Teaching and Learning

Kelly, R. R., Lang, H. G., & Mousley, K. (2001, June) PROJECT SOLVE: Web-based guided practice to improve math word problem solving. Paper presented at the Instructional Technology and Education of the Deaf Symposium, Rochester, NY. [AN 1726] *

PROJECT SOLVE is a Web-based problem-solving project for deaf students supported by a grant from the Fund for the Improvement of Postsecondary Education (FIPSE), U.S. Department of Education. PROJECT SOLVE is developing a Web site that offers college and high school teachers a platform to provide deaf students independent assignments for practicing and improving their analytical thinking and math word problem solving skills without restructuring their courses. The Web site will provide a range and variety of mathematical word problems presented in language typically found in college math courses. An optional help menu provides clear, concise written and graphic information to guide students with a range of reading abilities (8th-12th grade) through each math word problem. Thus, while students will be challenged with solving high school and college-level math word problems, they will have readable guidance help options at their ability levels. This Web program will be available daily on a 24-hour basis, giving students independent, unrestricted access to problem-solving instruction and guided practice.

Implications

PROJECT SOLVE addresses, in an innovative and practical way, a critical problem facing most deaf college students and other learners with special needs - inadequate preparation and practice in problem solving and analytical thinking. PROJECT SOLVE will provide Web-based problem-solving instruction and guided practice for math word problems. While deaf college students are the primary audience, this project has clear implications for other college students for whom reading and math word problem solving is difficult, especially Learning Disabled (LD) students. This project also has instructional implications for high school students who are college bound, and who face similar difficulties with reading comprehension, problem-solving logic, and organization.

Kelly, R. R., & Mousley, K. (2001) Solving word problems: More than reading issues for deaf students. American Annals of the Deaf, 146 (3), 251-262. [AN 1725]

Deaf and hearing college students were given 30 math problems to solve. The initial 15 were presented as numeric/graphic math problems, followed by 15 corresponding word problems, with both conditions sequenced for a progressive increase in problem complexity. Each word problem described the kind of shape and measurement information that was presented in its corresponding numeric/graphic problem. The results showed that the deaf college students, regardless of reading level, were comparable in performance to the hearing college students when solving the numeric/graphic math problems and the initial, least complex set of corresponding word problems. However, as the complexity of the descriptive information in the word problems increased along with the complexity of the problem situations, the performance scores of the deaf students decreased. No comparable decrease was observed in the hearing students' scores. While reading ability level was associated with the deaf students' lower scores when solving word problems, the analyses show that other important factors

also contributed. These other factors included computational errors (as opposed to procedural errors), leaving problems blank (with no attempts to solve them), making negative comments to avoid word problems resulting in lack of focus, and not applying prior learned information to the word problems.

Implications

The findings of this study show that while reading ability may be associated with deaf students' poor performance with math word problems, other important factors also contribute to their poor problem-solving performance. The positive side of this situation is that all these factors are amenable to instruction and practice. Generic thinking skills, problem analysis strategies, connecting current tasks to previous tasks or related information, review and evaluation strategies, persistence, and experience in processing increasingly complex information - all may be improved through sustained purposeful practice with appropriate educational activities.

Marschark, M. (2000). Education and development of deaf children - or is it development and education? In P. Spencer, C. Erting, & M. Marschark (Eds.), Development in context: The deaf children in the family and at school (pp. 275-292). Mahwah, NJ: Lawrence Erlbaum Associates. [AN 1686]

This chapter examines some of the relations between development and education, with particular regard to children who are deaf. Alternative approaches to educating deaf children are considered, as they reflect different views of development. "Hydraulic" and "water park" models of education are described as they relate to the specific needs of deaf children. It is argued that in order to gain a full understanding of the complex mosaic of education and development, it is necessary to consider three important factors (as well as their interactions): 1) deaf children's early access to communication and language, 2) their early social interactions, and 3) diversity in both object- and person-oriented experiences.

Implications

Many educators and development researchers interested in deaf children appear to believe that there is, or should be, some unitary, correct approach to educating deaf children. As it relates to deaf students, this orientation most often emerges with regard to the primary mode of educational communication, but it also surfaces in the educational process itself. Alternatives to the particular approach of choice (at the moment) often are criticized or ignored in the name of such unity-seeking. A full understanding of the teaching-learning process for deaf children, however, requires a fairly sophisticated understanding of the processes and contents of language, cognitive, and social development. It is suggested that a better understanding of the mechanisms of development can facilitate parents' and teachers' providing of stimulating educational experiences for deaf children.

Marschark, M., Green, V., Hindmarsh, G., & Walker, S. (2000). Understanding theory of mind in children who are deaf. Journal of Child Psychology and Psychiatry, 41, 1067-1074. [AN 1727]

Research on theory of mind began in the context of determining whether chimpanzees are aware that individuals experience cognitive and emotional states. More recently, this research has involved various groups of children and various tasks, including the false belief

task. Based almost exclusively on that paradigm, investigators have concluded that, although most hearing children develop theory of mind by age 5, deaf children (and children with autism) do not do so until much later, perhaps not until their teenage years. This study explored theory of mind by examining stories told by children who are deaf and hearing (age 9-15 years) for statements ascribing behavior-relevant states of mind to themselves and others. Both groups produced such attributions, but there were reliable differences between them - in favor of the deaf children! Results are discussed in terms of the cognitive abilities assumed to underlie false belief and narrative paradigms and the implications of attributing theory of mind solely on the basis of performance on the false belief task.

Implications

Research on theory of mind informs us both about cognitive development and social-emotional development. This study shows that, in contrast to claims by other investigators in this area, deaf children demonstrate theory of mind at least as competently as hearing peers by 9 years of age. This study does not consider whether the story-telling methodology would be effective with children as young as 5 years - the age at which theory of mind emerges in hearing children - but it indicates that the false belief paradigm results in an underestimation of deaf children's skills.

Marschark, M., Lang, H.G., & Albertini, J.A. (2002). Educating deaf students: From research to practice. New York: Oxford University Press.

This volume examines the education of deaf children by considering existing research pertaining to the strengths and needs of deaf children and educational methods that have been used - successfully or unsuccessfully - with both deaf and hearing children. Academic, cognitive, language, and personal/social development are seen as integrated and mutually influencing throughout the years from preschool to university. By evaluating what we know, what we do not know, and what we thought we knew about learning among deaf children, the book provides new insights into educating deaf students and others with special needs. Suggestions for parents and teachers of deaf children emerge from a non-technical summary of existing research, and implications for administrators and policy makers are provided.

Implications

This book examines the education of deaf children by considering both their strengths and needs. Development and education influence each other throughout the school years. By evaluating what we know and what we do not know about learning among deaf students, the book provides new insights into optimizing their education and offers specific guidance for teachers and parents of deaf children.

Marschark, M. & Lukomski, J. (2001). Understanding language and learning in Deaf children. In M.D. Clark, M. Marschark, & M. Karchmer (Eds.), Cognition, context, and deafness (pp. 71-86). Washington, DC: Gallaudet University Press.[AN 1728]

This chapter examines the cognitive functioning of deaf learners and the extent to which any reliable differences between them and their hearing peers might explain other observed

differences in academic achievement. A review of research on cognitive development and the assessment of learning by deaf students suggests that some differences may occur in their learning, knowledge organization, and approaches to problem solving relative to hearing students. The origins of the observed differences are not entirely clear, nor is the extent to which they may have long-term, significant implications for educational achievement. At a minimum, deaf learners appear more heterogeneous than their hearing age-mates. To the extent that there are also real differences in the cognitive domain, the impact of those differences on classroom learning may be magnified or modified by the variability of the learners. We suggest ways in which educational methods might need to change in order to optimize academic success of the individuals, and we emphasize the need for educational programs with sufficient flexibility to match diverse student needs.

Implications

Among those concerned with the education of deaf children, there are two broad perspectives on the interaction of language and learning. Most popular is the suggestion that "deaf and hard-of-hearing students are just like hearing students." Assumptions of this sort are consistent with our notions of equity and the flexibility of young learners, and they lie at the heart of arguments in favor of mainstream education for deaf and hard-of-hearing children. This chapter argues that however egalitarian such pronouncements might be, they are wrong, and following them blindly may be an even greater disservice to deaf children than treating them as though they are different from hearing children.

Parasnis, I., Samar, V.J., Bettger, J., & Sathe, K. (1996). Does deafness lead toenhancement of visual spatial cognition in children? Negative evidence from deaf non-signers. Journal of Deaf Studies and Deaf Education, 1, 145-152. [AN 1554]

Deaf and hearing school children in India were given a test of digit span and five tests that measured visual spatial skills. The two groups were matched for age and gender. All deaf children had severe to profound hearing loss from birth, had hearing parents with no other deaf person in the family, and did not know any sign language. The deaf group showed a shorter digit span than the hearing group, consistent with previous studies. Deaf and hearing children did not differ in their performance on the visual spatial skills tests, including one on which deaf ASL signers have been found to perform better than hearing non-signers. These results suggest that deafness by itself may not lead to better visual spatial skills. Early exposure to sign language and fluent sign skills may be the critical factors that influence the development of visual spatial skills in deaf people.

Implications

Since deaf people primarily rely on visual information for communication and learning, it is easy to consider them as more accomplished visual learners than hearing people. Indeed, there is little evidence that deaf signers perform better than hearing non-signers on many visual tasks. The results of this study, however, suggest that a deaf child is not necessarily better than a hearing child in visual skills and that deaf children among themselves may differ in their visual skills. Some deaf children may be stronger visual learners than others, perhaps based on their sign language background.

Parasnis, I. (1998). Cognitive diversity in deaf people: Implications for communication and education. Scandinavian Audiology, 27 (Suppl. 49), 109-115. [AN 1661]

Research and issues related to cognitive diversity in deaf people are reviewed which indicate how the visual-perceptual skills and cognitive processes of deaf people may be different from those in hearing people. It is suggested that deafness and the use of a sign language may selectively contribute to the development of such differences. Implications of the research and its limitations for enhancing the communication and educational experiences of deaf people also are discussed.

Implications

This paper summarizes several research studies conducted by Parasnis and her colleagues on visual-perceptual skills and cognitive processes in deaf people. The results of these studies indicate that deaf fluent signers have better visual attentional control than hearing people and use different visual-perceptual strategies in processing visual information. These results have implications for designing and presenting curricula to deaf students. Teachers should use visual organizational principles and rely on the use of visual attention cues and visual aids. Multimedia displays could include visual information in the periphery to a greater extent than is appropriate for hearing students, and could use a panoramic view of the visual information to be presented. Finally, curricula and multimedia materials that encourage deaf students to rely on their visual imagery and visual memory may be particularly effective.

Richardson, J., MacLeod-Gallinger, J., McKee, B., & Long, L. (2000). Approaches to studying in deaf and hearing students in higher education. Journal of Deaf Studies and Deaf Education, 5, 156-173. [AN 1692]

Some approaches to studying lead to a deeper understanding of information, and others lead to more superficial understanding, making application and transfer of learning less effective. NTID researchers and Dr. John Richardson, Brunel University, U.K., adapted and administered an "Approaches to Studying Inventory" to a matched group of deaf and hearing RIT students. Results indicate that deaf and hearing students use similar conceptual structures when they describe their study habits, but deaf students score higher on need for systematic structure in their approach to studying, while hearing students score higher on relating ideas. Deaf and hearing students' approaches to studying will be examined further relative to major, GPA, and credit hours completed to see if there is a relationship between these demographic variables and self-reported approaches to learning.

Implications

For the past 40 years or more, researchers have been interested in the methods students use to approach the task of learning. Much of the early work focused on the strategies students used to study/learn text material and surveys or interviews often queried students about specific activities such as underlining, reading aloud, making notes in margins of books, etc. Early work demonstrated positive correlations with certain study skills and students' grade point averages. More recently, work in the area has focused on what researchers now call "surface-level processing" vs. "deep-level processing." This article discusses results from a study habits survey administered to all RIT cross-registered deaf students and a matched sample of hearing students.

Samar, V.J., Parasnis, I., & Berent, G.P. (1998). Learning disabilities, attention deficitdisorders, and deafness. In M. Marschark & M.D. Clark (Eds.), Psychological Perspectives on Deafness, Vol. 2, (pp. 199-242). Mahwah, NJ: Lawrence Erlbaum Associates. [AN 1623]

The literature on learning disabilities (LD) and attention deficit disorders (ADD) in the deaf population is reviewed within the broader context of mainstream research on LD and ADD. Problems of definition, evaluation, and syndrome complexity that hamper progress in understanding the nature of LD and ADD in the deaf population are discussed, and some promising new directions for research on evaluation and remediation of LD and ADD are identified.

Implications

LD and ADD are the largest categories of additional disabilities among deaf children. Teachers often note that schools seriously underserve deaf children with LD and ADD and that finding effective ways to identify and accommodate the learning needs of these children is an urgent priority. While progress has occurred in understanding, identifying, and remediating LD and ADD in hearing children, very little specific research on these issues exists for deaf children. This chapter discusses the small literature on deaf people with LD and ADD and suggests new evaluation and research approaches based on the more advanced literature on hearing people.

Note: *[AN XXXX] represents a local NTID publications designation. Please include when requesting copies of these publications.*