Title of Project:
The Promise of Educational Media for Dual-language Learners' L1 and L2 Vocabulary Development

Researcher:
Kevin Wong
kevin.wong@pepperdine.edu

Current Institution
Pepperdine University

Doctoral Institution
New York University


Kevin Wong

Research Supervisor:
Dr. Susan B. Neuman
New York University

TIRF Research Topic Investigated:
Teaching English to Young Learners

Final Report

Motivation for the Research

Technology is ubiquitous in the lives of young children. In the United States, preschoolers are spending an average of two hours or more on screen per day (Rideout, 2014), watching media programs that are purportedly educational. Over the past decade, the American Academy of Pediatrics has addressed this hike in media usage by issuing a policy statement that recommends only one hour of daily screen time for preschoolers between the ages of 2-5 years old. Despite these recommendations, national surveys of media consumption in the United States report that 73% of 2-4 year-olds watch almost double the recommended amount of television every day for an average of 1.9 hours per day (Common Sense Media, 2013). Moreover, the AAP recommends "high-quality programming" without explicit guidelines for the instructional contexts that might promote high-quality literacy development for vulnerable populations like Dual-Language Learners (DLLs), defined as children in early childhood who acquire a new language (L2) while developing their first or home language (L1). Still, educational programs have the potential to expose DLLs to rich English word learning experiences (Silverman & Hines, 2009) while also providing opportunities for home language (orL1) maintenance.

Despite this potential, there is limited research on English and heritage language vocabulary learning for DLLs on screen. In response, I conducted a three-part dissertation that examined specific mechanisms on screen that might facilitate vocabulary acquisition for DLLs. In my first study, I examined how certain pedagogical approaches used in educational media might benefit DLLs. Specifically, I aimed to understand how ostensive (definitional) cues and attention-directing cues (Neuman et al., 2019) might influence second language (L2) vocabulary learning among DLLs with varying English language skills. Shifting my attention from instructional approaches to the learning context, my second study investigated how the overall instructional context for vocabulary learning (i.e., when programs adopt a participatory, narrative, or expository approach to teaching) influenced L2 vocabulary in DLLs. In my third study, I turned to the linguistic context of educational media, examining how the language of instruction in children's programming helped DLLs maintain two languages. I also sought to examine how the effects of screen-based conditions on vocabulary learning differed by children's home language (L1) and second language skills. The following research questions guided this dissertation:

Research Questions

Study 1: Screen-based pedagogical supports

a. To what extent do screen-based pedagogical supports affect vocabulary learning in young DLLs?
b. How do effects of screen-based pedagogical supports on vocabulary learning differ by children's L2 language skills?

Study 2: Instructional contexts

a. To what extent do certain genres (participatory, narrative, expository) affect vocabulary learning in young DLLs
b. How do effects of genres on vocabulary learning differ by children's L2 language skills?

Study 3: Bilingual language supports

a. To what extent do DLLs learn L1 and L2 vocabulary through educational media?
b. How do the language of instruction and language of definitions in a child's L1 or L2 affect L1 and L2 vocabulary learning in DLLs? How might this vary according to a child's dominant language?

Research Methodology

To address these research questions, I used primary data collection with a multi-methods research design. Experimental methods allowed me to draw conclusions about the malleability of instructional supports on screen and in the media context. The dosage of instruction was short 1-3-minute video clips that allowed me to carefully control children's exposure to video programs. Through experimental manipulation of vocabulary words, repetitions, imagery, and screen-based supports on screen, I was able to make inferences about the relationship between the type of support and educational outcomes. It also provided valuable information on the feasibility of utilizing pedagogically supportive educational media to facilitate vocabulary in authentic home and school settings.

I also used a within-subjects design: In a within-subjects research design, participants are exposed to all conditions in random, counterbalanced sequences and serve as their own control. They control for between-subject variability, reduce error, and increase power to detect potential differences between conditions, and minimize threats to internal validity.

Sample. Research was conducted in Head Start programs and school day preschool programs located in the northeast region of the United States. The schools served three to five-year-old children from low-income communities who qualified for free and reduced lunch. Moreover, children came from racially and linguistically diverse backgrounds. The most common languages other than English spoken in my samples included Spanish, Haitian Creole, and Mandarin. The number of children included in the sample of each study varied according to research design and power analysis (Study 1, N = 51; Study 2, N = 50; Study 3, N = 87). Children were screened out if they knew any of the vocabulary words in the media clips. Aligned with the Institutional Review Board's ethical norms of conducting research with human subjects, data collection did not commence until informed consent was attained from all participants (i.e., parents or caregivers) and assent was given from each student participant prior to their participation in any part of the study.

Analysis. I analyzed my data using quantitative statistical analyses. My dependent variable in all three studies was vocabulary learning, captured with different measures related to word identification and word meaning. Independent variables included screen-based pedagogical supports (Study 1), instructional contexts for word learning (Study 2), and language of instruction and language of definitions (Study 3). I used Repeated Measures Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) with these independent variables as the within-subjects factor. To investigate differences by language proficiency, I used children's PPVT scores or home language environment scores in my analyses to account for language differences. I also used age in months as a covariate in analyses to account for developmental differences (see Tables 1-3).

Summary of Findings

First, across all three studies, DLLs with varying levels of English and home language proficiency were largely able to identify vocabulary words and demonstrate an understanding of word meaning in their L1 or L2. Previous studies investigating early literacy development in educational media have primarily worked with monolingual preschoolers or kindergartners who speak the dominant language of society (Fisch & Truglio, 2014; Flynn, Wong, Neuman, & Kaefer, 2019; Krcmar & Cingel, 2017; Linebarger & Piotrowski, 2010; 1990; Samudra, Flynn, & Wong, 2019). Scholars have also begun to examine how multimedia environments influence language and literacy development in multilingual learners of all ages, focusing largely on older students in secondary or tertiary education contexts (Montero Perez et al., 2015). The current dissertation uniquely examines how DLLs in early childhood learn vocabulary words after single-viewings of educational media, and establishes that children are able to learn words on screen in both their L1 and L2. Moreover, with the opportunity for DLLs to learn a new language (e.g., English) and maintain their heritage language (e.g., Spanish), educational media has the potential to meet the diverse linguistic needs of bilingual populations around the globe.

Relatedly, there were important differences in how well children learned words from educational media by language proficiency. Moderating the impact of media scaffolds in this dissertation, findings demonstrated that when children were less proficient in English or exposed to less English in the household, certain instructional supports were more effective than others. In Study 1, the repetitions pedagogical support was particularly helpful for the group less proficient in English, suggesting media provided an opportunity to accelerate the development of L2 vocabulary knowledge. In Study 2, instructional contexts differentially affected vocabulary learning in the group more proficient in English, but had indiscriminate effects in the group less proficient in English, indicating media may have fueled the Matthew Effect (Stanovich, 2009). While the study indicated specific genres supported those with more English vocabulary knowledge, the study could not determine specific genres that supported those with less English vocabulary, thereby missing potential opportunities for vocabulary growth.

Theoretically, differences in vocabulary outcomes among students with varying levels of L1 and L2 proficiency support Cummins' (1979) Threshold Hypothesis as children less proficient in the L1 (Study 3) learned fewer words in the L2 than those more proficient in the L1. Likewise, in Studies 1 and 2, children less proficient in the L2 were also less likely to learn words in the L2 than those more proficient in it, suggesting a possible L2 threshold for L2 word learning. Moreover, Paivio's (1986) Dual-Coding theory is clearly supported as DLLs successfully learned vocabulary in a new language through visual and auditory presentations.

Implications

In an age where "screen time" is in the everyday discourse of families, educators, health care providers, and policymakers, it is clear that the quantity of media consumption will only continue to escalate. This dissertation extended research in the field of technology and language education by providing a fine-grained understanding of the mechanisms and supports on screen that facilitate early literacy development in DLLs. It also provided a nuanced understanding of how L1 and L2 language proficiency in DLLs differentially affect screen-based learning. In other words, this dissertation showcases the heterogenous nature of DLLs who are often blanketed and categorized as one homogenous group in policy discourse and decision-making. Policymakers should note the importance of addressing the unique linguistic needs of DLLs and also consider how educational media may be used to meet these needs.

In sum, my dissertation responded to the growing *quantity* of media consumption among young children and examined how *quality* screen time might cultivate vocabulary knowledge in English and the heritage language of DLLs, addressing the diverse linguistic needs of children in today's society and cultivating future generations of bilingual speakers.

Tables

Table 1
ANOVA Inferential Statistics for All Vocabulary Assessments Screen-Based Pedagogical Supports and English Language Environment (LEQ); (N=51)

Dependent Variable	Contrast	Main Effects and Interactions					
		F	df	Sig.	MS_{Effect}	SS_{Error}	MS_{Error}
Vocabulary in Context Posttest	Pedagogical Support *	6.328	1, 42	.016	.425	7.152	.170
	Pedagogical Support x LEQ	3.980	1, 42	.053	.267		
Vocabulary in New Context Posttest	Pedagogical Support	.031	1, 42	.861	.002	7.586	.181
	Pedagogical Support x LEQ*	.396	1, 42	.018	.396		
Combined Vocabulary Posttest	Pedagogical Support *	6.301	1, 42	.016	.382	7.138	.170
	Pedagogical Support x LEQ	.233	1, 42	.056	.233		

Note. SS = sum of squares; MS = mean square; LEQ = Language Environment Questionnaire.
* $p < .05$.

Table 2
ANCOVA Inferential Statistics for Vocabulary Assessments in Full Sample (N = 50)

Dependent Variable	Contrast	Main Effects and Interactions					
		F	df	Sig.	MS_{Effect}	SS_{Error}	MS_{Error}
Vocabulary identification posttest	Instructional Context*	11.003	1, 47	.002	.601	2.566	.055
	English PPVT	.564	1, 47	.456	.031		
	Age	.670	1, 47	.417	.037		
Vocabulary meaning posttest	Instructional Context	1.604	1, 47	.212	.021	.611	.013
	English PPVT*	4.962	1, 47	.031	.065		
	Age	1.220	1, 47	.943	.000		

Note. SS = sum of squares; MS = mean square; PPVT = Peabody Picture Vocabulary Test.
* $p < .05$.

Table 3
ANCOVA Inferential Statistics for All Vocabulary Assessments (N=87)

Dependent Variable	Contrast	Main Effects and Interactions					
		F	df	Sig.	MS_{Effect}	SS_{Error}	MS_{Error}
Word Identification Posttest	Language of Instruction*	7.835	1, 82	.006	.201	45.270	.041
	Language of Definitions	1.644	1, 82	.203	.032		
	English PPVT	3.492	1, 82	.065	.143		
	Chinese PPVT*	8.828	1, 82	.004	.361		
	Age*	30.057	1, 82	.000	1.229		
	Pretest*	15.409	1, 82	.000	.630		
Receptive Word Meaning Posttest	Language of Instruction*	20.833	1, 82	.000	.972	185.541	.062
	Language of Definitions	.201	1, 82	.655	.005		
	English PPVT*	6.438	1, 82	.013	.402		
	Chinese PPVT	3.925	1, 82	.051	.245		
	Age*	9.158	1, 82	.003	.572		
	Pretest*	6.426	1, 82	.013	.402		
Expressive Word Meaning Posttest	Language of Instruction*	22.136	1, 82	.000	.528	18.354	.047
	Language of Definitions	1.306	1, 82	.257	.027		
	English PPVT*	6.974	1, 82	.010	.327		
	Chinese PPVT	1.539	1, 82	.218	.072		
	Age	2.084	1, 82	.153	.098		
	Pretest*	13.032	1, 82	.001	.611		

Note. SS = sum of squares; MS = mean square; PPVT = Peabody Picture Vocabulary Test.
* $p < .05$.

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