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Incidental Word Learning through Multiple Media: A Review on a Case for the Theory of Synergy

Susan B. Neuman*

Department of Early Childhood and Literacy Education, New York University, New York, United States

***Corresponding author:** Neuman BS

Department of Early Childhood and Literacy Education, New York University, New York, United States

E-mail: sbneuman@nyu.edu

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Abstract

Children learn words through multiple media. In this paper, I argue that each medium's features, its structure, its method of handling materials adds a new dimension to children's knowledge and the means they employ to attain knowledge. Through an experiment that engages preschoolers in repeated presentations of a single medium (e.g. video or books) compared to different media (e.g. video and books) I show how vocabulary development benefits from multiple media presentations. Rather than detract from literacy learning, multiple media may provide an additional set of processing tools, which in combination with others contributes to vocabulary development.

Keywords: Incidental word learning; Multiple media; Synergy

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Introduction

Since Marshall McLuhan's elliptical phrase, "the medium is the message" [1], there has been a continuing and broadening debate on the influence of media in shaping cognition. Much of the debate has focused on whether or to what extent media should be used in instruction and how they might maximize children's learning [2]. The argument centers around the relative role of the characteristic symbol system of such media as screen media, print, computers-the combination of pictures, sounds, print and how these distinctive forms influence information processing demands. A number of scholars have made the case that each medium implicitly cultivates new set of skills for exploration and internal representation [3]. Therefore, as children are learning new words and concepts, they are incorporating the symbol systems that are implicit in each medium.

Extending this theory, Salmon [4] proposed that not only can a medium implicitly teach an information processing skill as these scholars had assumed, but by arousing certain attentional processes, it can become internalized as a "scheme of thought." Reporting on a number of intriguing studies, Salomon [5] found that students deficient in cue-attending after watching a film were able to internalize the zooming of a camera lens into a stimulus field, thereby increasing their ability to identify details in a visual montage. In another study, using computers to stimulate meta-cognitive skills in reading, students were able to transfer these meta-cognitive modes of representation when given a new condition. While Salomon acknowledges that these features may merely activate already established skills, he contends that these data show evidence that media codes were internalized, schematized, and then applied to new circumstances.

These scholars suggest that the medium may serve particular instructional functions, and consequently provide specific learning benefits to individuals [6]. The closer the match between the characteristics of the symbol system, the content of instruction and the strategies to be learned, the easier it is to acquire vocabulary and comprehension. This has important implications for instruction, suggesting that multiple media presentations have the potential to be more powerful than a single medium alone. In contrast to a zero-sum game inherent in the media effects literature, my work suggests that there is a critical synergy among media. Specifically, a theory of synergy suggests that skills acquired from two media may help children learn new vocabulary, construct meaning, and generate inferences in new contexts [7,8].

Literature Review

We built our case for the potential of synergy in an analysis of word learning and comprehension over three phases. In the first phase, we examined children's learning of target words in one of two formats, traditional printed book and video to determine if there are differences by medium. In the second phase, we then examined the differential effects of word learning and comprehension in situations where children are either exposed

to a repeated presentation of the same medium or different media. And in our third phase, we replicate this design in a new story context to determine if the effects are maintained. In each case, we examined their vocabulary learning and comprehension.

Methods

We adapted two screen media stories from "Peep and the Big Wide World," two 9-minute segments of a preschool science series on PBS. Using actors, we inserted in scripts nine novel target words, three of which were nouns, three adjectives, and three verbs, all of which were unknown to the average preschoolers. We then developed comparable stories in traditional print, using the same pictures from the program.

We recruited 140 preschoolers from a local Head Start program to participate in the project. Prior to the intervention, we assessed their vocabulary knowledge using researcher-developed and standardized measures. Then, based on random assignment, individual children were either assigned to a repeated reading or hearing of the story from a single medium (e.g. book or video), or different media (book and video). We repeated the experiment two weeks later using a different story.

Results

One of our interesting findings is that children learned words incidentally from either medium. After two viewings or readings, preschoolers learned over four words without explicit instruction. This suggests that both media are useful for helping children learn novel words. Then in the next phase of the experiment, children either watched or were read to using a single medium, or both media. Our results indicated that in both cases, children identified more words from two comparable media presentations more than a single medium, and these differences remained whether these words were embedded in the same story or in a different story.

This suggests that each medium's symbol systems may have resulted in providing a more powerful intervention. Finally, we were interested in whether some words were easier to learn than others. We next determined whether these findings were specific to a particular word class. Conducting a MANOVA we found a significant difference in pretest to posttest growth by word class, $F(1,135)=23.05$, $p<0.001$. Children significantly improved their performance from pre-to posttest in all three word classes: nouns, adjectives, and verbs. However, at the same time, children learned more nouns than either adjectives or verbs. These words tend to conjure mental imagery which promotes learning and retention.

In short, our results of this analysis indicated that children in all groups learned words from the media. Regardless of condition, gain scores from pretest to posttest, overall, were significant, $F(1,135)=54.92$, $p<0.001$. Furthermore, there is evidence that word learning was, to some extent, context-independent. Children seemed to learn the target words whether they were presented in the same story or in a different story $F(1, 135)=0.07$, $p=0.799$. However, in all cases, children learned more words through different media rather than a single medium presentation.

Discussion

A theory of synergy is based on the premise that existing medium presentations are qualitatively different, and that used wisely, multiple media presentations can quantitatively improve children's learning. It also suggests that using critical design features, as scholars like Richard Mayer [9] have demonstrated (spatial contiguity, temporal contiguity, coherence, modality and redundancy), we might use this synergy principle to construct multimedia presentations that further enhance transfer and retention. Second, although much less is known about who learns best from multimedia, initial studies [10] suggest that children who have limited prior knowledge seem to benefit more, as shown in evidence of higher retention and transfer than others. For example, in other studies [11], we have found that the screen medium's use of attention-directing cues and participatory formats (e.g. Blue's Clues) which encourage children to more actively participate in the episodes supports word learning and comprehension. Our eye-tracking studies suggest that screen media can help direct children's attention, especially for children who have limited prior knowledge [12].

These results, if further replicated, might have enormous implications for poor readers. Although the results are preliminary, it seems that verbal and visual representations tend to bootstrap children's knowledge while in the process of learning the basic skills of decoding.

For children with limited prior knowledge, such bootstrapping might be especially useful in helping them establish initial schemas at the very outset of hearing or listening to a story, leading to better comprehension of materials. For example, in our study using the "One-Ton Jewel," we found one poor reader mistakenly interpreted the "white dwarf" in a science program as a dead "rap" star, setting her whole interpretation of the story in a search about music schema. Third, research [13] has demonstrated that repeated readings of stories positively influence children's story comprehension. Children seem to be able to use new vocabulary, and recall story details in more elaborated forms after hearing a story multiple times.

Our experience suggests that repeated experiences with stories in multiple media, however, might be superior to multiple applications in the same medium. When only words are presented and heard, the most likely cognitive process will be to decipher words, organize words, and integrate words with prior knowledge. Yet when words, pictures, and moving images are presented, for example, then learners can also engage in selecting images, or organizing images and integrating words, pictures, and moving images. In other words, children benefit from a "redundancy effect" [13]. Considering the distinctiveness of medium presentations, and that each is a delivery system

for information, then it makes sense that multiple deliveries of information are better than only one delivery.

Conclusion

Finally, while the virtue of books is widely acknowledged as an avenue for learning, television, video, and pictures have only rarely been recognized. What we now know is that screen media has the capacity to be used constructively for learning. Just as children are exposed to a steady diet of genres and levels of reality and fantasy in reading, so too should they be exposed to stories in a variety of media presentations. Such experiences may enrich children's understanding of stories and events and motivate them to become engaged in literacy practices and literacy learning.

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