Metacognition in the Writing of ASL Dominant Deaf Adolescents

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ABSTRACT

This article explores the development of metacognition in deaf adolescents who use American Sign Language as their primary language. The students participated in a study that investigated student use of a writing rubric, Deaf Student Editing Rubric (DSER), and its impact on their writing. An examination of interview transcripts indicated an improvement on how students assessed their own writing. Student responses were summarized to show an improvement in how they described their writing and their thoughts about their own writing. Interview responses indicated the evidence of the development of metacognition among this student population.

As of 2011, the National Assessment of Education Progress (NAEP) writing assessment reported an estimate of around one-fourth of all students between eighth-and-twelfth grade were proficient at writing to share an experience, explain a procedure, or persuade an audience (National Center for Education Statistics, 2012). Developing writing skills in English is challenging for many deaf students (Albertini & Schley, 2003; Marschark, Lang, & Albertini, 2002; McAnally, Rose, & Quigley, 1994). Deaf students experience deafness on a continuum ranging from being profoundly deaf to hard of hearing (Fitzpatrick & Theoharis, 2010). They also use a variety of modes of communication, for example American Sign Language (ASL), spoken English, and cued speech. These modes of communication along with other factors can impact their performance in writing.

These writing challenges deaf students face have been consistently documented since the 1940s (see Albertini & Schley, 2003; Kretschmer & Kretschmer, 1984; Marschark, Lang, & Albertini, 2002). One of the primary reasons writing is difficult is because it involves encoding which is more a complex process than decoding which is required for reading. ASL users who do not have access to the spoken form of English demonstrate significant difficulties in expressing their ideas in written form. Despite the critical importance of developing English writing skills, there is a dearth of research on writing development in deaf adolescents. This article will share data from a study on deaf adolescent writers in a residential school for the deaf located in the Northeast that used ASL as their primary mode of communication. It also provides evidence on how discussing their writing in their first language, ASL, will help students develop metacognition.

LITERATURE REVIEW

Becoming a successful writer is a challenge for most students; however, given the numerous obstacles and barriers, it can be more problematic for d/Deaf and hard of hearing (d/Dhh) students. Deaf students, who use ASL, pose a unique case for language and literacy acquisition due to the fact they are working between multiple modalities (i.e., signed & spoken).

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When thinking about most effective ways to teach writing to deaf students it is important to note, deaf students bring a variety of family and educational experiences, different psychological, intellectual, linguistic, audiological, and learning preferences to the educational environment. In addition, d/Dhh students often arrive to school with minimal first language development, lower literacy skills compared to their hearing peers, and thus experience difficulties in learning and writing standard English (Quigley & Paul, 1990).

All of these variables illustrate the need for unique strategies for teaching writing to support student growth, development, and learning in the area of writing. While research through the years has recognized the challenges d/Dhh students face (Cheng & Rose, 2008; Marschark & Hauser, 2012) and the consequences of weak writing skills (i.e. lower paying jobs and limited vocational options) (Bickley, Mosely, & Stansky, 2012), debates continue regarding the most effective way to teach written English to d/Dhh students.

Understandably, given the aforementioned challenges, some d/Dhh individuals tend to struggle with writing thus causing a lack of motivation to write. Yet, more than ever, today's jobs require sophisticated writing skills in order to be successful (Wolbers, Dostal, Graham, Cihak, Kilpatrick, & Saulsburry, 2015). Writing is critically important to enable students to advance to post-secondary education, succeed in the workforce, and participate in daily activities. Two-thirds of salaried positions include writing (of some form) responsibilities, and half of all companies consider an individual's writing skills when recommending and determining promotion (National Commission on Writing in America's Schools and Colleges, 2004).

Strassman (1997) defined metacognition as the knowledge and ability an individual has to control one's own thinking. The reader is able to exercise control by using metacognitive knowledge. This control refers to the strategies a student uses to monitor his or her own progress. This demonstrates active engagement on the part of a learner over his or her own learning.

For example, Flavell (1979) used a model to describe metacognition as the process of cognitive monitoring and regulation. According to this model, cognitive monitoring takes place during the occurrence and interaction of the following: metacognitive knowledge, metacognitive experiences, goals (tasks), and actions (strategies). Metacognitive knowledge refers to knowledge a person has about one's self and others related to people, their self, as an individual as well as in relationship with others as cognitive beings, the task at hand and strategies available to accomplish a goal. Metacognitive experiences encompass the reflective thinking that occurs providing information to a person about where he or she is in a learning situation.

These experiences will impact the goals and tasks at hand. The goals and tasks will include what the learner will achieve during a cognitive activity, such as composing an expository essay. The goal of an expository essay is to write about a topic or a complex process in a way that gives a reader a clear understanding.

Actions and strategies are those behaviors learners exhibit to accomplish a task. In this case the teacher may provide the student with an organizing tool that will help the writer with the required structure of the essay. Metacognition includes "one's understanding of the strategies available for the learning task and the regulatory mechanisms needed to complete the task" (Hallahan, et al., 2010, p. 200).

Paul (2003) defined metacognition in reading as the control a reader has over how he or she comprehends what is being read. Metacognitive control refers to the self-monitoring strategies one uses during literacy tasks. According to Hacker (1998) metacognition involves the process of thinking about one's thoughts. Sitko (1998) described the Flower and Hayes cognitive process model of writing which includes three major aspects of the writing process: planning, translating, and reviewing. Planning includes setting goals, generating ideas and organizing the writing. Translating refers to the converting of ideas to written text. Reviewing occurs when writers evaluate their writing and make revisions.

Metacognition is a critical element in the writing process, as it helps students think about and consider what they have learned and apply it to different situations, when learning new concepts and skills, and generalize appropriately when making connections (Pressley, Snyder & Cariglia-Bull, 1987). Joseph (2010) stated metacognition includes the active process of thinking about learning tasks and is essential to academic success. She proposed that middle and secondary teachers should explicitly develop metacognitive awareness across subject areas, assignments, and grade levels. Hacker, Keener, and Kircher (2009) argue "writing is applied metacognition" (p. 154). This review of the literature highlighted the existing research on metacognition awareness for deaf students whose primary language is ASL.

Deaf Students and Metacognition

Deaf students experience difficulty with metacognition because they are not aware of learning strategies and how to use them (Luckner, Slike, & Johnson, 2012). Luckner, Slike, and Johnson (2012) described metacognition as "purposefully monitoring our thinking (p. 62). Echevarria, Vogt, and Short (2010) added metacognition can be demonstrated by four distinct areas: (a) matching strategies to a specific learning situation, (b) ability to clarify the purpose of learning during a lesson or learning activity, (c) monitoring their own understanding throughout the processes using self-talk and self-questioning, and (d) making connections or a new plan if an attempt fails.

Most students over the course of time have learned how to gain and establish the strategies for how they learn best in different content areas and environments and have developed a way to evaluate their performance. During this process they can then make the needed adjustments and repeat the cycle (Luckner, Slike, & Johnson, 2012). Research indicated d/Dhh students are not as aware of when they are not comprehending the content or mastering a new skill as their hearing peers (Schirmer, 2003). Unfortunately Strassman (1997) reported that d/Dhh students are typically unaware when strategies have been taught or do not

know how to incorporate them meaningfully or generalize the strategy.

When writing, students must be able to manipulate the syntactic and morphological structures of language, while following numerous grammatical rules in order to express a message that can be understood and is meaningful to the reader (Schirmer, Bailey, & Fitzgerald, 1999). This task is often a challenge for d/Dhh students because deaf students do not hear the spoken word (Paul 1996). While clearly for a variety of reasons writing is difficult for d/Dhh students little research has been conducted in this area. Research reports the success of the product or process approach to writing for deaf learners (Schirmer, Bailey, & Fitzgerald, 1999). A few studies have stated specific programs that have shown a positive impact on writing (e. g., Kluwin & Kelly, 1992; Schleper, 1996). Other authors have looked at how different writing strategies and instruction have improved d/Dhh writing abilities (Cambra, 1994; Schirmer & Bond, 1990).

Wolbers's (2019) research examined the benefits of interactive and guided writing for d/Dhh students. The study took place in two elementary classrooms and one middle school classroom with a total of 16 deaf students over 21 days. The findings showed that students made significant gains in writing specifically in higher order skills, which the author classified as attending more to primary traits of the text structure. Students also noticeably improved their ability to revise and edit pieces of writing including their own. For elementary students this included capitalization, spelling, and punctuation errors (Wolbers, 2019).

Lang and Albertini's (2001) research studied twelve science teachers across the science domains (i.e., earth science, physical science, general science, biology, & chemistry) for grades 6–through-11 and collected 228 writing samples from deaf students. This study focused on the use of writing in the context of action-oriented science classrooms using writing to learn strategies.

While this study focused on science learning and teacher variables rather than reading and writing, it did provide information on writing and learning of course content. It was noted that through the writing to learn strategies students' work illustrated their thinking process. Teachers were able to understand the students' thinking and guide them to make corrections leading to a better understanding of the content.

In 1999 Schirmer, Bailey, and Fitzgerald researched whether a writing assessment rubric could be used as an effective teaching tool with students who are d/Dhh between fifth-and-seventh grades. The students significantly improved their writing in four areas: topic, content, story development, and organization. However, they did not improve in five areas: text structure, voice/audience, word choice, sentence structures, and mechanics. While they did not improve in all areas, Schirmer, Bailey, and Fitzgerald (1999) noted that the rubric was equally effective at both grade levels. They stated that rubrics could be developed to reflect the writing levels of the students.

Schirmer, Bailey, and Fitzgerald (1999) noted that further research should be done by providing students opportunities to discuss their writing, and provide them with time to evaluate their products and note their progress or areas where improvement is needed. This study provided the opportunity for students to discuss their writing during peer and teacher conferences. Additional data were gathered from interviews to determine how students assessed their own writing.

METHODS

This study focused on the following research question: How do prelingually, profoundly deaf students assess their own writing abilities? Students discussed their writing during peer and teacher conferences conducted during the writing process. They had another opportunity to discuss their writing during interviews conducted in November, February and June.

The data source for this question came from individual pre, mid, and post-interviews conducted with a subset of junior and senior high school students to examine how they assessed their own writing abilities. These students were drawn from the classes of four language arts teachers. The teachers included the five stages in the writing process: (a) pre-writing, (b) drafting, (c) revising, (d) editing and (e) publishing to teach writing. They also used peer conferences and teacher conferences where students had an opportunity to discuss their writing. The teachers also used the DSER (Appendix B) for students to independently self-edit their writing. Students were interviewed by the researcher to determine how they assessed their own writing abilities.

Participants: There were two levels of participation in this study. Level 1 participants were fifteen students drawn from prelingually profoundly deaf students at the junior-senior high school ranging in age from 14-to-18. These fifteen students were born deaf, with a hearing loss of 90 decibels or more, and used ASL as their first language.

According to a survey completed by their parents all participants began acquiring ASL between birth and two years therefore it is considered their first language. In addition, they had no other disabilities that could impact their academic performance. The parents of these students ranged from deaf-to-hearing. All the deaf parents signed in ASL. All hearing parents began learning ASL since their child was a baby and at least one member of the family unit signed fluently. Level 1 participants were given the rubric to use during the writing process.

A Level 2 group was formed by selecting eight students from the Level 1 group. These students were selected on the basis of their attendance. Their teachers also recommended them based on them being key informants during the interview process. These students were interviewed in November, February, and June. The researcher examined the interview transcripts of eight students and analyzed how they assessed their writing abilities. Student responses were summarized in Appendix A. Actual excerpts from the interviews have been added to highlight the evidence of metacognition in these students responses.

Data Source: The researcher interviewed eight Level 2 participants in November, February, and June. Questions for the interview were drawn from an interview protocol (Appendix C).

Each of the participants were asked the same questions. The interviews were conducted in ASL and were videotaped to maintain response accuracy. Since all these students were residential students, the videotaped interviews took place after school during study hour. The researcher transcribed all interviews into English. After the transcriptions were complete, a native ASL user verified the accuracy of the transcriptions by reviewing interview recordings and the transcriptions.

Data Analysis: The researcher used Glaser and Strauss's (1967) grounded theory approach to analyze students' interview responses. Open coding was used to group responses in emergent categories. At the end of each interview cycle, the response to a question was analyzed and major concepts were recorded on index cards by using the naming technique. These categories were further analyzed, and emerging strands noted. Innovation configuration maps were used to record student responses in these emergent categories for each interview.

Limitations: The sample in this study consisted of 16 prelingually profoundly deaf students who used ASL. Since communication styles and the degree of deafness varies among all deaf students, this study cannot be generalized. For example, this study may not generalize to students who communicate using oral English or are categorized as hard of hearing. Another limitation was the inability to design a true experimental study with a control group because the study focused on this special population.

RESULTS

Flavell's Model of Cognitive Monitoring was used to analyze the interview data to determine evidence of metacognitive knowledge, metacognitive experiences and strategies (Flavell, 1979). Since there was only one student who mentioned a goal in the final interview, this category was not included. Appendix A includes a summary of students' responses during these three interviews.

Table 1: Response Frequencies in Fall, Winter, and Spring Showing evidence of Metacognitive Knowledge.

Frequency	Fall	Winter	Spring
Frequencies of Metacognitive Knowledge	Joe 6	Joe 3	Joe 4
	Alicia 1	Alicia 3	Alicia 7
	Stacy 2	Stacy 4	Stacy 4
	Andrew 4	Andrew 1	Andrew 2
	Robbie 2	Robbie 6	Robbie 7
	Randy 0	Randy 3	Randy 7
	Matt 1	Matt 2	Matt 4
	Alex 4	Alex 3	Alex 6

Table 1 presented an analysis of interview data indicating the occurrence of metacognitive knowledge. Interview data was analyzed to see if it revealed information about oneself or others as a writer. Data was also included if it reflected knowledge about the writing task or a specific strategy. Students were allocated one point for every response that indicated metacognitive knowledge. Five out of eight students' interview data showed an increase in the occurrence of metacognitive knowledge from the first interview to the third.

Interview responses revealed unexpected insights by the students into their own metacognitive knowledge. Earlier in the school year, students described their writing superficially, for example, as "being simple and containing many errors." However, subsequent interviews indicated an improvement in the depth and quality of the description of their writing. Students also began to use more technical language, for example, Randy described his writing as including better vocabulary choices and revisions.

An analysis of student responses during the first interview showed that students were brief and limited in the description of their writing ability. Although their responses indicated some knowledge of the structural features of writing (e.g., verb tense) they did not use technical language to describe their writing. One student, Stacy, described her writing ability by using basic phrases like "no paragraphs." Andrew, on the other hand initially described his writing as "being awful." He preferred the teacher telling him about his writing. Joe described his sentences as being simple and including many grammatical errors. Overall student responses in the first interview focused on structural aspects analogous to sentence construction, grammar and vocabulary.

Table 2: Response Frequencies in Fall, Winter, and Spring Showing evidence of Metacognitive Experience.

Frequency	Fall	Winter	Spring
Frequencies of Metacognitive Experience	Joe 0	Joe 1	Joe 1
	Alicia 2	Alicia 0	Alicia 4
	Stacy 1	Stacy 0	Stacy 3
	Andrew 0	Andrew 2	Andrew 2
	Robbie 0	Robbie 0	Robbie 1
	Randy 2	Randy 0	Randy 4
	Matt 2	Matt 1	Matt 0
	Alex 1	Alex 3	Alex 6

Table 2 included the frequencies of metacognitive experience in the interview responses of the participants. Interview responses that reflected a deeper level of thought were categorized as a metacognitive experience. Responses that indicated that students were able to compare and contrast their skill level were included in this component. A comparison between previous and current writing was also included in this category. Students received one point for every response that indicated metacognitive experience. Seven-out-of-eight students improved their score in this category by the final interview, Alex having improved his score by five. Joe, on the other hand only improved his score by one point. Matt, the only student whose score showed no improvement obtained two responses indicating metacognitive experience in the first interview and none in the final interview.

Students' responses indicated a conscious cognitive experience where they expressed difficulty in a certain aspect of writing. Andrew stated he had difficulty with paragraphs and adding details. Alex mentioned he experienced difficulty in sentence construction. Some students like Andrew declared that they "thought" about their writing. Students' responses over time also indicated that they were able to compare their current writing samples with their previous writing samples and note an improvement in their writing. For example, during the first interview, Alex stated that he could not write. In his final interview he stated that he had the ability to write. Similarly Stacy's responses also indicated an awareness of the changes in her writing. She mentioned using a "better style of writing".

Table 3: Response Frequencies in Fall, Winter, and Spring Showing evidence of Strategies.

Frequency	Fall	Winter	Spring
Frequencies of Strategies	Joe 0	Joe 0	Joe 1
	Alicia 1	Alicia 1	Alicia 1
	Stacy 1	Stacy 0	Stacy 1
	Andrew 0	Andrew 0	Andrew 1
	Robbie 1	Robbie 0	Robbie 1
	Randy 0	Randy 1	Randy 1
	Matt 0	Matt 1	Matt 1
	Alex 0	Alex 1	Alex 1

Interview responses were further analyzed to see if metacognitive experiences led students to use strategies and revise their work. Table 3 presented the interview data indicating the frequency of strategy use by the participants. Students received one point each time they mentioned using a strategy. An analysis of this category revealed that students mentioned one strategy during an interview. These strategies differed among interviews. During the first interview, Stacy stated that she began to change her writing from using ASL word order to English word order. However, in her final interview she talked about revising her own work. Five students out of eight students did not mention any strategies during the first interview and stated one strategy in the final interview. The remaining three students' responses indicated no increase in score from the first to the third interview. The students also mentioned specific strategies they used to improve their writing, like the ability to self-edit, revise their own work and incorporate language from the rubric. A review of the final interview transcripts indicated that all eight students interviewed reported being able to self-edit their work or make changes to their writing.

This data analysis provided information on how students assessed their own writing. It also included their thought process indicating evidence of the metacognitive knowledge, experiences and strategies. Students were able to take ownership of their writing and independently determined their strengths and areas they needed to improve on. This self-evaluation of their writing indicated a development of metacognition.

DISCUSSION

As discussed above, many deaf student face difficulties writing in English (Albertini & Schley, 2003; Marschark, Lang, & Albertini, 2002; McAnally, Rose, & Quigley, 1994). One of the reasons for this challenge is that the structure of ASL is different from the structure of English. In this study, students' interview responses were analyzed to find evidence of metacognitive processes. Interview data was analyzed using Flavell's Model of Cognitive Monitoring (Flavell, 1979) and any reference to metacognitive knowledge, metacognitive experience and strategies were noted.

The development of metacognition in deaf students related to their writing can be identified in their interview responses. Talking about their writing using their first language during interviews provided a scaffold for students to internalize knowledge about their writing. It also increased their ability to apply this knowledge to assess their own writing and thus improve their writing skills.

Over the course of three interviews during the year, students' assessment of their writing skills was initially negative and transitioned to a more positive perspective. Their use of technical language to describe writing features (e.g. verb tense, use of leads) also increased. Discussing their writing using their first language helped them to think about their writing and assess their ability. This interaction sharpened their metacognitive abilities. The students began strategizing and became more aware of where they were in their own writing development and how they could improve their writing.

All eight students reported self-editing at least once, and their comments provided evidence that talking about their writing helped them internalize knowledge about writing and applied this knowledge to assess and improve their own writing. In a typical response during the final interview, Stacy stated: "The rubric made my writing better because I got better at verb tense and it reminded me to change that and it helped a lot."

A development of ownership, control, and confidence related to their writing is seen in comments like: "knew about rules now" and "expanded writing". The fact that they discussed their writing during the interviews using their first language, ASL made them aware of the strategies they used. This process allowed them to develop a sense of ownership of their writing. For example, in his third interview, Robbie stated: "There's a change in my editing. You know before I had limited vocabulary, now different words, grammar, and sentences. It means the rubric helped me." Students also demonstrated a growing sense of pride in their writing. For example, Alex stated in his final response that he had the "ability to write a story book."

The fact that students said they thought about their writing reflects metacognition. Students also clearly articulated skills they acquired such as including the audience in their writing and that their writing was making sense. These responses indicate a purposeful analysis of their writing and the ability to evaluate their own writing. They also reflected metacognitive knowledge of themselves as writers and of their writing in relationship to others. There is also evidence of metacognitive

experience where students were able to evaluate their writing ability. These experiences in turn led them to select a strategy and actually revise and edit their writing.

IMPLICATIONS

The results of this study reveal the importance of using a bilingual approach to teach writing to deaf students. Students who have the opportunity to discuss their writing and the writing process using their first language, ASL, allows them to articulate the components of their own writing and grow in their knowledge of the aspects of their composition skills. Students are able to build on existing linguistic knowledge of their first language to improve their written performance of their second language. They also get a better understanding of their strengths and areas they need to improve on.

The results of this study have the potential to influence the instructional practices of educators of deaf students. The use of interviews during the study revealed the importance of social interaction when talking about their writing. This potential for interaction emphasizes the importance of using the writing process where peer conferences and teacher conferences provide a platform for students to talk about their writing. These interactions allow students to talk and think about their writing, thus, promoting an awareness of their own writing process. A further analysis of the interviews indicated social interactions in their first language ASL helped students internalize the process of their writing and this led to self-assessment. During interviews, students reflected on their own strengths and areas they needed to improve on.

The use of a rubric in this study provided a scaffold for students to develop metacognition. Independent use of this rubric allowed students to analyze their perception about their writing. It also made them think about the skills they were developing as writers as well as determine areas they needed to improve on. Finally, use of the rubric led students to self-edit their work and select strategies to improve their writing.

CONCLUSION

As noted above, writing is a challenge for deaf students (Albertini & Schley, 2003; Marschark, Lang, & Albertini, 2002; McAnally, Rose, & Quigley, 1994). This study explored how deaf students assessed their own writing ability. An analysis of interview data demonstrated evidence of metacognitive knowledge, experience, and how this led to deaf students' using specific strategies to revise their writing. Writing instruction by using the writing process allowed students to interact with others and discuss their writing.

In this study, the students had the opportunity to discuss their writing during peer and teacher conferences using ASL, their first language. They were also able to reflect on their writing ability during interviews conducted in ASL. The participants in this study used a rubric, DSER to self-edit their work. The use of the rubric provided a scaffold to internalize aspects of English writing and make changes to their own writing. This process helped students develop metacognition in writing.

Although many studies explored the concept of metacognition among hearing students (see Sitko, 1998), fewer studies have involved deaf students (Marschark, Lang, & Albertini, 2002). These studies were related to metacognition in reading (Strassman, 1997) and not writing. Further, the process of metacognition developed students' ownership of their writing and this led to them becoming more involved in their own growth and eventually employ strategies to revise their writing. Thinking about their writing also helped them identify areas of strength and areas that needed improvement. This study suggests that ASL can be used to facilitate the development of metacognition in the writing of deaf students.

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