Executive Function and Working Memory: Influencing Interprofessional Conversations and Collaborative Practices

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Abstract

Partnerships are dynamic, negotiated spaces encompassing community organizations and interprofessionals. Partnerships support young children and families as they transition from home to school. Interprofessionals create a culture for learning and accessible resources. Early childhood centers, public health and libraries develop collaborative partnerships with educators and families. Addressing oral language issues of toddlers and preschoolers, interprofessionals including an early childhood educator, teacher, speech and language pathologist, public librarian, and county manager identified the needs and strengths of young children in a rural community using informal data. Conceptualizing Bourdieu's habitus as the embodiment of cultural capital of daily lived experiences, interactive storybook reading in a playgroup are skills shared by interprofessionals and families while co-constructing knowledge. Exploring the executive function and working memory within a playgroup where language is socially constructed; familial literacy practices of storybook reading affected children's vocabulary development and phonological awareness through on-going modelling, support and dialogue between community organizations and families.

Introduction

Confronting 21st-century issues of educating women, systemic poverty, and parent engagement requires an active global community of collaborative problem-solvers (OECD, 2009; Silva, 2009; Ontario Ministry of Education, 2014) and critical thinkers to guide and lead literacy development. Historically, mothers' role of early childhood education and care (Taisey Petrie & Holloway, 2006; MacLeod, 2008; Hegarty, 2016) is a complex, systemic issue of educating women and economically disadvantaged women working (Dahlberg, Moss & Pence, 2007) within early childhood education and care as a female intensive profession. Through inter-generational transference of modeling literate behaviours, teaching and learning are a partnership with family members and community organizations, including interprofessionals. Liaskos, et al. (2009) define interprofessionals as "learners who improve collaborative practices and quality of care through partnerships of negotiated spaces with dynamic flow challenging perceptions of strengths and needs awareness" (p. S43). This position paper posits interprofessionals in education, including early childhood educators (ECEs), teachers, public health and libraries, and speech and language pathologists (SLP) as partners supporting family literacy practices. Embodying skills, dispositions and knowledgeable professionals in the Early Childood Education and Care (ECEC) field, commitment to access community resources highlights inter-professionals conceptualizing learning processes to guide

their practice. This position paper focuses on the skills, knowledge and attitudes of interprofessionals' support of oral language development through resources, materials and texts with the following question: How might interprofessionals enhance oral language (vocabulary) and early literacy development through storybook reading for preschool-aged children?

Interprofessionals draw on professional reading and learning to refer to executive function and working memory research related to storybook (*Diamond*, 2012; *Garcia-Madruga et al. 2013;* Garcia-Madruga, Gomez-Veiga, & Veia, 2016) reading during discussions related to observations of children's interactions in a playgroup. Interprofessionals observed weekly interactions between mothers, materials and text in a playgroup located in a rural community. Recognizing connections between home, community and school as a triangle of literacy support (Figure 1), growing collaborative partnerships developed relationships with knowledgeable professionals to support family literacy practices modelled and shared within a rural playgroup.

Triangle of literacy support

Figure 1.
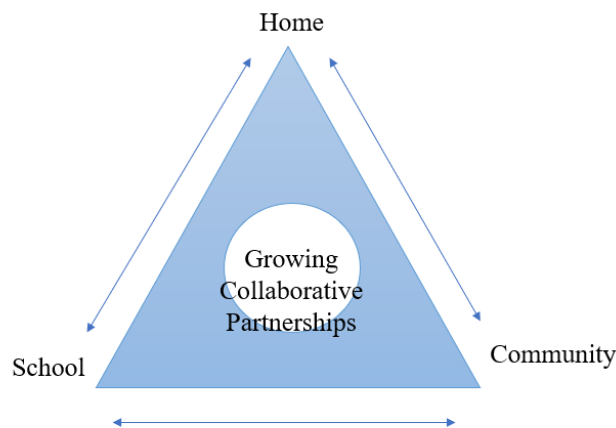
Literature Review

Partnerships in Rural Communities

The energy from the interprofessional group benefits those within the group as they extend their thinking and creativity to consider more than one perspective. However, partnerships may be described as "fragmented, bureaucratic, and inefficient" (Lanspery & Hughes, 2015, p. 38), responding narrowly to defined problems and fostering inaccessible, expensive, institutional partnerships rather than preventative results-oriented measures. The focus of government-funded community organizations was to address the transformation of accessibility and integration of programs and specialized services in municipalities; however, literacy resource centers were located in core areas with limited accessibility to rural family caregivers. Transportation in rural areas to community programs leaves caregivers with few options to connect in person, engage in co-learning, socialization, and possibly leading to isolation and fragmented services.

Government-funded programs mandated community outreach as a "comprehensive community initiatives (CCIs) as a means to understand the needs and strengths of individuals and their communities, to strengthen the capacity of the community to address those needs and strengths, and subsequently, to attend to the complex needs and strengths of children and youth" (Zaff, Donlan, Jones & Lin, 2015, p.1) with existing community organizations supporting the transitioning of children to Kindergarten. Interprofessionals support preschool to Kindergarten transitions. Government-funded community-based ECEs and SLPs, local public libraries, and county representation/management noticed preschoolers struggling with oral language and literacy development. Employing informal observation notes, attendance records at a community-based site and speech and language caseload numbers from community organizations, the interprofessional group developed a plan to support early literacy and oral language development of young children through an open playgroup. An accessible outreach program for caregivers focused on supporting oral language and early literacy development through playful interactions and a structured storytime one day per week at a local school for young children birth – preschool age.

Language Influenced by Social Constructs

Language is socially constructed by one's culture and daily interactions (Liu & Matthews 2005) with others. Branscombe, Burchman, Castle and Surbeck (2014) contend social constructivism is a theory of the construction and co-construction of knowledge rather than repetitive actions. "Each individual uses the knowledge she has already constructed and relates new information to that knowledge. In the process, she creates knowledge for herself" (Branscombe et al., 2014, p. 9) through experiences. Conceptualizing knowledge building as created verses found, Bredo (2000) implies choice and decision-making processes influence knowledge building. In Western cultures, storybook reading is conceptualized and romanticized as a time for positive social interactions between children and adults. Storybook reading connections to developmental phases in a variety of contexts, including home, library and preschool, postulates positive relationships through co-learning. According to Vygotsky (1981), knowledge is transformed into action through external influences as an assimilated social construct of meaningful experiences between adults and children. According to Power (1999), daily activities such as bedtime stories are influenced by power, dominant relationships and social structures. Western culture situates parents in a dominant decision-making role, including family literacy practices, e.g., reading to their children at bedtime. Children gain competence through scaffolding or intentional supports, leading to successful task completion (Powell & Kalina, 2009), influenced by supportive and meaningful social structures and methods. The zone of proximal development described by Vygotsky (1962) as approximations of language can be modelled through storybook reading.

Inter-professionals contribute to awareness, modelling oral language as social interactions in a play environment and through reading storybooks. Trehearne, Hemming Healy, Catalini-Williams, and Moore (2000) in their resource book for educators, *Kindergarten Teacher's Resource Book* defines read-aloud in a comprehensive literacy program as

"[r]eading aloud brings the Kindergarten class together to listen, think about, and share books, poems, and charts. Students watch and hear a fluent reader. Reading aloud to students builds on

the secure setting of home reading" (p. 256). Children in preschool settings, including playgroups, benefit from supportive and meaningful social structures to acquire language and literacy skills.

Young children develop oral language and early literacy skills supported by professional lenses afforded "multiple facets of the phenomenon to be revealed and understood" (Baxter & Jack, 2008, p. 544) as interprofessionals review the narratives of parents and children participating in a playgroup. Early Childhood Educators selected text reflective of their community and experiences while engaging in reading stories to children. Reading storybooks with children presents opportunities to scaffold learning through questioning, listening and exploring the strengths of children and families. The ECE in this project provided materials for the children to explore and extend their learning with the support of inter-professionals and parents attending the weekly playgroup sessions. Interprofessionals engage parents in conversations about their experiences at home and their connections to the playgroup setting. The ECE and teacher routinely dialogued informally about learning and reading strategies used in the playgroup setting based on professional learning and experiences with children and families.

Pragmatic Knowledge

Children use language for a variety of purposes, including storytelling, communicating needs, role play and attention-seeking in social settings. Pragmatic knowledge is the social context or social rules of oral language to make meaning and build relationships, according to Owens (2008), whereby children are influenced by settings or social structures and frequency of interactions. Adults and children in social situations are engaged in reciprocal exchanges. Social conditions include "acknowledging a child's feelings, asking for a child's opinion, attending to a child's extracurricular activities, displaying vocal variety, and attentively listening when a child is speaking" (Munz & Wilson, 2017, p. 669) encompasses social rules.

Morris (1938) defined semantics as "the relation of signs to the objects to which the signs are applicable" (p. 6) in recognition of 'the word' as a word freely used in everyday exchanges between people. Semantics or meaning of phrases and terms linked to context supports understanding of how young children develop language. In *Historical Cognitive Lingusitics* edited by Winters, Tissari and Allan (2010), Geeraerts (2010), described this relationship as a 'connection to background knowledge' and contends,

> "[t]he mental status of lexical meanings links up directly with the overall function of thinking, i.e. with the function of cognition as a reflection and reconstruction of experience. Language, one could say, has to do with categorization: it stores cognitive categories with which human beings make sense of the world" (p. 335).

Related experiences make meaning of social rules and relationships.

Language requires words in a particular order for meaning to be derived. McKoon and Ratcliff (2003) contend syntactical processes of nouns, verbs etc. are put together through language structures. Still, the researchers (McKoon & Ratcliff, 2003) "propose a new view of language comprehension that we label *meaning through syntax* (MTS). The goal of MTS is semantic: to understand how syntactic

structures determined by meaning and how they express meaning" (p. 490) through structures. According to Willingham (2009), within the context of meaning-making, students question, reflect, review, connect to background knowledge and synthesize information on a deeper, competent level. Deriving meaning from syntax and semantics through background knowledge, questioning and recognizing story structures developed with children's funds of knowledge (Gonzalez, Moll & Armati, 2005) are contributors to learning.

Sterling Honig (2008) contends morphemes may be culturally bound and reflective of one's community. "Black English", according to Sterling Honig (2008, p. 20), is described as the words and their meanings children need to comprehend text through a developmental continuum. Similar to dialects influenced by the socio-cultural and geographic isolation of members communicating within a group. According to Otto (2014), a specific language develops and is reflective of one's culture.

Scaffolded instruction provides supports for using morphemes more proficiently. Perkins and Freeman (1975) investigated the instructional response of morphemes and found the developmental acquisition of morphemes did not change, but the overall performance may be enhanced. Speciale, Ellis and Bywater (2004) propose an interplay between short term memory and phonological regularities as children acquire lexical knowledge supported by approximations and phoneme chunking.

From Bedtime Ritual to Preschool/Playgroup Environment: Exploring a Continuum

The role of interprofessionals functioning as a support system provides rich oral language experiences through playful interactions, interprofessionals recognize the role of scholarship and professional learning as they explore the role of working memory as a component of executive function within the context of a playgroup. More specifically, the planning of storybook reading opportunities for children and their families. Drawing on positive, past practices between home, local library and school, educator practices support language development through storybook reading as a time where adults and children come together to listen to a story. The continuum of this practice from one context to another supported an outreach proposal while bringing forward research literature supporting the growing needs and strengths of a community in transition. Birth to six years of age is cited as a critical phase (Piaget, 1970; McCain & Fraser Mustard, 1999) of human development. Cprek, Williams, Asaolu, Alexander and Vanderpool (2015), contend storybook reading is related to vocabulary size, phonemic awareness, book knowledge, and literacy attitudes. The interprofessionals outlined a storytime procedure to include a text representative of a diverse community, including culture, socioeconomic status, gender, sexuality and race. Children needed to see themselves in the text.

Storybook Reading: A Method of Reading with Young Children

A storybook was introduced using the following format: a picture walk describing the pictures in the book followed by the educators frontloading and promoting relevant vocabulary and sound-symbol/associations of words (phonology) to support children's focused, growing interest and engagement. A comprehension strategy of prediction was employed to ask questions to assess comprehension (semantics) and connect background knowledge while labelling objects to associate relevant vocabulary, fluency and intonation in support of comprehension. The storybook was introduced

to children as it related to their world (pragmatics) and supported their questions and reiterations modelling correct English/school language syntax. Overall phonological awareness screening results were reviewed as a metric of phonological awareness. Assessment Companion Tool (ACT), Teacher School Readiness Inventory (TSRI), Nipissing Developmental Screen, Yopp-Singer Speech and Language Phonological Screening Tool, Binder of Assessment Tools (BAT) including alphabetic principles developed by Marie Clay were chosen by regions to address assessment and intervention strategies. Phonological awareness skills were modeled for the children. More specifically, the ECE and librarian modeled connections between the first letter/sound of nouns in the storybook.

Children's strengths and learning and educator's teaching to support connections to executive function and working memory are part of the preplanned selection process. Focused language and emergent literacy teaching lead to gains in alphabet knowledge, letter-word recognition, and vocabulary (Connor et al., 2006 as cited in deHaan, Elbers, & Leseman, 2014). Direct teacher instruction of academic language skills was positively associated with emergent literacy skills. Direct instruction influenced the planning storybook reading process. The educators of this project selected and planned storybook reading based on reflections of their interactions related to language between and with children and adults, the use of vocabulary and phonology such as categories of words, rime, segmentation and letter/sound associations to support direct instructional strategies during storybook reading through engaging and playful interactions.

Young children segment words from one another and still hold their meaning. For example, a young child may hear the words 'mother' and their name. They assign meaning to the two words as separate entities. The child's name and mother are part of a larger category the child recognizes as a family and retrieve these words from memory as they are closely related (Curtin & Zamuner, 2014; Yurovsky, Fricker, Yu & Smith, 2014) known as referents or schemas. The educators had opportunities to associate known words with newly introduced words as children can retrieve pre-existing vocabulary. Relating working memory to other concepts such as syllables, rhyme, sound/symbol associations bound within word awareness, educators deconstruct down more significant concepts into phonemes or morphemes. Children take parts of wholes and make them into memorable bits examined within the context of a story. For example, the educator strategically chooses a rhyme from a nursery rhyme book and examines the rhyming words with the children in a wordplay related to previous experiences while introducing newer rhyming words. The child uses their working memory to hold onto bits of new information as they connect to other pieces of knowledge previously explored and utilized in different contexts. Many exposures to rhyme at home, the library and playgroup provide children with opportunities to revisit phonological skills. Baddeley's (2003) working memory model hypothesizes the construction of new knowledge acquired through a domain-specific cognitive system, namely, the phonological loop. The phonological loop consists of two sub-components: the short term phonological forms storage, and the rehearsal mechanism. According to Kaushanskaya (2012), the phonological loop stores new phonological forms in short-term memory, and transfers the information to long term memory through repetition. Teachers model and prompt children to rime while reading predictable text. A variety of genres, including nursery rhymes,

poetry and fiction, further supports children as they acquire new vocabulary.

Building on the seminal work of Slobin (1985), Devescovi et al. (2005) proposed young children do not inherently make many errors in language structures such as grammar (syntax). The researchers conceptualize "in a single language, vocabulary size is a more powerful predictor of grammatical development than age or gender, contributing significant variance to measures of grammar" (Devescovi et al. 2005, p. 761) refuting educators' beliefs young children are bathed in language. Storybook reading provides children and adults with opportunities to 'talk about books' using book-like language with specific English and school-like language structures. The use of text throughout the storybook reading time positions educators to engage in 'think aloud' (Ritchhart, Church, & Morrison, 2011) or metacognitive talk about the text while explicitly modelling language structures. Think aloud is an explicit demonstration of the process of what the reader is thinking to make meaning. These structures or explicit grammar lessons may carry over in the work of the educators as they engage in playful interactions with children. Providing children with multiple contexts of home, school and the library or storybook reading in playgroups, children may generalize new learning. "[S]tudies of memory retrieval, recollection is consistently affected by the interaction between the properties of the encoding context and the properties of the retrieval context" (Vlach & Sandhofer, 2011, p. 395) through shared encoded and retrieval contexts leading to retrieval of memories. The use of rich storybooks reflective of a child's world contextualizes language leading to more profound meaning-making.

Conclusion

The current position paper examines how interprofessionals engage in early language experiences through social interactions with young children in a playgroup. The influence of planning specific, explicit interactions such as phonological skills during storybook reading, children may acquire the skills necessary to develop early literacy and language. Peng, Mo, Huang and Zhuo (2017, p. 225) contend academic interventions have an impact on academic achievement; however, the researchers question cognitive interventions improving intelligence. A recent meta-analysis (Weicker, Villringer, & Thone-Otto, 2016) of 103 studies of working memory training found training lead to long-lasting improvements on reasoning/intelligence and cognitive control functions. The researchers (Weicker et al., 2016, p. 225) suggested, "working memory training had a long-lasting beneficial effect on cognitive function of brain-injured patients," and working memory training for young children may provide individuals with possibilities not yet realized in pre-schools.

Storybook reading may provide young children with opportunities to retell stories using vocabulary acquired through explicit instructional opportunities in guided play and storybook reading. Repetition of words and key phrases shared in storybooks in context and a variety of environments using multiple props such as finger puppets and loose parts allow for repetition, chunking and high motivation. The use of visual cues such as colours were "found to be effective in teaching grammatical skills to both preschool (Ebbels, 2014; Zwitman & Sonderman, 1979) and school-age children. The use of "rehearsal plus visualization strategies led to greater improvements on a test of following directions over traditional speech therapy alone and traditional therapy combined with rehearsal but without visualization " (Wener

& Archibald, 2011, p. 314) were beneficial. Future action research by interprofessionals may inquire from the children how they remembered the story and what strategies were linked to retell.

According to Rainey, Davidson and Li-Grining (2015), more research is required to understand the links between executive function and syntax. The organization of language "[n]eeded to encode information and linguistic cues from the environment" (e.g., St. Clair-Thompson & Gathercole, 2006). Multiple research teams including, Bierman, Nix, Greenberg, Blair, & Domitrovich (2008); De´ak, 2003; Foy & Mann (2013); and St. Clair-Thompson & Gathercole (2006) have linked executive function with skills such as vocabulary development, literacy development and phonological awareness. Rainey et al. (2015) question the role of executive function, syntactic awareness and language processing. The work of researchers continues as young children and scholars engage in the work of learning together with inter-professionals to support the development of early literacy skills through storybook reading and how these skills and strategies modelled in a playgroup. Further dialogue between government-funded organizations and inter-professionals in the field of early childhood and care may provide a road map of accessibility to resources, partnerships and fundamental understandings and communication of resources within communities supporting early literacy strategies through playgroups.

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