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Recommended Citation

Marschark, M., Sapere, P., Convertino, C., Seewagen, R. (2005). In Marschark, M., Peterson, R., & Winston, E.A., (Eds.), *Interpreting and interpreter education: Directions for research and practice*. New York: Oxford University Press.

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Educational Interpreting: Access and Outcomes

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To appear in Marschark, M., Peterson, R., & Winston, E.A., Editors (in press). *Interpreting and interpreter education: Directions for research and practice*. New York: Oxford University Press.

Educational Interpreting: Access and Outcomes

In his review of the history of deaf education, Lang (2003) noted that despite the efforts of scholars and researchers, the field remains plagued by false assumption and ill-founded attitudes. “This is especially true,” he claimed, “with regard to the issue of language and its relationship to academic achievement ... [where] misconceptions, as well as insufficient bridging of research and practice, have thwarted efforts to effectively teach language and academic content to deaf children” (p. 9). While the forgoing may be obvious with regard to school placement of deaf students and the modes of communication used in academic settings, in this chapter we suggest that a similar situation has emerged with regard to educational interpreting. Whether through “misconceptions” or simply a lack of relevant research, the assumption that mainstream education – supported by sign language interpreting – can provide deaf students with fair and appropriate public education may be unfounded.

The need for educational interpreting is greater today than ever before, as mainstream academic placement has become the primary means of educating deaf students. In the United States, for example, a requirement in Public Law 94-142 (1975) requiring education in the “least restrictive environment” for all handicapped children has resulted in over 75% of deaf children now being educated in local public schools with hearing classmates. Yet, there is a well-documented shortage of qualified interpreters (Baily & Straub, 1992; Jones, Clark, & Stoltz, 1997), and the headlong rush to mainstreaming has been based more on perceived cost savings than the educational needs of deaf children or our ability to provide them with full access in academic settings (see Easterbrooks, Lytle, Sheets, & Crook, 2004, for the legal consequences of such shortcomings).

The basis for PL 94-142 – and the continuing popularity of mainstream placements for deaf children – lies in the belief that we are able to educate deaf children (and others with special needs) in that environment as well as or better than in special settings. Whether or not there are existing data for that position (see Karchmer & Mitchell, 2003; Stinson & Kluwin, 2003), educating deaf children in regular public school classrooms involves two fundamental assumptions that are in need of empirical evaluation. One is that the structure of information

communicated by a hearing teacher for a hearing class is commensurate with the knowledge structure and learning styles of deaf students. If deaf students “learn differently” than hearing students, then they may be at a serious academic disadvantage in mainstream classrooms compared to settings designed to account for those special needs. This assumes, of course, that we have identified such differences and developed methods to incorporate them into teaching methods (see Marschark, Lang, & Albertini, 2002; Ramsey, 1997 for discussion of the broader educational issues).

The second assumption underlying mainstream education is that for those students who depend on signed communication, a skilled sign language interpreter will provide them with access to classroom communication roughly equivalent to that of their hearing peers.¹ Yet, despite an increasing research literature concerning sign language interpreting, remarkably little is known about how much of an interpreted message is actually understood by deaf students in the classroom – or deaf individuals in any setting, for that matter (Harrington, 2000; Napier, this volume). As the various chapters in this volume reveal, a number of studies have documented some of the processes thought to underlie effective interpreting and, to a lesser extent, means of teaching and evaluating interpreting skills (see also Monikowski & Winston, 2003). Few investigators, however, have considered explicitly the contributions of student characteristics (e.g., communication preferences, content knowledge, educational level), interpreter characteristics (e.g., education, content knowledge, familiarity with students), instructor characteristics (e.g., experience with deaf students and sign language, use of visual materials) or settings (e.g., social, educational, technical). To what extent do these factors actually influence comprehension of interpreting? Do they only affect the comfort of students, teachers, and interpreters?

Both in mainstream settings and in educational programs designed for deaf children that make use of educational interpreting in various situations, there is a tacit assumption that providing those students with interpreting for lectures and classroom discussion gives them learning opportunities comparable to those of hearing students. Yet, there is almost a complete lack of knowledge concerning how variables like those noted above might influence learning by students of different ages/grade levels or different class contents. These questions are not new

(Harrington, 2000; Jacobs, 1977; Redden, Davis, & Brown, 1978; Stewart & Kluwin, 1996), but surprisingly little progress has been made.

Understanding Classroom Interpreting

Questions concerning the effectiveness of educational interpreting need to consider the interpreter and the student as well as the instructor and the setting (Ramsey, 1997). On the interpreter side, Schick, Williams, and Bolster (1999) suggested that educational interpreting is unlikely to provide deaf students with full access to instruction. They evaluated interpreters' skills in K-12 educational settings, using videotaped samples of expressive production of classroom content and receptive performance from a standardized interview with a deaf student. Assessments took into account factors such as students' grade levels and modes of communication. Schick et al. found that less than half of the 59 interpreters they evaluated performed at a level considered minimally acceptable for educational interpreting. They concluded that many deaf children are denied access to classroom communication because of the skills of their interpreters.

Johnson (1991) investigated challenges faced by deaf students and interpreters in the classroom, reflecting the interactions of all of the contributing factors noted above. She videotaped graduate level, interpreted classes and described several situations in which even when interpreters understood the instructors' message, communication breakdowns occurred. Of particular difficulty were situations in which classes involved material that was unfamiliar to students and interpreters and those in which diagrams and ambiguous descriptions of visual-spatial scenes were involved. Beyond the issue of divided attention between visual materials and the interpreter (considered below), Johnson noted that communication via sign language requires visual-spatial detail not required in spoken communication. In interpreting the description of a house built on a platform, for example, an interpreter was seen to establish characteristics of the platform, the house, and other details, some of which conflicted with later information. Not only was the student confused as to the description, but attempts at repair (when the student was unaware that they were repairs) only increased confusion. Further, assumptions on the part of instructors, hearing classmates, and interpreters about what deaf students saw and understood

resulted in miscommunications due to the asynchronous nature of “simultaneous interpreting.”

Research on students’ classroom comprehension of interpreting has most frequently evaluated the use of natural sign languages versus vernacular-based sign systems (e.g., American Sign Language [ASL], British Sign Language [BSL], and Australian Sign Language [Auslan] versus English-based sign or sign-supported English), that is, use of interpreting versus transliteration.² Although there is some variability in the literature, and in some cases definitions are left to the imaginations of readers, *interpreting* and *transliteration* are used here rather specifically. Following descriptions used by Frishberg (1986), the Registry of Interpreters for the Deaf (<http://www.rid.org/expl.html>, accessed 21 January 2004), and others, *interpreting* here refers to the immediate transmission of productions in ASL or other natural signed languages through the spoken vernacular (“sign-to-voice”) and from the spoken vernacular into the corresponding natural sign language (“voice-to-sign”). *Transliteration* refers to the transmission of a spoken language into a vernacular-based sign system (e.g., English-based sign), retaining features of the spoken vernacular but strongly influenced by the natural sign vernacular, and the reverse. Unless otherwise indicated, our use of these terms assumes they are of high-quality in terms of clarity and accuracy, as determined by appropriate methodologies. This is not to say that they always are, only that we will assume for the sake of discussion that they are produced by qualified and skilled interpreters.

One of the first studies to compare interpreting and transliteration was Fleischer (1975), who found that deaf high school students comprehended more of a lecture communicated via interpreting than by transliteration. Although information on the students’ sign language skills was not reported, Fleischer suggested that students’ language fluencies might interact with mode of communication. However, Murphy and Fleischer (1977) replicated Fleischer’s (1975) study, comparing interpreting and transliteration with groups of deaf students who reported preferring one mode or the other and found no differences in comprehension due either to mode of communication, communication preference, or their interaction.

Livingston, Singer, and Abramson (1994) further explored interpreting and transliteration and the mode-match issue. In that study, college students were designated as “oriented toward ASL or English-like signing” by deaf adults working with the investigators. Looking ahead, it is

noteworthy that comprehension scores were quite variable, ranging from 50 to 74 percent, with an overall mean score of only 62 percent. More importantly to Livingston et al., however, was the finding that of the students who had seen an interpreted lecture, those designated as ASL-oriented scored significantly higher overall than students designated as oriented toward English-like signing. There was no advantage of transliteration for students in the latter group, however, and when a narrative presentation rather than a lecture was interpreted, neither comparison was reliable. These results indicate that ASL interpreting is not necessarily (or generally) better for classroom communication than transliteration, nor is the matter one of simply matching the mode of interpreting to student language skills.

Marschark, Sapere, Convertino, Seewagen, and Maltzen (2004) explored the issue of interpreting versus transliteration in greater depth. In three experiments, deaf college students saw lectures accompanied by either interpreting or transliteration. In two experiments, the groups were mixed with regard to whether students were more skilled in and preferred ASL or English-based signing, as determined by a questionnaire following the experiment and by information available from university databases. Regardless of whether students received written comprehension tests (Experiment 1) or interpreting-congruent signed tests (Experiment 2), there was no effect of mode of interpreting nor any interaction with student skills/preferences.³ A third experiment that involved a priori (congruent and incongruent) student assignment to interpreting or transliteration conditions also failed to find any overall effect of the mode of interpreting or any interaction with student skills/preferences. These null findings have now been replicated in another, larger study (Marschark, Sapere, Convertino, & Seewagen, in preparation), and we have considerable confidence in their validity and reliability. Further, our findings that deaf students were comprehending only 60-75% of interpreted lectures (compared to 85-90% by hearing peers) is consistent with the averages reported by Livingston et al. (1994) and Jacobs (1977), also with deaf college students and multiple-choice comprehension tests.

Two other aspects of the Marschark et al. (2004) study are important here. First, regression and other analyses of student demographic characteristics found that comprehension of lectures was not related to reading levels, degree or age of onset of hearing losses, parental hearing status, use of assistive listening devices, registration in baccalaureate or pre-

baccalaureate programs, or the age at which sign language was learned. This result could reflect either the complexity of student-interpreter-setting interactions or the large variability in the language and educational histories of most deaf students. Alternatively, the effects of interpreting versus transliteration may be more subtle than can be discerned on the basis of a comprehension test following a single lecture. It is also likely that some individual deaf students might benefit more from interpreting or transliteration either across settings or in particular contexts, even if such relations do not hold at the group level. This possibility is of particular interest to interpreters and interpreter trainers. After all, why put so much time and effort into providing both ASL and English-based interpreting services if it makes little difference to comprehension? In large measure, this should be considered a rhetorical question, but it is also one that will take on greater importance if further investigation indicates that the same findings are obtained with regard to learning in more extended investigations or in K-12 and community settings.⁴

The second important aspect of the Marschark et al. findings concerns the extent to which deaf students (or other consumers of interpreting services) are aware of how various factors influence their comprehension. Marschark et al. (2004, Experiment 3) found that when students were asked to predict their performance on comprehension tests following interpreted lectures, hearing students' predictions were reliably correlated with their actual test scores, while those of deaf students were not. This manipulation followed observations in earlier experiments that deaf students were extremely confident of 100% (or close) correct performance on such tests, only to score closer to 60 percent on average. One possibility is that the students understood the content of the interpreted lecture, but were less able than hearing peers to accurately judge their performance on the comprehension test. A re-analysis of data available from the study by Marschark et al. (in preparation), however, revealed no relation between students' actual test scores and their ratings of either their comprehension or the quality of the interpreter.

Without any evidence to the contrary, it thus appears that the deaf college students generally may be less aware than hearing peers of how much of classroom lectures they understand (see Johnson, 1991; Napier & Barker, 2004). It remains unclear whether such findings indicate that they simply do not understand interpreting as well as we (and they) assume they do, or that they do not apply or have metacognitive skills to monitor ongoing

comprehension. Although other possibilities are considered below, these two alternatives are intertwined in such a way that if one is true, both are likely true. They therefore warrant a bit of elaboration.

On Knowing What We Know and What We Understand – or Not

A central component of learning for any student involves recognition of when comprehension is successful and when it is not. The role of *metacognition* in the comprehension of sign language interpreting has not yet received significant attention. Seal (1998, pp. 117-119) noted that interpreting at the secondary school level might serve as a catalyst for metacognitive and metalinguistic processing by deaf students and discussed the need for such processing by interpreters in order to improve their own performance. Metacognition also has been recognized as important in reading and academic performance for both deaf students (Strassman, 1997) and hearing students (Kruger & Dunning, 1999; Sinkavich, 1995). The general finding in this area clearly indicates that “the rich get richer and the poor get poorer.” Students who know more are better able to distinguish what is known and what is new and, if anything, tend to underestimate their performance. Students who know less tend not to realize how much they do not know/comprehend and thus tend to overestimate their performance (Kruger & Dunning, 1999). In metacognition studies with hearing students, however, it can be assumed that the participants are all English fluent. With deaf students, we have to figure out how much of their overestimations are specific to sign language interpreting, the result of less content knowledge, or the product of lower facility in their sign language skills.

Because most deaf students grow up with variable language and education experiences, perhaps it should not be surprising that they are unable to judge accurately whether and how much they comprehend of classroom content (Johnson, 1991). In particular, given the reports of poor interpreting quality in K-12 settings (Jones et al., 1995; LaBue, 1995; Schick et al., 1999) and the likelihood that instructors are unaware of deaf students’ level of access to classroom communication (Ramsey, 1997), students who encounter more skilled interpreters in a post-secondary classroom might understandably be delighted at their increased levels of understanding and participation. At that juncture, another aspect of metacognition in the

classroom becomes important. While some students recognize gaps in their comprehension and attempt to compensate through reading and meetings with tutors or instructors, others are either unaware of their comprehension failures or simply accept them as normal (see Napier & Barker, 2004). Moreover, reading comprehension is well-recognized as being problematic for deaf students, and individual tutoring or advising without effective communication only perpetuates the information-impooverished situation (Harrington, 2000; Lang, Biser, Mousley, Orlando, Porter, 2004), so the remedial value of these alternatives remains in question.⁵

Another factor affecting comprehension in the classroom is students' prior knowledge, both about course-related content and more general world knowledge.⁶ In a series of experiments involving hearing students, Rawson and Kintsch (2002) demonstrated that the role of background information on memory for textual materials lies in its facilitating the organization of new information through existing category superordinates and other semantic links. Rawson and Kintsch noted that "To the extent that organizational superordinates are not developed until further into study trials, fewer opportunities to link content to those superordinates would be available" (pp. 774-775; see also, Mayer, 1983). Studies by McEvoy, Marschark, and Nelson (1999) and Marschark, Convertino, McEvoy, and Masteller (2004) demonstrated that such conceptual linkages in the mental lexicon are far more variable across deaf college students than hearing peers, as reflected qualitatively and quantitatively in tasks involving single words. Thus, it is likely that prior knowledge is less effectively applied by deaf than hearing students in contexts such as reading and interpreting (Jelinek Lewis & Jackson, 2001; Oakhill & Cain, 2000).

Taken together, the above findings suggest that deaf students may be at a relative disadvantage in a classroom where information is structured by a hearing instructor for hearing students, while at the same time instructors and interpreters would find it more difficult to "tune" instruction to match several deaf students in the same classroom. The findings also suggest that differences observed between deaf and hearing students understanding of classroom content might be independent of the nature and quality of educational interpreting, but due to inappropriate comprehension/learning strategies or failure to apply content knowledge (see also Lang, 2002; Marschark et al., 2002; Richardson, MacLeod-Gallinger, McKee, & Long, 1999).

Marschark, Sapere et al. (2004, Experiment 3) therefore statistically controlled for the effects of prior knowledge using scores from pretests corresponding to each lecture. Deaf students scored significantly lower than hearing students on the pretest and still scored lower on the comprehension test when the effects of prior knowledge were removed. It is possible that controlling for prior knowledge via content-specific pretests is not sufficiently sensitive to demonstrate its effects, but it appears more likely that the application of content knowledge is only one of several factors affecting comprehension of sign language interpreting. Student sign language skill might be expected to predict understanding of interpreting, for example, but it also will interact with interpreter skill and the setting (e.g., Johnson, 1991), making any simple causal relations unlikely.

In this regard, recall that Marschark, Sapere et al. (2004) found no significant relation between deaf students' comprehension scores and their sign/spoken skills. Many of those students, however, had gained their sign skills in a college environment where there is considerable social pressure to use sign language (Kersting, 1997) and thus may have lesser sign fluencies. Might those students who had appropriate language tools at their disposal throughout development demonstrate the expected language advantage?⁷ Evaluation of that suggestion is possible by re-examining data from Marschark, Sapere et al. Experiment 3, where 17 students reported learning to sign from birth and 31 reported learning it later. Overall, students who reported starting to learn sign at one year of age or before obtained significantly higher scores on the comprehension test than the later signers (81% vs. 73%), although they still scored significantly lower than the hearing students (89%) (see Mayberry & Eichen, 1991, concerning the long-term benefits of early sign language acquisition). A similar analysis was conducted using the data from the Marschark et al. (in preparation) study, in which students saw two different lectures. Using comprehension test scores on two content-knowledge pretests and both comprehension tests, no differences were observed between the comprehension of 23 students who had two deaf parents and 60 others who had either one or no deaf parents. The same result was obtained if a criterion of one rather than two deaf parents was employed.

Summarizing the results described in this section, it appears that both prior content knowledge and sign language skill affect deaf students' understanding of interpreting in the

classroom, but neither is sufficient to explain their poorer comprehension relative to hearing peers. Deaf students in the studies reviewed thus far comprehended only about 85% of what was understood or recalled by hearing students. Although growing up with ASL may enhance comprehension, even those students who had deaf parents did not comprehend as much of an interpreted lecture as their hearing peers did. We cannot continue to deal with various aspects of deaf students' educations as though they were independent. Rather, we have to examine possible interactions among characteristics of students, interpreters, instructors, and settings. Let us therefore consider further the language and learning tools that deaf students bring to the classroom setting and the degree to which those tools put them in a position to benefit from an interpreted education.

Cognition, Learning, and Comprehension of Interpreting

Schick (in press) argued that successful educational interpreting requires an understanding of deaf children's cognitive development (see also, Detterman & Thompson, 1997; Marschark & Lukomski, 2001; Marschark et al., 2002). Schick emphasized the importance of a deaf child's developing theory of mind, peer socialization, and various other pragmatic language interactions as essential for their acquisition of the skills necessary to benefit from interpreting. She acknowledged the likely interaction of these processes, as deaf children may not have the skills necessary to benefit from interpreting in the classroom, a barrier which in turn affects their learning of additional academic skills. Consistent with the arguments of Marschark et al. (2002), Schick suggested that "The deaf child may need interaction and teaching that is more fine-tuned to their level of skills and understanding" (draft p. 21), a rare occurrence in classrooms where an interpreter serves primarily as a conduit for instruction designed for hearing children. The question here is how educational interpreters should deal with this issue – or whether they should.⁸ In either case, they have to be aware of it.

Given the interactions of experience, language development, and cognitive development, consideration of the cognitive processes involved in sign language interpreting must take into account the nature of the to-be-processed material and its mental representation as well as individual characteristics and experience. Deaf children, for example, have been shown to have

more difficulty processing and retaining sequentially-presented information relative to both simultaneously-presented material (e.g., Todman & Seedhouse, 1994) and spatially-related information (O'Connor & Hermelin, 1972). Spoken language appears to confer an advantage in retention of sequential information, even among deaf people (Burkholder & Pisoni, in press; Lichtenstein, 1998; see Marschark, 2003 for a review). Let us consider two related domains in more detail.

Visuospatial Considerations for Educational Interpreting

Lack of hearing early in life has significant impact on the development of the nervous system and organization of function within the brain. Tharpe, Ashmead, and Rothpletz (2002) accordingly proposed stronger or weaker forms of a *sensory compensation hypotheses* by which, because deaf individuals lack hearing, they should be particularly adept in the visual domain. Adherents of such a position would argue that the visual advantage among deaf individuals would increase over time and visual experience. In general, however, there is no overall enhancement of vision, visual perception, or visuospatial processing skills in deaf individuals (see Emmorey, 2002, Ch. 8, Marschark, 2003, for reviews). Nonetheless, vision is the primary modality for learning by deaf students, and it is incumbent on us to determine how the characteristics of visuospatial cognition among deaf individuals would affect learning via interpreting. For example, deaf adults who use sign language show relatively better performance in some aspects of visual perception relative to both hearing individuals and deaf individuals who use spoken language: the ability to rapidly shift visual attention or scan visual stimuli (Corina, Kritchevsky, & Bellugi, 1992; Rettenback, Diller, & Sireteanu, 1999), visual detection of both motion (Neville & Lawson, 1987) and sign language (Swisher, 1993) in the periphery, and face recognition (Bellugi et al., 1990). Although there do not appear to be any studies indicating that deaf individuals have lesser visual attention skills than hearing individuals, it would not be surprising to find that deaf individuals suffer more from eye fatigue and relax their visual attention (i.e., reduce vigilance) more often. Alternatively, because hearing individuals can utilize their hearing, they may take advantage of redundancy in visual and auditory messages but be less visually vigilant than deaf individuals.

The development of visual attention skills is enhanced by environments rich in stimulation and connections between different sense modalities. While sound appears to contribute to some aspects of (visual) perceptual and cognitive development (Burkholder & Pisoni, in press; Quittner et al. 1994; Smith, Quittner, Osberger, & Miyamoto, 1998; Tharpe et al., 2002), signed communication does too. Emmorey and her colleagues, for example, have shown that skilled signers are faster in generating and manipulating mental images than either later (deaf or hearing) signers or hearing non-signers (Emmorey, Klima, & Hickok, 1998; Emmorey, Kosslyn, & Bellugi, 1993; Emmorey & Kosslyn, 1996; see also Talbot & Haude, 1993). Visuospatial skills of this sort might be utilized in the multi-faceted visual environment of the classroom, enhancing access to information by deaf students who sign by allowing them to more readily perceive, process, and retain visual information from different sources.

Cognitive Considerations for Educational Interpreting

Related to the issue of how deaf students coordinate multiple sources of visual information is the question of how they deal with relations among visual displays, course materials encountered outside of the classroom, and instructors'/interpreters' productions in the classroom. That is, deaf and hearing individuals appear to make differential use of relational versus individual-item information. Ottem (1980) reviewed over 50 studies involving various kinds of memory, learning, and problem solving tasks and found that when tasks involved only a single stimulus dimension, deaf individuals usually performed comparably to hearing individuals. When a task required simultaneous attention to two or more dimensions, the performance of hearing individuals usually surpassed that of their deaf peers.

Most likely a result of early educational experiences, many deaf individuals appear to focus on individual items or events within a context, rather than to relations among items, an orientation shown to affect performance in a variety of cognitive tasks (e.g., Marschark, 2003; Richardson et al., 1999). Banks, Gray, and Fyfe (1990), for example, found that although deaf and hearing students recalled equal amounts of read text, the deaf students tended to remember disjointed parts rather than whole idea units. This result also was obtained when the stories were signed in BSL rather than printed, indicating that it was not solely a consequence of reading

difficulties or a lag in the development of reading skills. Such findings suggest that, at least in some contexts, deaf students are less likely than hearing peers to attend to or recognize relational information. Interpreters may be implicitly aware of this situation and adjust accordingly, for example, describing the location, shape, and function of part of a building (Johnson, 1991). Analyzing the productions of interpreters relative to what an instructor says thus might reveal that various relations and inferences are supplied, even if they were not stated explicitly. Such provision might occur more often during interpreting rather than transliteration, because interpreters often feel they have more flexibility in the former, not being as closely tied to the literal production of the speaker (Frishberg, 1986). However, understanding which inferences are relevant (or necessary), which are intended by the teacher, and which are likely to be drawn by the deaf student without assistance presents a challenge even when the interpreter is familiar with both the content and the student. At present, it is unclear how interpreters are to decide on the correctness and helpfulness of their elaborations – or whether they are even aware of them. Anecdotal reports from a number of educational interpreters suggest that they see such activity as an important part of their roles, as deaf students often do not seem to make those connections themselves.⁹ In the short-term, one would expect that providing information beyond that given by an instructor (or other speaker) would facilitate comprehension, perhaps even giving them an advantage relative to hearing classmates. In the longer-term, however, providing relational/inferential links for deaf students may discourage them from doing so themselves in other settings or perhaps even being aware that such links are helpful.

Marschark (in press) argued that such narrow approaches to learning on the part of deaf students likely would be the consequence of the limited language interactions among deaf children and their hearing parents, lower expectations and less consistency in classrooms with hearing teachers, and lesser quality in K-12 interpreting. Nonetheless, the behaviors of well-meaning interpreters might also be an important contributor in that regard. If sign language interpreters supply such inferences and relations explicitly, deaf students still have to learn to engage in such higher-order processing on their own (Bebko, 1998). An interpreting strategy of this sort also may pre-empt the instructional strategies of teachers who set up situations that explicitly require students to go beyond the information given, thus fostering problem solving

and learning skills. Ultimately, both the frequency of such strategies by interpreters and their positive or negative consequences are empirical questions, precisely the kind of questions that we should be asking about the impact of interpreting on teaching and learning.

Convergence of Visuospatial and Cognitive Considerations in Educational Interpreting

One more issue is in need of consideration in the context of ways that deaf students' visual and cognitive abilities might influence learning via interpreting. The increasing use of multimedia tools in academic settings has been bolstered by research demonstrating the utility of combining verbal and visual information (e.g., Gellevij, van der Meij, Jong, & Pieters, 2002; Paivio, 1986; Tiene, 2000). But research has not yet adequately addressed the fact that deaf students are unable to simultaneously attend to both visual displays and sign language in the classroom. The enhanced peripheral vision and speeded visual attention shifts by deaf students who are skilled signers may offset this challenge, but the pairing of interpreting and visual instructional technologies appears likely to create a barrier to deaf students' full participation in the classroom.

Matthews and Reich (1993) argued that deaf students' relatively poor academic performance could be explained in part by the visual demands of classroom communication. They examined communication in high school classes at a school for the deaf, a setting in which one would presume that both teachers and students would be particularly sensitive to communication needs. Analyzing sign production and gaze direction from videotaped segments of classes, however, Matthews and Reich found that when they were signing, teachers were being looked at by students an average of only 44% of the time, and students were looked at by their peers only 30% of the time. Students who were specific targets of a production by a teacher visually attended to the teacher only about 50% of the time. Matthews and Reich thus concluded that "Even with well-trained teachers and relatively sophisticated students, the level of possible reception of transmitted messages is disappointingly low, somewhat below 50%" (p. 16).

In a second relevant study, Siple, Steve, Convertino, Sapere, Seewagen, and Marschark (in preparation) examined the information available to deaf students during an interpreted class in which an instructor used a projected computer display to teach a software package. Detailed

analyses included relations among the instructor's use of the display, the interpreter's behavior, and student attention. Most obviously, on-going descriptions frequently did not re-state what happened on the screen, but explained actions, directed attention, or provided supplementary information (e.g., "So we click on this and drag it over here...you can [selecting from menu] change its appearance..."). Attending to the interpreter thus often meant that deaf students would miss other information. At the same time, attending to the screen could result in missing both the explanation of a demonstration and supplementary information from the instructor.

Siple et al. examined the instructor's spoken language in terms of his computer demonstrations, revealing that if deaf students had watched the interpreter only, they would have missed almost half of the information contained in the demonstration. Similarly the relation of demonstrated actions to the instructor's spoken production was such that if students were watching the screen only, they would have missed approximately half of the information communicated by the instructor. Finally, because students could not watch both the interpreter and the screen at the same time, Siple et al. examined the amount of information accessible via one source or the other, taking into account what the interpreter heard from the instructor (some actions were not accompanied by speech), what the interpreter produced, and whether or not students appeared to be looking at the interpreter or the screen. Overall, that analysis indicated that, indeed, the deaf students would have had the opportunity to receive only about half of what was available to hearing peers.

Consistent with earlier findings (e.g., Johnson, 1991), the Siple et al. results indicate the need to better understand the interactions of students, interpreters, and settings if mainstream education is to be successful. While research on such issues is continuing, it is clear that learning via sign language interpreting adds another layer to the interplay of cognitive, linguistic, and situational factors in teaching and learning. Further, adding to this complexity is consideration of deaf students' communication preferences.

What Do Deaf Students Want?

Jagger and Richard (1967) noted that while people cannot always get what they want, they sometimes get what they need. In part, investigations like those of Livingston et al. (1994)

and Marschark, Sapere et al. (2004) reflect a frequent assumption in interpreting that deaf clients should get the former (what they want) regardless of what they need. At the same time, skilled interpreters working in educational settings claim (confidentially, of course) that many deaf students who request ASL in the classroom have little notion of what it really is and do not understand it. Despite the fact that our work has consistently found that even those students who prefer English-based signing and claim not to be skilled in ASL understand ASL interpreting just as well as transliteration, there are larger issues involved. We will not deal here with the ethical questions surrounding the responsibilities of interpreters to give students what they want by way of interpreting. Instead, we will focus on the issue of the extent to which interpreting can provide deaf students access to academic settings.

Surprisingly, the relative value of direct instruction versus interpreted (or mediated) instruction has not been considered in any depth, although the matter clearly depends on both the content knowledge and communication skills of students, interpreters, and instructors (Lang, McKee, & Conner, 1993). One aspect of this issue is the frequent assumption that deaf students prefer direct instruction to interpreted instruction, but there does not appear to be any empirical support for this belief. What about comprehension in interpreted and direct instruction mainstream classrooms? Quinsland and Long (1989) examined students' understanding of a college science lecture from either an instructor signing for himself (via simultaneous communication) or interpreters designated as "skilled" or "unskilled" based on their RID certification. Quinsland and Long found that students learned about twice as much with a skilled interpreter relative to an unskilled one, but there was no difference between direct instruction and instruction via a skilled interpreter. Test scores were comparable to those in the interpreting studies described above, with deaf students' scores about 84% of those obtained by hearing peers.

Use of simultaneous communication (SimCom) in the Quinsland and Long study might make it suspect, and the issue of SimCom versus natural sign language in the classroom is not at issue here. Nevertheless, Cokely (1990) also failed to find any comprehension differences when deaf college students saw lectures presented via SimCom, sign language alone, or interpretation, and there is apparently no published research to support the frequent claim of interpreters and

teachers of deaf students alike that interpreted education cannot be as beneficial as direct instruction. Although we have already noted that the relative benefits of the two modes of education will depend on instructor communication skills as well as student, interpreter, and setting characteristics, discussion surrounding the chapters of this volume indicate that we are far from agreement on this issue (see Gallimore et al., this volume).

Lacking any quantitative evidence for the benefits of direct instruction over interpreting or vice versa, there also is the question of what mode of interpreting students prefer in the classroom, what mode of interpreting interpreters think students prefer in the classroom, and what actually benefits the student more. Our results thus far suggest that, at least for individual lectures, interpreting and transliteration are equally effective, regardless of student preferences. So let us address the other two questions.

Napier and Parker (2004) conducted a qualitative study in which they examined deaf university students' preferences for "free interpretation" (primarily Auslan) versus "literal interpretation" (primarily transliteration). They found that students who preferred Auslan in social settings and some academic settings nevertheless wanted transliteration in more technical courses, so that they could acquire the same vocabulary as hearing peers. That consensus was consistent with Napier's (2002) finding that university-level interpreters routinely code-switch in order to provide deaf students with information necessary for their academic success.

Sapere, Marschark, and Convertino (in preparation) examined both deaf students' mode preferences for interpreting and interpreters' beliefs about those preferences. Over 400 deaf students attending Rochester Institute of Technology (RIT) chose whether they would prefer interpreting or transliteration (each of which was explained fully) in three different settings: social and co-curricular situations, liberal arts courses, or science and engineering courses. In addition, they completed a checklist for each situation containing 14 possible reasons for their preferences. Forty RIT interpreters completed the same survey, indicating what they thought the "typical RIT deaf student" would prefer in those settings and why. Consistent with interpreters' predictions, students reported preferring ASL to transliteration in social settings. However, the preference was not a large one, as ASL was preferred by only 51% of the students, while 93% of the interpreters predicted that a typical deaf student would prefer ASL. The interpreters were also

correct in predicting that students would prefer transliteration over interpreting in science and engineering courses, although again, students' 65% to 35% preference for transliteration was not as strong as expected by the interpreters, 80% of whom expected deaf students to prefer transliteration. The greatest differences were observed with regard to liberal arts courses, where 63% of students preferred to receive instruction through transliteration, while 73% of the interpreters predicted that they would prefer ASL interpreting. Students' reasons for choosing one kind of interpreting or another in different settings are somewhat complex (e.g., students who prefer transliteration in Liberal Arts courses were more likely to cite "better pacing" as a reason for their choice, whereas interpreters predicted that students would choose ASL for the same reason). Across comparisons, however, the important finding is that their reasons are quite different than those assumed by interpreters (see Sapere et al., for details, and Lang et al., 1993, for similar findings with regard to students' and teachers' perceptions of instruction preferences).

These findings leave us with a dilemma. It is clear that interpreters' expectations about the communication preferences of deaf students do not match those reported by the students themselves. At present, there is no evidence that student preference for interpreting is related to their actual comprehension or recall of interpreted material. Indeed, at least as judged by comprehension of individual lectures, deaf students understand just as much regardless of whether the mode of interpreting matches their preferences or not (Murphy & Fleischer, 1977; Livingston et al., 1994; Marschark, Sapere et al, 2004). So, is this just a matter of comfort (interpreter or student), or might preferences be more important over the term of an entire course than a single, brief lecture? At present, there is no way to know, but clearly the matter warrants further investigation. Why no one has addressed these issues is almost as interesting as the educational questions themselves.

When Students Prefer Not to Have Interpreters

Before leaving the issue of student preferences in educational settings, it is important to note the increasing numbers of students requesting online text presentation (e.g., captioning, CART, C-Print) as a means of gaining access to the classroom. This trend may reflect either an increasing pressure from hearing parents (and hearing peers) for deaf students to appear more

“hearing” in school settings or the shortage of skilled interpreters (Baily & Straub, 1992; Jones et al., 1995; Schick et al., 1999). Examination of recent data concerning deaf students’ literacy skills, however, reveals that they still read significantly below hearing peers (Traxler, 2000), and it is unclear whether they would be able to benefit any more from captioning than from sign language interpreting. Jelinek Lewis and Jackson (2001), for example, found that even when reading level was controlled, deaf students (in 4th, 5th, and 6th grades) comprehended less of a captioned video than hearing peers, apparently because “deaf students lag behind hearing students in their ability to generalize information or to use prior knowledge” (p. 49) (see also, Jackson, Paul, & Smith, 1997; Oakhill & Cain, 2000).

One early study in this area, by Stinson, Meath-Lang, and MacLeod (1981), compared deaf students’ comprehension of a lecture that was either interpreted or provided in printed form. They reported that students recalled significantly more information when the material was presented in print rather than interpreted. However, only 19% of the idea units was recalled from text, compared to 12% from interpreting, suggesting that neither mode of classroom communication was very effective. Further, without information concerning the reading or sign language skills of the students in the Stinson et al. study, it is difficult to know how those results should be interpreted. More recently, Everhart, Stinson, McKee, and Giles (1996) found that deaf students reported understanding significantly more in class when using C-Print rather than an interpreter, but the accuracy of those reports was not assessed (cf. Marschark, Sapere et al., 2004). Stinson, Kelly, Elliot, Colwell, Liu, and Stinson (2000) compared deaf students’ comprehension and memory for an interpreted introductory sociology lecture as compared to presenting the same information C-Print and failed to show any significant difference between conditions, although students who were better readers scored higher overall.

In short, while it remains unclear just how much sign language interpreting “levels the playing field” in educational settings, there are not yet any convincing data that the use of text materials in the classroom (e.g. via captioning) offers a more viable alternative. Indeed, just as some proponents of captioning argue that not all deaf students know sign language sufficiently well to benefit from interpreting, it is very clear that most deaf students do not read well enough to benefit from the typically fast pace of captioning (see Marschark, 2001, for discussion).

Importantly, however, both the studies mentioned in this section and those described above with regard to sign language interpreting have involved only single lectures, and the effects of these support services over an entire course or after multiple presentations on the same topic remain to be determined. These issues all clearly need to be addressed, taking into account the extent to which these alternatives actually mesh with students' knowledge, communication skills, and learning strategies.

Conclusions

The research described in this chapter emphasizes the need to better understand the complex personal and functional interactions of students, instructors, interpreters, and settings if educational interpreting – and interpreted education – is to be optimally beneficial for deaf students. We are sensitive to the fact that findings of the sort described here make an already difficult situation seem even more so. Ultimately, however, if some of the factors that have previously been assumed important turn out not to be, we may be able to significantly improve the effectiveness of educational interpreting without overwhelming the interpreter or shortchanging the student.

There is now convincing evidence that deaf students do not comprehend as much as their hearing peers in the classroom, even when provided with highly-qualified sign language interpreters in controlled settings where competing visual information is not at issue. Several analyses provided here have addressed the issue of whether such findings are specific to sign language interpreting or indicative of more general teaching-learning challenges in educating deaf students. The answer remains to be determined. Examination of deaf students' comprehension of interpreting indicates that they are not as accurate as hearing peers in assessing their own comprehension. Whether this result is specific to sign language interpreting is not entirely clear, but in any case a metacognitive gap of this sort would impede full understanding of ongoing communication in the classroom. One would expect that at least a partial resolution of this issue could be found by looking at how accurate deaf students are in predicting their reading comprehension (e.g., from captioning). Despite a variety of studies concerning

metacognition and reading in deaf students (see Strassman, 1997), however, this rather obvious question apparently has not been asked.

Much of the research described here has been conducted with deaf college students, and it has not yet been extended to community or K-12 settings. Overall levels of comprehension may be much the same, but deaf adults in the community may well show greater comprehension when the mode of interpreting (ASL versus English-based) is more commensurate with their preferences and reported skills. Although such differences have not been demonstrated in studies involving college students, deaf students involved in the research described here represent a relatively limited range of experimental participants. Yet, results thus far are consistent across students enrolled in two-year and four-year programs, different universities and methodologies, students who varied in their sign language exposure, and the content areas of material presented. Students who learned to sign earlier sometimes score higher on comprehension tests than peers who learned to sign later, but they still perform at levels below hearing peers.

If students' interpreting preferences are not related to improved understanding of interpreted lectures, the comprehension gap between them and their hearing peers may derive from several different sources. One possibility lies in their language skills per se. As over 95% of deaf students have hearing parents, it may well be that variable language exposure during childhood has left them with lesser language flexibility or language comprehension skills below those of hearing peers. Although there do not appear to have been any rigorous studies of comprehension via oral interpreting, cued speech, or speechreading in classroom settings, such investigations are clearly important and would be informative in several respects. If the observed comprehension challenges are specific to sign language interpreting, we should be able to work with interpreters and interpreter educators to alter interpreting methods and compensate in areas of documented (content or language) difficulty. If the comprehension challenges prove a product of general language fluencies, we expect interpreters and instructors to recognize that fact and address it as well as possible (hopefully together), student by student, in different settings.

Closely related to a general language comprehension barrier to interpreting success is the possibility that deaf students' conceptual knowledge, world knowledge, or information processing strategies differ from those of hearing students in ways that create barriers to

comprehension of interpreting (Marschark, 2003; Marschark, Convertino et al., 2004; McEvoy et al., 1999). In that case, it may be that the structure of information conveyed by an instructor will not match the cognitive structures of deaf students in the class¹⁰ or, perhaps less correctable, deaf students may lack sufficient background knowledge and vocabulary to grasp ongoing classroom lectures/discussions as rapidly as hearing peers. Many deaf students depend on other sources of educational support, such as tutors, text materials, and instructor time, to facilitate their academic success. Interpreters who are familiar with course content and their student clients might be able to provide additional support for them in mainstream settings where teachers are unfamiliar with the needs of deaf students (see Harrington, 2000; Johnson, 1991), although professional and practical considerations currently prevent their doing so. The distinction between the interpreting role and other possible roles makes good sense in a variety of community settings (see Cokely, this volume), but it may be less of a service to deaf individuals in educational settings.

Another possible reason why deaf students might learn less from interpreted lectures than hearing peers do from spoken lectures may lie in some basic differences between direct instruction and mediated instruction. There are a variety of intuitively appealing arguments for direct instruction for deaf students through some form of signed communication, and one obvious explanation of our findings is that interpreters simply can never really hope to duplicate the knowledge and nuances that a good instructor brings to a classroom lecture by virtue of teaching experience and content knowledge (i.e., that interpreting cannot duplicate its source).¹¹ Yet, there have not yet been any demonstrations that direct instruction is superior to interpreted instruction nor any evidence that deaf learners prefer it. Further, there is mounting evidence that deaf and hearing learners process information differently, have different content/conceptual knowledge, and different knowledge organization than hearing peers (and, presumably, hearing instructors). Hearing instructors with experience teaching deaf students and who sign for themselves in the classroom may well recognize those differences, implicitly or explicitly, and adjust for them. The fact that almost twice as many deaf students graduate from the National Technical Institute for the Deaf and Gallaudet University than other college programs could be taken as support for that argument (independent of the issue of sign language skill). Alternatively, it also may be that the difficulty of courses taken in those settings and/or the level

of instructors' expectations for those deaf students are somewhat different than are encountered in mainstream settings. In any case, if either instructors or interpreters were aware of differences between deaf and hearing learners and could modify instructional content accordingly, it seems likely that student comprehension and learning would improve. As yet, however, few instructors, interpreters, or interpreter educators seem willing to recognize such differences, let alone develop collaborative strategies for dealing with them.

Finally, regardless of the extent to which any of the preceding alternatives contribute to academic barriers for deaf students, the lack of research into interpreting and its outcomes surely is a significant factor in deaf students' challenges in academic settings. Much more research is needed, and it requires the support and participation of all stakeholders in the interpreting enterprise. As noted at the beginning of this chapter, whether due to the relative youth of the interpreting profession or the ambiguous role of interpreters, there are many important questions that have not been asked. Even where information has been obtained with regard to deaf learners, there has yet to be any concerted attempt to incorporate the relevant psychological and educational research into interpreter education. Some interpreters take relevant courses as part of their own professional development, but findings like those discussed in this chapter suggest that a course on deaf learners (or appropriate study materials) should be a requirement for any program that trains interpreters who work in educational settings and instructors who have deaf students in their classes. To do otherwise either accepts ignorance as acceptable or hides it behind a mask of political correctness. Both are equally detrimental to deaf children, depriving them of educational opportunities and squandering their potential.

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Authors' Notes

Preparation of this report and research reported herein was supported by grants REC-0207394 and REC-0307602 from the National Science Foundation. Any opinions, findings and conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation. We thank Harry Lang and Jemina Napier for comments on an earlier draft of the chapter.

Notes

1. Unless otherwise noted, references to interpreting situations throughout this chapter assume that the deaf individuals involved are fluent in the language involved and that the interpreting is of the highest-quality, even if the meanings of “quality,” “skill,” and “fluency” are open to debate. In practice, of course, neither of these assumptions necessarily holds. In research, it is therefore incumbent on the investigators either to select participants who meet these criteria or clearly indicate when they do not hold – political correctness notwithstanding.
2. Although most of the work in this regard has been done in English-speaking countries, “ASL” and “English” henceforth will be used generically to refer to natural sign languages and their vernacular-based variants. There may be some subtle variations across different spoken and signed languages with regard to the issues addressed in this chapter, but they are beyond the current goals and yet to be empirically discerned.
3. Note that because signed version of comprehension tests did not improve deaf students’ performance (Marschark, Sapere et al., 2004, Experiments 1 and 2), written tests were used in subsequent experiments.
4. There are also some fascinating cultural, epistemological, and developmental aspects to this matter, for example, if the lack of any interpreting/transliteration differences are the consequence of experience with relatively poor interpreting in K-12 settings. These issues are beyond the scope of the present discussion but clearly in need of investigation.
5. Instructors vary widely in their knowledge and skill in working with deaf students as well as their ability and willingness to make special accommodations for them. In a study conducted at RIT, we found that instructors in two academic units were perceived as less supportive of deaf students and less cooperative with interpreters. Deaf students taking courses in those two units

had the lowest grades of all units studied, although the causal relations in those findings remain unclear.

6. Prior content knowledge on the part of interpreters also might affect students' comprehension, a possibility currently under investigation.

7. In a similar fashion, Leybaert and her colleagues have found that young deaf children who are exposed to cued speech both at home and at school show significant improvement in their acquisition of French Sign Language, but exposure in only one setting or the other does not provide such marked benefits (Leybaert & Alegria, 2003).

8. In our view, interpreters are responsible for ensuring that teachers are made aware if students have apparent difficulty understanding communication in the classroom. Although some interpreters argue that such behaviors violate their role (see Dean & Pollard, this volume), they also complain that instructors place too much responsibility for communication on them. Clearly, this issue is in need of discussion and resolution.

9. Opinions on this issue do not appear to be a function of experience in the field, and study of educational interpreters' beliefs about what they are doing and why would be most informative.

10. The matching of cognitive structures here refers both to the situation where information from a hearing instructor matches the conceptual structure of hearing students but not deaf students (Marschark et al., 2004) and the situation in which the diverse learning strategies and variability in knowledge organization makes it difficult or impossible to accommodate several deaf students in a single class.

11. The possible issues of poor teaching, lack of support for the special needs of deaf students, and instructor resistance to sign language interpreters are not at issue here.