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Critical Review and Pilot Study: Classroom Instructional Strategies Used to Support Children with Specific Language Impairment or Working Memory Impairment

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Students who meet the criteria for specific language impairment (SLI) are at risk for low academic achievement, starting in the elementary grades. It is incumbent on educators and speech-language pathologists to identify ways of best supporting students with SLI so that both teachers and students can use instructional strategies to achieve classroom success. A search of the literature did not return any peer-reviewed evidence regarding the use of instructional strategies to support children with SLI in general education classrooms. Analysis of interviews with elementary teachers revealed that teachers implement a wide variety of instructional strategies to support children with SLI. Speech-language pathologists are well positioned to collaborate with teachers as they work to identify and implement the most effective supports for each unique presentation of SLI.

Introduction

Children who enter into kindergarten with specific language impairment (SLI) continue to have language difficulties throughout their grade-school years (Stothard, Snowling, Bishop, Chipcase, & Kaplan, 1998). Furthermore, longitudinal research reveals that the narrative skills and syntax skills of 7-year-old children with SLI are predictive of these same children's language profiles at 11 years of age (Botting, Faragher, Simkin, Knox, & Conti-Ramsden, 2001). The research is clear that many school-age children with SLI will require "provision," otherwise known as curriculum accommodation or modification (Botting et al., 2001). Intervention supports for children with SLI is a topic of current interest in the communication sciences and disorders peer-reviewed literature, but little is known about effective teaching support for children with SLI in general education classrooms.

As children of all abilities spend more time in general education classrooms, teachers are required to further diversify their instructional approaches to meet multiple needs. Dockrell and Lindsay (2001) argue that the move towards inclusive education necessitates further investment in applied professional development activities to support effective instruction of children with complex needs (including elementary school children with specific speech and language needs). A multi-pronged research approach is needed to identify the instructional supports and strategies that classroom educators currently implement when teaching children with SLI. This will enable further investigation into the effectiveness of these specific classroom instructional strategies. Such investigation will permit an informed educational dialogue on how best to support the day-to-day progress and development of school-aged children with SLI.

Despite this clear vision, it is difficult to know where to start, since very little published peer-reviewed literature addresses the experiences of children with SLI and/or the experiences of the general classroom teachers who instruct them. It is possible that this inquiry may be informed by literature that documents the classroom experiences of children with working memory impairment (WMI). Alloway (2006) documents a method for observing and illuminating the classroom experience for children with WMI, and it can be argued that there is some basis for looking more closely at these observed experiences when considering future classroom research with the SLI population. Archibald, Joanisse, and Edmunds (2011) suggest an overlap between the classroom presentation of primary school children with WMI and children with SLI. Their findings show that teachers rate children with one or both impairments as requiring more classroom support than peers without impairment, but these teachers fail to differentiate clinical profiles based on underlying deficit. Therefore, there may also be overlap in the instructional strategies that classroom teachers use to support the performance of such students. Identifying the strategies and determining the overlap in application by classroom teachers must occur before quantitative analysis can be used to evaluate and rank the impact of these strategies on the classroom performance of children with specific impairments.

Objectives

This paper reports two studies.

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The primary objective of **Study 1** is:

To critically review the published research that documents the spontaneous use or application of instructional strategies to support the learning and achievement of elementary school children with WMI or SLI in general education classrooms.

The primary objective of **Study 2** is:

To investigate the instructional strategies that teachers report using when providing support to children with SLI in general education elementary school classrooms.

Additionally, this paper seeks to propose clinical practice recommendations for the educators and clinicians who support children with WMI or SLI in general education classrooms. Recommendations for future research will also be provided.

Study 1: Methods

Search Strategy

Computerized databases, including PubMed, PsycInfo, Embase, and ERIC, were searched using the following search strategies: **1.** (((instruct* strateg*) OR (teach* strateg*))) AND ((language delay*) OR (language impair*) OR (specific language impairment)); **2.** ("classroom research*") AND "specific language impairment"; **3.** (teacher*) AND "specific language impairment"; **4.** (teacher*) AND "language delay"; and **5.** ("inclus*") AND "language delay".

Additionally, an expert in the field of WMI identified a relevant book chapter and journal article. All of the peer-reviewed documents that referenced this article were searched. The 5 search strategies stated above were modified for WMI and searched in each of the previously mentioned databases.

Selection Criteria

Documents selected for critical analysis had to be peer-reviewed. In the event that a peer-reviewed article reported on research that was described elsewhere, that research was also included for appraisal. Peer-reviewed articles were required to report on the general classroom instructional strategies in use by 1) elementary school students with SLI/WMI and/or 2) the teachers who support these students. Such reports had to derive, in whole or part, from observational research, survey research, and/or research interviews. Studies in which teachers were trained and/or told how to instruct and support were not included, since the purpose of this critical review is to determine the strategies that teachers use, based on their own experience with specific forms of impairment.

Data Collection

Results of the literature search yielded one journal article and one book chapter. Though not peer-reviewed, per se, the book chapter (Alloway, 2006) was included in the critical appraisal because it described the research that was used to derive the results relevant to the article (Gathercole, Lamont, & Alloway, 2006). This book and article reported observations and data about the classroom strategies used to support elementary school children with WMI.

In summary, this critical appraisal addresses two Level 4 observation research-evidence studies (Alloway, 2006; Gathercole et al., 2006).

Study 1: Results

Gathercole et al. (2006) reported an observational research study that evaluated the working memory constraints of classroom activities through observation of elementary school students with WMI. The authors also reported learning strategies used by these children and/or introduced by educational staff to reduce WM burden. Observations were made of 5- and 6-year old male children (n=3) in state schools in northeast England. These children were selected from the participant population of a broader screening study of memory and cognition. The paper did not explain how these three participants were chosen, so selection bias cannot be satisfactorily assessed. The paper also failed to note whether or not parental consent had been further elicited beyond the consent provided for the original screening study. There was no documentation of approval by the relevant institutional ethics review board(s).

Standardized tests revealed that all three children had age-appropriate non-verbal intelligence scores and phonological loop measurement scores. Their working memory scores were at or below 2 SD from the test means. These criteria, together, determined a profile of specific working memory impairment.

Participants were observed in the classroom over the course of 3-4 days. Observations focused on participant performance in activities loaded with working memory demands; the use of spontaneous strategies by participants and teachers to relieve working memory burden were also noted. The paper did not address who did the observation, nor did it clarify if training was provided. No reliability ratings were mentioned and no observation templates were included. The research design was appropriately aligned with the research objectives, but there was no acknowledgement or justification for the assumption that performance

breakdown was a direct result of WM burden. Matching of participants with typical peers (i.e., peers without WMI) and a comparison of performance could have resolved some of this ambiguity.

Results included important observations about participation in classroom activities and tendencies toward task simplification. Memory-related failures were found to occur most frequently in numeracy and literacy activities. Recommended strategies to support learning in the face of WMI included ensured remembrance of instructions, use of external memory aids, and reduction of processing load. Salient discussions of strategy application were provided, but there was no clarity about which strategies were derived from the observational data and which strategies were derived from the synthesis of literature.

This study reports clinically useful information with broad application, but the reporting of the research methods is incomplete. The data suggest the emergence of an important classroom profile for WMI. The extent to which the instructional and support strategies can be tied to direct classroom observation is unclear.

Alloway (2006) summarized a body of published literature and proposed working memory as a key contributor to classroom achievement. Working memory was defined in the context of everyday classroom activities. Discussion of individual differences underscored the idea that WM capacity exists on a spectrum. The relationship of WM to literacy and numeracy activities was carefully articulated, and WM was queried as an underlying deficit in the profile of children with "learning disabilities." WMI was suggested as one of the factors in compounded learning problems that build in magnitude as children move from grade to grade. This argument would have benefited from a presentation of longitudinal data showing the relationship of WM capacity to academic achievement. In the event that such data did not exist, this paper could have proposed that such research be done.

Data from the Gathercole et al. (2006) study were also reported in the Alloway (2006) article. "Classroom management" was highlighted as one of the most important ways to mitigate WM deficits through use of the instructional strategies already discussed in the Gathercole et al. (2006) appraisal. However, this discussion occurred without any real acknowledgment of the perspective of educators. When arguing that WM is key to classroom learning, students and teachers both need to be folded into the discussion. Such inclusion may encourage more attention to these ideas by education researchers.

The Alloway (2006) article advances an important conversation about WMI in the classroom. It reports that there is little data to indicate WM *training* as an effective intervention for this population, and redirects the conversation to classroom strategies that can be used to relieve WM burden. Unfortunately, this paper also lacks in the provision of specific details that would permit a more critical assessment of the current state of research related to WMI and classroom performance. As such, the paper provides equivocal evidence for application of instructions strategies at the level of the classroom.

Discussion

Gathercole et al. (2006) supplemented their observational data with survey data gathered through teacher completion of the Conners' Teacher Rating Scale. This instrument was used to provide a rating of classroom behaviour for each of the three students under observation. Results revealed only one of the three student participants as being reported to have significant behavioural challenges. The authors did not evaluate the congruence of the observational data with the survey data, nor did they follow up the teacher ratings with open-ended questions for the educators. The act of profiling WMI in the classroom needs to reflect the dynamic educational environment. Learning is an active process. What is the nature of the dynamics involved in the learning pathway of children with specific forms of impairment? What does this engagement look like?

Prasad (2005) cautions researchers against slipping into the domain of qualitative positivism, which she defines as the use of nonquantitative research methods without an adequate foundation of inquiry into the nature of human experience. Gathercole et al. (2006) and Alloway (2006) both present evidence suggestive of specific classroom strategies that are used to support learning in the presence of WMI. This evidence warrants consideration of the strategies that are used to support learning in the presence of other specific impairments, such as SLI. The study presented below initiates this work through a research lens of qualitative inquiry.

Study 2: Qualitative Inquiry

The abilities to use and understand language are critical to educational achievement. Students with specific language impairment (SLI) are at high risk for low achievement, so identification of effective classroom instructional strategies is key to optimizing the learning experiences of these students. The study reported on

below was focused by the following research question: How do elementary education teachers support children with SLI in general education classrooms?

Study 2: Methods

Participants

Three English-language public school teachers of students who fit the criteria for SLI (language scores below one standard deviation from the mean, with typical working memory and non-verbal intelligence scores) participated in the study. The teachers had all previously instructed students who were identified as meeting the criteria for SLI in a longitudinal study of language, working memory, and academic achievement (Archibald, Oram Cardy, Joanisse, & Ansari, 2013). The Nonmedical Research Ethics Board at Western University approved study procedures, and parental consent / teacher consent was provided prior to initiation of each interview.

Two of the teachers reported on their experience of teaching children in Grade 5, and one teacher reported on the experience of teaching a child in Grade 3. All three of the aforementioned students were male, between the ages of 9;9 and 11;10. Two of these individuals had been on an individual education plan (IEP) at the time of instruction by participating teachers. Although teachers were not aware that the students met criteria for SLI, they identified the children as students who required accommodations or modifications.

Research Methods

Individual semi-structured interviews were conducted by a graduate student with clinical certification in speech-language pathology. Teachers were asked to describe instructional strategies that they used with the students in question. All of the strategies were volunteered independently by the teachers; the interviewer did not provide teachers with a list of possible strategies. Interview length varied between 28 and 34 minutes.

The interviews were transcribed verbatim by a speech-language pathology student at Western University. Identifying information was omitted from the transcripts. Following transcription, the interviews were first coded for all mention of instructional strategies and educational supports. Additional themes emerged based on the thoughts and ideas shared by the teachers as they described their experiences teaching, observing, and counseling students with SLI.

Study 2: Results

The instructional strategies reported by teachers were categorized according to the four types of curricular/instructional differentiation adopted by the Ontario Ministry of Education (2013): content, process, product, and affect/environment. Twenty-nine different strategies were reported in all (see below), with fifteen of these strategies being mentioned by more than one teacher.

Content Strategies: curriculum modification, extra practice, appealing to personal interests, use of language facilitation strategies

Process Strategies: multi-sensory engagement, chunking, repeating instructions and providing reminders, modeling, direct cueing, prompting, scaffolding, provision of extra time, use of visual aids and cues, graphic organization/highlighting information, physical organization, peer assistance, scribing

Product Strategies: reduction of task expectations, role assignment for group projects, comprehension checks, use of assistive technologies and software, cued speech rate reduction, implementation of listening strategies

Affect/Environment Strategies: one-on-one instruction, preferential seating, gentle delivery of instructions, preferred activity rewards, encouragement, access to a quiet room

All three teachers felt that the students struggled most with math and language activities: “Language was really tough for him. It was really, really tough.” The language modalities in which the children were challenged varied from child to child, but all three students were reported to have significant difficulty with written work. The teachers also expressed areas of strength that they had observed and witnessed from these students, including following routines, drawing, reading, creative thinking, and hands-on tasks (i.e., dismantling electronics).

When discussing use and implementation of various strategies, teachers expressed frustration at the lack of perceived initiation or self-motivation demonstrated by students: “He doesn’t go out and, um, try to resolve it [task challenge] himself. He just automatically comes to me.” Another teacher said something remarkably similar when reflecting on the student’s ability to incorporate detail into his descriptions: “You know, we urge him. He’ll come up with that…But, he would never do that by himself…he really needs the one-on-one.” Likewise, the teachers expressed dissatisfaction at the ability of the students to capitalize on the

environmental strategies available to them, such as access to a quiet room: "So he says he needs a quiet place to work, but then I go in there and he's fooling around...But now he's tending to take it for granted and abuse it a little bit."

Another common theme to arise in the interviews was the perception of inflexible or careless student behaviour: "He kind of hears what he wants to hear and he has an idea of what he's going to do, and then he just does what he wants to do." Teachers also recognized that learning challenges directly precipitated classroom behaviours, such as exiting the classroom, premature termination of tasks, tantrum behaviours, and internalized "shut-downs."

All of the teachers commented on their collaborations with other professionals: "[The learning support teacher] was very involved, actually. I got a lot of support from her." In fact, one of the teachers mentioned that his student received so much pull-out instruction that the student often missed task instructions and would re-enter the general classroom only to find himself confused about what to do next. Despite significant periods of pull-out teaching and collaboration, teachers expressed disappointment in the ability to access and use resources to provide the necessary levels of support. One teacher recognized that the needs of the student exceeded the capacity to successfully differentiate instruction in the classroom: "I'm inadequate when it comes to [student]."

Study 2: Discussion

All of the teachers voluntarily reported language and math activities as the most challenging activities for the students. Both of these content areas require use and manipulation of symbol systems, and current research suggests that many children with SLI who struggle with linguistic symbols might also struggle in their use and manipulation of mathematical symbols (Alt, Arizmendi, & Beal, 2014). Teacher insight into these areas of deficit suggest that general classroom teachers have much to contribute in the assessment and understanding of academic performance of children who meet the criteria for SLI.

The strategies reported in the results section of this paper have significant overlap with the strategies reportedly used by teachers of children with working memory impairment (WMI) (Vanderlaan, 2012). Of the 13 types strategies reported by Vanderlaan (2012), only one (i.e., student teacher conferencing) stood out as unique to the teachers of children with WMI. This information suggests that teachers use many of the same strategies to support children with different types of impairment. Interestingly, there were also several strategies used to support specific aspects of speech and language development in the children who met the criteria for SLI. These strategies included reducing speaking rate (both for the teacher and the student), requesting clarification (for unintelligible speech), and facilitating language development (by expanding utterances).

The feeling of inadequacy expressed by one of the teachers raises the interesting consideration of how the implementation of strategies might occur more successfully, and who such success might benefit. The data from the interviews suggests that both teachers and students would benefit from increased uptake of strategies. When unable to complete tasks independently, teachers reported that the students would often shut down or act out behaviourally. These responses were sometimes interpreted by teachers as indicating a lack of effort on behalf of the student. Alloway (2006) notes that children with WMI often reject higher-level strategies for lower-level strategies in order to reduce the cognitive burden that the strategies impose. The proposed solution is to provide children with a lot of practice in successfully using the strategies. This same recommendation may be salient to the considerations raised by teachers of students who meet the criteria for SLI.

Conclusion

A thorough review of the literature revealed that there has been no observational or qualitative research done in general education classrooms to determine the strategies that teachers employ when supporting children who meet the criteria for SLI. Research from education specialists suggests that teachers seek more information about providing effective supports for children with specific speech and language impairments. The qualitative data presented in this paper suggests that teachers use a variety of strategies to differentiate content, process, product, and environment in the act of supporting students with SLI. Despite report of effective collaboration with other educational team members, general education teachers struggle to adequately support children with SLI.

Clinical Implications

The small body of evidence presented in study 2 suggests that there is a clinical role for speech-language pathologists to play as general education teachers optimize the support that they provide to students with SLI. As specialists in language development, SLPs have the opportunity to work with teachers and other education professionals to create a more comprehensive

understanding of the behaviour that children with SLI display. Such understanding may help to generate alternatives to the underlying assumption that children with SLI are not "trying" hard enough. SLPs might also be well-positioned to help general education teachers understand how and why math and language deficits might be expected to co-occur in children who meet the criteria for SLI.

The sheer variety of instructional strategies reported in study 2 suggests that general education teachers are familiar with many ways of differentiating instruction. SLPs might be able to help teachers identify criteria for choosing specific strategies to support specific deficits or task challenges. They might also be able to work with these teachers to implement an evaluation protocol that permits periodic check-in of the resources and energies that are being invested in instructional differentiation. Finally, SLPs could support the training of students in strategy use such that students might be better equipped to initiate use of these strategies inependently.

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