be achieved by the teacher and student when they completed their reading activity. Both
the teacher and the student of each dyad confirmed in the respective stimulated recall sessions that comprehension of the text had been achieved. The reading activity was held in the student’s regular classroom where French reading was usually taught while the other students were elsewhere with another teacher. Only the teacher, the student, and the researcher who videotaped the activity were present.

Our study favored a constructivist approach, which acknowledges the importance of the social milieu on the learning process. In this approach, the teacher is viewed as a facilitator or catalyst in the learning process and plays the role of mentor. Learning is viewed as a process of acquiring knowledge and skills through personal experiencing. Thus, the reader/writer is in control and actively seeks to create meaning based on prior knowledge and constructions. Literary skills are developed or refined through an active process of meaning-seeking/creating while the teacher monitors this process (Paul, 1998).

Following the reading session, two stimulated recall sessions (Ericsson & Simon, 1993) were conducted, one with the student and one with the teacher. These recall sessions occurred within 3 days of the reading activity and were facilitated by a trained research assistant with the help of an LSQ-French interpreter in a small room away from the classroom and the other students. In the recall activity conducted with the student, the participant was asked to view the videotape of his reading session and to identify words or passages from the text that were challenging as well as strategies he and his teacher used to make sense of difficult segments. In the recall activity with the teacher, the participant was asked to view the videotape of a reading session and to provide information on the words or passages that were difficult for the student and to report on the strategies they both used to help the student construct meaning.

The recall sessions thus focused on problems encountered by the student while reading the text and the strategies used by the teacher and student to construct the meaning of the text. Each recall session lasted approximately 60 min and was recorded on video and audiotape for analysis. Ericsson and Simon (1993) demonstrated that verbal reports are reliable and valid. In addition, Schirmer (2003) investigated the use of verbal protocols to identify the reading strategies of deaf students. Her research demonstrated that deaf signing students were able to effectively use verbal (visual) reports to name the strategies they used in reading.

The constructivist framework, which guided this investigation, allowed tapping into the students’ and teachers’ understanding of their reading process and strategy use. The transactional process taking place in the recall sessions encouraged the participants to reflect on their behavior and sometimes even name or describe strategies. The participants were not given a list of strategies prior to the recall interviews so as to not bias their observations. Only after analyzing the recall interviews were the researchers able to draw up a list of strategies based on the participants’ descriptions of tactics used to overcome problems encountered and sometimes using the terms used by the students and the teachers describing what they did in the reading sessions (Guba & Lincoln, 1994; Lincoln & Guba, 2000).

Data Analysis

The study we conducted was qualitative in nature and as such our analysis was based on the videotapes of three different types of activities: (a) the reading session, (b) the student recall activity, and (c) the teacher recall activity. These three sources of data provide triangulation of the results.

All video footage was analyzed using the Noldus Observer XT software (Noldus Information Technology, 2009). The Observer XT is a behavioral coding and analysis software that supports all steps of a research project such as ours. The system allows building a coding scheme, data entry, data management, data analysis, as well as interrater consistency analysis. To use the system, the videos of the reading sessions as well as the students’ and the teachers’ stimulated recall were first converted into computerized files. Then, each video was visualized separately and coded for behaviors, which in the case of our study were strategies. The Observer software made it possible for us to keep all our video events in one database and gave us access to all data at all times. A complete description of the use of the Noldus Observer XT system for
analyzing these data is reported elsewhere (Ducharme & Arcand, 2009).

As previously mentioned, the data collection and analysis focused on problematic words or passages. Specifically, we were interested in the strategies used and named by the students and the teachers to understand difficult segments. Each coded strategy was initiated either by the student or by the teacher, as they worked together and mutually influenced each other to construct the meaning of the text. We coded segments that represented a challenge for the students and created themes based on the strategies students and teachers reported using to understand the specific problematic word or passage. We listed all types of strategies, as they were described in the stimulated recall sessions by the student and/or his teacher. We also coded the frequency of each type of strategy.

In the process, we ensured interrater consistency. Specifically, two trained research assistants participated in the coding procedures. Each research assistant coded half of the interviews and reviewed the interviews coded by the other assistant noting points of disagreement. In line with the paradigm guiding this study, wherein meaning is co-constructed through the research process, each point of discrepancy was discussed between the main researcher and the two research assistants until consensus was reached about the meaning of a segment. This process enhanced the trustworthiness of the study.

Results

The results are presented in graphs illustrating strategy use by each participant. First, we show the strategy use of each of the three students, who were all developing readers, with both of the teachers, deaf and hearing. Then, we show the overall strategy use of the teachers. Finally, we compare the strategy use of the deaf and hearing teachers with each student. In the Results section and in Table 1 and figures 1–6, we present the strategies used “by each participant” however, as a function of the constructivist paradigm underlying our study, it is necessarily implied that meaning was constructed through interaction between student and teacher. We recognize that student and teacher influenced each other in the choice of strategies to use (Paul, 1998) but for the sake of clarity and to simplify the tables, we present strategies “by participant.”

In the process of analysis, we were attentive to the participants’ descriptions of the strategies they used to understand difficult passages in a text. We noticed that terms and expressions were recurrent in the recall interviews, and we used the participants’ own words to designate and define the strategies they used. After a preliminary analysis, our findings were contrasted with the results of an earlier study (Ducharme & Hurst, 2009). This previous study examined the strategies used by one student with a deaf and a hearing teacher and used a categorization based on a differentiation between global meaning and word attack types of strategies (Padden & Ramsey, 1998).

Comparing our data with this earlier study (Hurst & Ducharme, 2009), it became evident that our participants’ strategies could be classified using the two previously observed categories. In doing so, we uncovered 14 global meaning strategies and 11 word attack strategies, as shown in Table 1. As suggested by Padden & Ramsey (1998), global meaning strategies focus on grasping the overall meaning of a sentence or a paragraph, whereas word attack strategies focus on understanding specific words. For all global meaning strategies, the focus is on grasping ideas expressed by a group of words, a sentence, or a paragraph, even though some words might remain unclear. For example, in using a strategy such as “reference to LSQ,” the teacher would encourage the student to read a sentence from beginning to end. She would then ask the student to sign the meaning of the sentence. If the student had difficulty grasping the full meaning, she might use sign to explain the difference between grammatical structure in LSQ and written French. On the other hand, when using word attack strategies, the focus is on understanding every single word and the reading process is a word by word one. Let us consider an example with a “drawing” strategy. The teacher would encourage the student to read a sentence, signing as he moves through the sentence. Whenever the student would encounter an unknown word (i.e., wolf), he would be encouraged to tell his teacher. She might then draw a picture of a wolf to help him find the meaning of the word.
Upon closer examination of the nature of these strategies, we were able to further categorize them using the framework of Schirmer (2003) and Schirmer et al. (2004). All the strategies recorded, both word attack and global meaning, were thus further categorized in this framework as constructing meaning, with the exception of one, comprehension check, which is categorized as monitoring and improving comprehension (see the Implications section for the instruction of reading earlier in this article for more detail on this framework).

<table>
<thead>
<tr>
<th>Global meaning strategies</th>
<th>Analogy</th>
<th>Find similarity in the meaning of two words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background knowledge</td>
<td>Use of background knowledge such as memories, experience, knowledge</td>
<td></td>
</tr>
<tr>
<td>Comprehension check</td>
<td>The teacher questions the student to check his comprehension of a sentence, a paragraph, or the story</td>
<td></td>
</tr>
<tr>
<td>Context (use of)</td>
<td>The student or teacher uses information around the word (in the sentence or in the picture he constructs of the story)</td>
<td></td>
</tr>
<tr>
<td>Creating an image in mind (student)</td>
<td>The student creates an image in his mind linked with what is happening in the text</td>
<td></td>
</tr>
<tr>
<td>Explanation in LSQ (teacher)</td>
<td>The teacher gives the student information in LSQ to help him better understand a new concept—the student does not know the word or the sign for this new concept</td>
<td></td>
</tr>
<tr>
<td>Global meaning</td>
<td>The student uses the whole text to gain a general understanding of the story or a paragraph</td>
<td></td>
</tr>
<tr>
<td>Grammatical structure</td>
<td>Use of grammatical features of French or LSQ to construct the meaning of a sentence</td>
<td></td>
</tr>
<tr>
<td>Guiding (teacher)</td>
<td>The teacher gives an example, a clue, or an answer to help the student construct meaning</td>
<td></td>
</tr>
<tr>
<td>Meaning making (student)</td>
<td>The student tries to construct meaning on his own</td>
<td></td>
</tr>
<tr>
<td>Mime</td>
<td>The student or teacher uses gestures to illustrate an action</td>
<td></td>
</tr>
<tr>
<td>Questioning</td>
<td>The teacher asks the student questions, back and forth, until the student understands</td>
<td></td>
</tr>
<tr>
<td>Reference to LSQ</td>
<td>The student or teacher uses rules of syntax or morphology in LSQ to construct meaning</td>
<td></td>
</tr>
<tr>
<td>Reference to the pictures in the story</td>
<td>The student points to or mentions the pictures shown in a text to construct its meaning</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Word attack strategies</th>
<th>Answer in LSQ</th>
<th>The teacher shows the sign in LSQ, knowing that he knows the concept and will understand the word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decoding (phonological or visual)</td>
<td>The student or teacher uses letter-sound correspondences or the visual aspect of a word</td>
<td></td>
</tr>
<tr>
<td>Drawing</td>
<td>The student or teacher uses a drawing to construct meaning</td>
<td></td>
</tr>
<tr>
<td>Fingerspelling</td>
<td>The teacher manually spells a word using signs for each letter</td>
<td></td>
</tr>
<tr>
<td>Lipreading</td>
<td>The student or teacher uses lip movements to pronounce a word as a way of helping its comprehension</td>
<td></td>
</tr>
<tr>
<td>Logic</td>
<td>The student or teacher uses reasoning or coherence in the text to help find the meaning of a word</td>
<td></td>
</tr>
<tr>
<td>Role-playing</td>
<td>The student or teacher takes on the role of a character to imitate the story</td>
<td></td>
</tr>
<tr>
<td>Synonyms</td>
<td>The student or teacher uses another word that has an equivalent meaning to help understand the problem word</td>
<td></td>
</tr>
<tr>
<td>Vocabulary learning</td>
<td>Strategies to help the student learn new vocabulary</td>
<td></td>
</tr>
<tr>
<td>Words from same root</td>
<td>The student or teacher uses a word with a similar root to help understand a difficult word</td>
<td></td>
</tr>
<tr>
<td>Writing</td>
<td>The teacher writes out one or more words to help the student better understand or distinguish a difficult word</td>
<td></td>
</tr>
</tbody>
</table>

Note. LSQ = Langue des signes québécoise.
Student Strategy Use

This section reviews the strategy use of the three students, Justin, Dominic, and Richard, with each teacher to understand how they constructed meaning together as they read. These three students present slightly different reading abilities, although all are considered developing readers. We first analyzed Justin’s trends in the strategies he used to understand a text, then Dominic’s, and finally, Richard’s. Each student’s strategy use is presented in Figures 1–3, giving a visual overview of their trends. When presenting the strategy use of the students, we offer the frequency (reported in number of times) of each strategy used with each teacher as well as the rate (reported in percentages) of global meaning and word attack strategies.

Justin. Justin was a grade 2 level reader, as assessed by the TRF (Sarrazin, 1996). As depicted in Figure 1, Justin used a variety of 14 different strategies when reading a text with his teachers. His most frequently used strategy was phonological or visual decoding, which was used in the same proportion (i.e., 13 times) with Melissa, the deaf teacher, and Carrie, the hearing teacher. Some strategies were used mainly with Carrie, namely lipreading (i.e., three times with Melissa vs. 11 times with Carrie), reference to the context (i.e., five times vs. eight times), and reference to LSQ (i.e., three times vs. seven times). He used logic with similar frequency with both teachers (i.e., five times with Melissa and four times with Carrie), but he favored independent meaning making with Melissa (i.e., six times vs. three with Carrie). As indicated in Figure 1, Justin used a few other strategies infrequently with both teachers.

When reading with Melissa, Justin used global meaning strategies half the time (50.0% or 22 times) and word attack strategies the other half. More specifically, meaning making (i.e., six times), use of the context (i.e., five times), and references to the pictures in the story (i.e., four times) were his most commonly used global meaning strategies with Melissa. Of all strategies, he favored phonological or visual decoding, a word attack strategy he used 13 times when reading with Melissa.

Justin used global meaning strategies 38.2% of the time (i.e., 22 times) and word attack strategies 61.8% of the time (i.e., 34 times) when working with Carrie. The use of context (i.e., eight times) and references to LSQ (i.e., seven times) were the global meaning strategies he used most frequently when working with
Carrie. Also, phonological or visual decoding (i.e., 13 times) remained his most commonly used strategy when working with Carrie, followed by lipreading (i.e., 11 times), both word attack strategies.

Dominic. Dominic was a grade 3 reader according to the TRF (Sarrazin, 1996). With both teachers, he used an array of 17 strategies with relatively low frequency. As seen in Figure 2, his most commonly used strategy was meaning making, which he used independently—mainly with Carrie (i.e., three times with Melissa vs. eight times with Carrie). He also used phonological or visual decoding in equal proportion with both teachers (i.e., five times). In trying to construct the meaning of the text, he created images in his mind, more often with Carrie (i.e., twice with Melissa vs. five times with Carrie) and made references to LSQ (i.e., twice with Melissa and three times with Carrie). Dominic used other strategies with very low frequency, with both teachers.

When reading with Melissa, Dominic used global meaning strategies 52.4% of the time (i.e., 11 times) and word attack strategies 47.6% of the time (i.e., 10 times). Dominic used strategies with low frequency, particularly with Melissa (21 uses in total). He sought to learn vocabulary to better understand the text four times and to independently make meaning of what he was reading three times. His most commonly used strategy was phonological or visual decoding, a word attack strategy he used five times, and only made use of one other word attack strategy, namely synonyms, once.

In his reading session with Carrie, Dominic used global meaning strategies 68.4% of the time (i.e., 26 times) and word attack strategies 31.6% of the time (i.e., 10 times). With regard to meaning making strategies, he used independent meaning making eight times and creating images in his mind five times. He also used word attack strategies, mainly phonological or visual decoding five times.

Richard. Richard was the strongest reader with a fourth grade reading ability as indicated by the TRF (Sarrazin, 1996). Figure 3 shows the strategies used by Richard when reading a text with each teacher. Specifically, he used 12 different strategies to understand the texts he read. He referred to LSQ (i.e., 8 times with Melissa and 12 times with Carrie) and used meaning making, predominantly in collaboration with his teachers (i.e., five times with Melissa and nine times with Carrie) but also independently (i.e., twice in the reading session with Melissa and 3 times with Carrie).
Carrie). He infrequently used a number of other strategies with either of the teachers as indicated in Figure 3.

When working with Melissa, Richard used global meaning strategies 81.0% of the time (i.e., 17 times) and word attack strategies 19.0% of the time (i.e., 4 times). With regard to the global meaning strategies, he used references to LSQ eight times and meaning making with the collaboration of the teacher five times. He used few word attack strategies, specifically phonological or visual decoding twice, lipreading once, and synonyms once.

When reading with Carrie, he used global meaning strategies 85.7% of the time (i.e., 30 times) and word attack strategies 14.3% of the time (i.e., 5 times). He used more strategies with Carrie, particularly of the global meaning approach. For instance, he used references to LSQ 12 times and meaning making with the collaboration of the teacher nine times. He used little word attack strategies, specifically he used phonological or visual decoding twice, logic, in collaboration with the teacher twice, and lipreading once.

In summary, the three students’ pattern of strategy use was different. Justin, the grade 2 level reader used global meaning strategies 50% of the time when working with Melissa (the deaf teacher) and 38.2% of the time when working with Carrie (the hearing teacher). He used 14 different strategies and favored decoding, lipreading, and made reference to the context to understand the text he was reading. Dominic, the grade 3 level reader used global meaning strategies 52.4% of the time when reading with Melissa and 68.4% of the time with Carrie. He used 17 strategies in a lower frequency and preferred meaning making, decoding, and creating images in his mind. Finally, Richard, the grade 4 level reader used global meaning strategies 81% of the time in the reading session with Melissa and 85.7% of the time with Carrie. To understand the text, he drew on 12 different strategies, notably making reference to LSQ as well as meaning making in collaboration with the teacher, and independently.

Teacher Strategy Use

This section compares the strategies used by the two teachers to determine if Melissa’s and Carrie’s strategy use differed as they helped students understand a text. To allow an analysis of the teachers’ behaviors, the strategies they used with all three students were pooled and graphed. Figure 4 offers a visual representation of each teacher’s overall strategy use.
Figure 4 illustrates the similarities and differences between the deaf and hearing teachers participating in this study. In particular, it shows that some strategies were frequently used by both teachers, specifically giving explanations in LSQ (i.e., 42 times for Melissa and 46 times for Carrie), guiding the student (i.e., 38 and 78 times), questioning (i.e., 37 and 36 times), and making comprehension checks (i.e., 20 and 19 times). We can also observe differences in the strategy use of the teachers. For instance, when compared with Carrie, Melissa made more references to LSQ (i.e., 16 vs. 5 times) and gave more answers in LSQ (i.e., 17 vs. 7 times). Another notable difference is that Carrie used word attack strategies, such as writing (i.e., 0 times for Melissa and 30 times for Carrie), words from the same root (i.e., once vs. 20 times), collaborative use of logic (i.e., 5 vs. 18 times), and synonyms (i.e., 4 vs. 13 times). Interestingly, as illustrated in Figure 4, Carrie used more strategies, more often.

Figure 4 also shows that the teachers exploited a greater array of strategies than the students. Specifically, Melissa used 20 different strategies to help the three students understand the text, whereas Carrie used 27. As for the students, Justin used 14 strategies, Dominic used 17, and Richard used 12. Some strategies (i.e., mime, fingerspelling, role-playing, and writing) were used by the teachers but not by the three students. Others are teaching strategies, for example, comprehension check, giving explanations in LSQ, guiding the student, questioning, and giving an answer in LSQ.

Teacher Strategy Use With Regard to the Student’s Reading Level

This section presents an analysis of the participating teachers’ use of strategy in reading sessions to determine whether teachers’ strategy use differed according to the student’s reading abilities. The teachers’ strategy use with each individual student is illustrated in Figures 5 and 6.

**Melissa.** In her reading sessions with the three students, Melissa used an array of 20 different strategies. Figure 5 illustrates that her most frequently used strategies were offering explanations in LSQ (i.e., 42 times), guiding the student (i.e., 38 times), and questioning the student (i.e., 37 times). These three strategies were used most often with Justin, the grade 2 reader, and least often with Richard, the grade 4 reader. Melissa also made a number of references to LSQ (i.e., 16 times, strictly with the weakest reader) and gave answers in LSQ (i.e., 17 times). She used
a number of other strategies less frequently and without any discernible trends.

By pooling the strategies used by Melissa with all three students, we can calculate the proportion with which she used global meaning strategies and word attack strategies (see Table 1 for a list of both categories of strategies). This calculation indicates that Melissa used global meaning strategies 84.1% of the time and word attack strategies 15.9% of the time, suggesting she had a preference for the global meaning approach.

Carrie. When reading a text with Justin, Dominic, and Richard, Carrie used a variety of strategies (i.e., 26 strategies), with a preference for giving explanations in LSQ (i.e., 46 times), guiding the student (i.e., 38 times), questioning (i.e., 36 times), writing (i.e., 30 times), and making links with words of the...
same root (i.e., 20 times). However, as illustrated in Figure 6, there does not seem to be any clear trend in her use of these strategies with regard to the reading level of the student.

Again, pooling the strategies used by Carrie with all three students allowed us to calculate the proportion with which she used global meaning and word attack strategies overall. She used global meaning strategies 66.6% of the time and word attack strategies 33.4% of the time. This suggests that she had a preference for the global meaning approach.

Discussion

The research question guiding this study was “What is the on-task behavior of profoundly deaf LSQ signers and their teacher when constructing the meaning of a text?” We used procedures as well as a behavioral coding and analysis software that allowed us to specify a list of strategies used by three deaf students and two teachers when co-constructing the meaning of a text. We offer a list of behaviors (Table 1) used by three deaf developing readers working with a deaf teacher and a hearing teacher. The analysis of six dyads (two teachers and three students) provides a better understanding of how a student and a teacher interact to construct the meaning of a text in a bilingual–bicultural (LSQ-French) context.

The findings of this examination are noteworthy as they concern a population that is underrepresented in the literature on deaf education and distinct in relation to its double minority situation (i.e., minority deaf in a hearing society and minority French in an English-dominant country and community). ASL and LSQ, although they share similarities, are distinct languages with different lexical, grammatical, and pragmatic characteristics. The same applies to written French and English. Similarly, the relationship between LSQ and French print should differ from that of ASL and English print. It is therefore crucial to seek to understand the specificities of the process of learning to read French among LSQ signers.

Our analysis indicated that each student had his own reading style and preferences, and it is difficult to observe trends with regard to the specific strategies used by the students. It is however possible to discern distinctions in the readers’ use of strategies when comparing the three cases. The first distinction we observe is that, in comparison to the other students, Justin, the weakest and more dependent reader, used more strategies, more often with both teachers. One possible explanation for this behavior might be that his strategies are less effective, making it necessary to use more of them. This possibility will be examined in another article specifically examining the efficacy of strategies. Dominic, also a relatively dependent reader used the fewest strategies, least often, and the frequency of strategies used by Richard, the most independent of the three readers, is between the first two.

Another notable comparison in the students’ reading behavior was in their use of global meaning strategies and word attack strategies (Padden & Ramsey, 1998). Specifically, Justin, the more dependent reader used global meaning strategies 50% of the time with Melissa and 38.2% of the time with Carrie. In a previous study (Ducharme & Hurst, 2009), a grade 2 reader used global meaning strategies 36.4% of the time with Melissa and 13.2% of the time with Carrie. These results are coherent in that both studies report a higher use of global meaning strategies with the deaf teacher.

The current study also reports that Dominic, the median reader, used global meaning strategies 52.4% of the time with Melissa and 68.4% of the time with Carrie. Finally, Richard, the least dependent of the three readers, used global meaning strategies 81.0% of the time with Melissa and 85.7% of the time with Carrie. The observation of the three developing readers in this study thus suggests that the use of global meaning strategies increases with the reading abilities, and conversely, the use of word attack strategies decreases. This might suggest that teaching should target more global meaning strategies as ability increases; however, more research is needed to generalize this finding because we only observed three participants.

The purpose of this analysis was not to compare deaf and hearing teachers’ strategy use. However, our results do reveal notable differences in the teachers participating in this study. These dissimilarities relate to two dimensions, namely differences between teachers and differences according to the student’s reading
ability. First, Melissa and Carrie used strategies in distinct ways. For instance, Melissa used 20 different strategies, for a total of 227 uses, whereas Carrie used 27 various strategies, for a total of 356 uses. In other words, Carrie used more strategies, more often. This is in line with the results of Ducharme and Hurst (2009) in which a hearing teacher used more strategies (i.e., 12 different strategies) than a deaf teacher (i.e., 8 different strategies) with one deaf grade 2 level reader.

With regard to the types of strategies used, our analysis indicates that Melissa used global meaning strategies 84.1% of the time and word attack strategies 15.9% of the time. Carrie, on the other hand, used global meaning strategies 66.6% of the time and word attack strategies 33.4% of the time. It thus appears that Melissa had a clear tendency to use global meaning strategies, whereas Carrie’s preference for this approach was more modest. This observation concurs with the results of our earlier study (Ducharme & Hurst, 2009), indicating that a deaf teacher used more global meaning strategies than the hearing teacher (74% of the time vs. 34.4% of the time).

Second, the teachers differed in their strategy use according to the reading abilities of the student. For instance, Melissa’s most commonly used strategies were offering explanations in LSQ, guiding the student, and questioning the student to help him make sense of the sentence or story. Notably, she used these three strategies most often with the more dependent reader and least often with the more independent yet still developing reader, suggesting that her pedagogical practices were tailored to the strengths and needs of the students.

As previously mentioned, Carrie had a moderate preference for global meaning strategies overall. She used global meaning strategies 57.9% of the time with Justin the more dependent reader, 69% of the time with Dominic, the other dependent reader, and 80% of the time with Richard the more independent of the readers. In other words, the more independent the reader was, the more global meaning strategies she used, without showing any preference for any one specific strategy within this category. This suggests that she also adapted her teaching style to the reading ability of the student.

The results of this study must be considered with caution as we acknowledge a few limitations. First, the nature of our research makes it an exploration of strategy use, which is not necessarily representative of other deaf students or deaf and hearing teachers of similar profiles. A different study, possibly with replications of both students and teachers, might enable generalizations of student and teacher behavior. Additionally, this study compares teachers who are not in parallel roles with the students. Explicitly, Carrie taught French to all three students at the time of the data collection, whereas Melissa had never taught any of them. It is thus possible that the differences observed between the teachers are influenced by their contrasting relationship with the students as well as their hearing status. Nevertheless, both teachers were able to achieve the objective they were initially given for the task, that is to construct the meaning of a text with each student.

A final word on the findings of our study concerns an outcome that was unexpected. Our study was based on data collected on two occasions and thus did not intend to comment on the progress made by students in reading. However, in the retrospective interviews conducted with the students, we did record comments from the students that are evidence of a developing awareness of reading strategies. That is, student participants were asked to name strategies, and this exercise seems to have helped them develop an awareness of them. Reflecting on the reading process was thus a learning experience in itself. Perhaps this is an avenue to pursue in future research.

Conclusions

Most research on the reading skills of deaf signers has been conducted with children who used ASL as their main means of communication. An earlier case study (Ducharme & Hurst, 2009; Hurst & Ducharme, 2006) established a list of strategies used by one profoundly deaf LSQ signing adolescent and found that his strategies did help him understand a text. This current investigation sought to extend those findings with an in-depth analysis of strategy use reported by three profoundly deaf LSQ signing students and their deaf and hearing teachers.
We also noted differences in strategy use, particularly between the more dependent and more independent readers, with the former using more word attack strategies and the latter using more global meaning strategies, suggesting that as reading proficiency increases more global meaning strategies are used. Finally, we found that both teachers showed a preference for global meaning strategies, although Melissa used a much larger proportion of these than Carrie. The teachers’ use of strategies also varied according to the students’ level of independence. In fact, both Melissa and Carrie seemed to adapt their style to the needs of each student.

Our investigation provides an important contribution with respect to the strategies used by these participants. In response to our research question, regarding behavior when constructing the meaning of a text, we have provided a list of strategies that are categorized as global meaning or word attack types. Our work was guided by Padden and Ramsey’s (1998) categorization of deaf students’ reading strategies, but the current investigation allowed us to further develop a proposed list, expanding it and adapting it to our specific bilingual–bicultural (LSQ-French) context. Our investigation is thus an invaluable contribution to the field of deaf studies as the French Canadian deaf community faces a specific situation of double minority and is highly underrepresented in research. Finally, we are hoping to support educators in their endeavor to produce better deaf readers.

Note

1. No LSQ curriculum exists for teaching LSQ in schools. A government-funded project is currently underway to develop such a curriculum.

Funding


Conflict of Interest

No conflicts of interest were reported.

References


