Video storybooks as a bridge to literacy

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Low-Income Immigrant Pupils Learning Vocabulary through Digital Picture Storybooks

Abstract

Children from immigrant, low-income families in the Netherlands start school with a limited vocabulary in the language of instruction, thus place them at risk for developing reading difficulties. Exposure to books is assumed to reduce their L2 vocabulary disadvantage. In this experiment, we examined the effects of video storybooks on the receptive and expressive language of 5-year-old children. Children (N = 92) were exposed repeatedly to the digital storybook. The story was presented with either static or video images. Children in the control condition played with a nonverbal computer game. Children's receptive and expressive book-based vocabularies were assessed. Results revealed that children learned words receptively and expressively, however, seldom the same words both ways. Both treatments benefited receptive and expressive vocabulary, however, readings with the addition of video were found to be especially effective for expressive L2 vocabulary acquisition.

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Introduction

Some immigrant groups like the Turkish and Moroccan in the Netherlands belong to the most disadvantaged groups in Europe with lower educational attainment and subsequent employment levels than other minority groups, even in the second generation (Heath, Rothon, & Kilpi, 2008). Educational disadvantages can largely be explained by parents' low socioeconomic origins as they come from less developed non-European countries. A vocabulary lag occurs in both the first (L1) and second language (L2), probably because input in both languages is negatively influenced by socioeconomic and sociolinguistic factors (Leseman, Mayo, & Scheele, 2009), that puts them at risk for developing reading problems (Duursma, Romero-Contreras, Szuber, Proctor, & Snow, 2007; Juel, 2006; Nation, 2008; Stanat & Christensen, 2006).

Wide reading plays a major role in the vocabulary development of readers (Nagy & Herman, 1987; Stahl & Fairbanks, 1986; Cunningham & Stanovich, 1998). For young, preliterate children, storybook reading has been shown to lead to improvements in vocabulary development. Storybooks familiarize children with language beyond the basic level of lexical knowledge needed for informal, everyday interpersonal communication, thus preparing children for learning to read (e.g., Bus, van IJzendoorn, & Pellegrini, 1995). Storybook reading is also assumed to be an effective device for L2 children to make up for their word poverty (Broekhof, 2006; Stolwijk & Peters, 2006) despite the fact that story texts may be difficult to comprehend for low-income immigrant kindergarten children due to a high quantity of unknown words (Carver, 1994; Hu & Nation, 2000; Stahl, 1999).

In the majority of Dutch primary schools, there is currently one computer per five pupils, and access to the Internet (Kennisnet ICT op school, 2008). Digital storybooks available via the Internet may offer new opportunities for young L2 children, who suffer from word poverty when entering school. Normally an adult scaffolds text understanding but when books are presented on screen children are mainly focused on the computer as a conveyer of meaning (Smith, 2001). Most studies of storybook reading (e.g., Beck & McKeown, 2001; Biemiller & Boote, 2006; Frijters, Barron, & Brunello, 2000; Hargrave & Sénéchal, 2000; Raikes et al., 2006; Sénéchal, LeFevre, Thomas, & Daley, 1998; Wasik & Bond, 2001) have included interaction with an adult as an incentive for learning from book exposure. The current study examines the effects of digital storybook reading without additional adult-child interaction.

Storybooks via the computer often include video representations of the scenes. In contrast to the first generation of video storybooks (Labbo & Kuhn, 2000; de Jong & Bus,

2002; Unsworth, 2003), recent additions are designed to dramatize the story text, rather than simply being just amusing or funny. For example, the spoken text "*Winnie the Witch picks up her magic wand, waves it once and Abracadabra. Wilbur was no longer a black cat. He was bright green"* is accompanied by an illustration that depicts Winnie with a magic wand, a wave of green coming down, and a green cat looking perplexed. In the video storybook, visual elements that must normally be compressed into just one static illustration are split into several smaller portions, each portion representing a small part of the narrative. The video of the above-described scene with Winnie the Witch turning her cat into a green cat successively shows Winnie picking up her wand, waving it, using the magic charm, a green wave coming down, and the cat turning from black to green, thereby connecting these visual representations with parts of the narrative. Sounds combined with music back up the events; for instance, when Winnie waves her wand we hear the swishing sound while the music swells.

The close temporal proximity of words and images in video storybooks makes it more likely that the learner is able to build mental connections between verbal and visual representations and thus develops memory traces that connect details of pictures with phrases in the narrative (Mayer, 1999; 2001). According to Paivio (2007), visual imagery plays an important role in vocabulary development. He explained the finding that concrete words are more easily learned than abstract words (Paivio, 1986) by assuming that drawing on both forms of coding - verbally and nonverbally - makes it is easier to retain words. When concretizing is forced by presenting spoken words in close proximity to visualizations, like in video storybooks, we may expect a positive effect on vocabulary tests.

An additional aim of this study was to examine the effects of storybook reading on the depth of vocabulary knowledge of preliterate L2 children. Static illustrations have been found to help children to narrow down possible meanings of unknown words and phrases (Ninio & Bruner, 1978; Snow & Goldfield, 1983; Weizman & Snow, 2001). However, as static illustrations represent the complete event, it is relatively hard for children to know which part of the illustration to focus on in order to form strong associations between words and visual details in pictures. Children may remember something about the visual context in which they heard a word (Sénéchal, 1997), leading to improvements in receptive vocabulary, i.e., the ability to identify semantic content, but the association might not be precise enough to store word knowledge that is needed for expressive vocabulary tests, i.e., producing the correct word for an image (Sénéchal & Cornell, 1993; Stahl, 1999).

Video, on the other hand, often presents corresponding portions of the narrative and details of the picture at the same time, even showing motion and change, thus enabling the learner to connect visual images with words. Instead of exposing children to a complete illustration depicting various details all at once, children's attention is guided to visual details corresponding with the text. In line with Paivio's (2007) cognitive theory, video would thus be more likely to promote stronger memory traces, which would be sufficient to result in higher scores on expressive vocabulary tests. The scaffolding provided by adults during book reading may have a similar effect on expressive vocabulary, stimulating responses to relevant details in the picture while reading the story text (Sénéchal, 1997).

It seems plausible that word identification (receptive vocabulary knowledge) precedes production of semantic content (expressive vocabulary knowledge) (e.g., Henriksen, 1999; Laufer & Goldstein, 2004; Melka, 1997; Nation, 2001; Van Kleeck, 2003). Thus, we might assume that words from the same book will not be learned both ways, receptively and expressively. Rather, we could assume that for words learned expressively, an initial understanding of the words was already in place (Stahl & Stahl, 2004). In this study, we hypothesize that both video and static storybooks will affect receptive as well as expressive vocabulary, but that video is especially beneficial in constructing precise associations between images and words thereby promoting expressive vocabulary.

As a basic principle we assumed that children might not learn new words incidentally from storybook exposure until they have had multiple encounters with the same storybook (Biemiller & Boote, 2006; Justice, Meier, & Walpole, 2005; Sénéchal, 1997; Stahl & Stahl, 2004). The memory of information about words will often not be strong enough to be accessible to a child's conscious mind unless books are repeatedly read (Stahl, 1999). For the time being, we can only guess what the optimal frequency will be. Based on existing research, three to four repetitions seem to be optimal for vocabulary learning from static books (e.g., Biemiller & Boote, 2006; Justice, Meier, & Walpole, 2005; Penno, Wilkinson, & Moore, 2002). A previous study (Verhallen, Bus, & de Jong, 2006) revealed that low-income immigrant children could recount at most half of the story elements after hearing the story four times. Thus, it may be necessary to have at least four repetitions for children to actually learn new vocabulary.

This Study

The purpose of this study was to examine the relative effects of two storybook presentation formats – static and video format – on children's vocabulary development. Specifically we addressed two questions:

(1) Does presentation format effect the development of vocabulary for preliterate, immigrant children?

(2) Are receptive and expressive vocabulary differentially affected by presentation format?

In addition to these two main questions, two secondary questions were addressed in the study:

(3) Is the language of an age-appropriate storybook in L2 language difficult to understand for second language learners from low-income immigrant families due to a high quantity of unknown words (Carver, 1994; Hu & Nation, 2000; Stahl, 1999)?

(4) Does expressive learning of words occur primarily for words that are already known receptively?

To test effects of video storybooks, we conducted a randomized experiment in which children were assigned to either a video or static picture condition and given multiple exposures to the same storybook. The effects of presentation format on both receptive (identifying the correct picture with a choice of four pictures) and expressive vocabulary (completing short stimulus sentences accompanied by a picture) knowledge were examined. Further, to examine whether words learned expressively were those that were already known receptively, we used the same set of 42 difficult words from the target storybook in both tests. Children from two immigrant groups, Turks and Moroccans, were included to assess the generality of the findings for children from different cultures.

Method

Design

We carried out an experiment with two different treatment conditions (video format vs. static format). Children who qualified for participation in the study were randomly assigned to one of the two treatment conditions or a control condition. Data collection was spread over a period of two years. To prevent school as well as class effects, we randomly assigned children from each classroom within each school to conditions, taking care that

equal numbers of gender and ethnic group were present in each condition. A maximum number of 3 children per classroom was eligible for participation.

Participants

Children qualified for participation if they were five-year-old and had ethnic minority parents with a low educational and occupational level. All children came from families that spoke Turkish or Moroccan-Arabic or Berber at home, native languages for the most widespread minorities in the Netherlands (Van Praag, 2003). As is common in the Dutch school system, all children were taught Dutch, the language of (reading) instruction, starting at the age of four. All participating schools received the highest additional staff funding for children from ethnic groups with parents who have received only a few years of vocational training or are performing unskilled labour, as these children are considered most at risk for school failure (Bosker & Guldemond, 2004).

The selection of subjects was made in three steps:

(1) We contacted inner-city schools in The Hague with at least 80% immigrant children from low-income families.

(2) With the help of information provided by teachers and school administrations we made a first selection of pupils on the following criteria: (a) five years old, (b) spoke Turkish or Moroccan-Berber at home, (c) low-income, (d) received a second language educational program since they the day they became four, and (e) had no special language impairments or special educational needs.

(3) Next, three selection tests were applied individually to select children according to the following criteria: (a) scoring at or below the 50^{th} percentile on a standardized Dutch language test for kindergartners, (b) nonverbal intelligence in the normal range, and (c) not familiar with the target story. From the 130 children who were assessed 21 children were excluded because they scored average or higher on the language test. Five children were excluded due to low scores on the Raven test or familiarity with the target book.

We continued the recruitment process until a sufficient number of eligible subjects was found. Although the Turkish and Moroccan populations are the two largest minority groups in the Netherlands, inner city schools are populated by children with a wide variety of first languages. Therefore, we had to recruit subjects from several inner city schools (N = 15) and classrooms (N = 76).

Table 1 shows the characteristics of the four treatment groups and the control group involved in this experiment (N = 92). The groups were similar in ethnic background

(each group was about half Turkish and half Moroccan), educational and occupational level of the parents (all parents had only a few years of vocational training or performed unskilled labor), age (*F (*2, 89) = .17, *n.s.),* gender, standardized scores on the *Cito Language Test* (*F* (2, 89) = .39, *n.s.)*, and standardized scores on the *Raven's Colored Progressive Matrices* (*F* (2, 89) = 2.05, *n.s*).

Table 1

Characteristics of the Treatment Groups

	4Xvideo (*n*=34)	4Xstatic (*n*=29)	Control (*n*=29)	Total (*N*=92)
% of at-risk children	100	100	100	100
Age in months	67.35(2.82)[2]	67.28(3.44)	66.93(2.70)	67.20(2.97)
% girls	50.00	51.72	48.28	50.00
% Moroccans	50.00	48.28	51.72	50.00
RPM[1]	4.47(1.48)	4.30(1.48)	5.12(1.97)	4.62(1.67)
Cito Language Test	59.12(7.04)	57.97(6.18)	57.76(6.49)	58.33(6.56)

Note[1] RPM: *Raven's Colored Progressive Matrices*

Note[2] Mean scores with standard deviations in parentheses

Procedure

Each child worked at the computer in a room other than the classroom for four separate sessions spread over approximately nine days. The only other persons present in this room were the experimenters: one instructed the child and the other was responsible for video registration.

To guarantee that approximately the same amount of time was spent on the static and video version, the experimenter was in control of the pace and loaded the pages of the static version. Duration of one exposure for both versions was approximately 5 minutes.

Intervention programs

The commercially available CD-ROM Heksenspul [*Winnie the Witch*] (Thomas & Gorky, 1996) is a Dutch adaptation of a CD-ROM that originally appeared in English. The CD-ROM included two versions, one with static illustrations and one with video. Both included the original literary text, setting and characters as well as preserved the distanced relationship between viewer and characters (Unsworth, 2003). In both versions the same

story text is read out loud by the same professional narrator. The static version consists of 22 screens with pictures depicting scenes from the story. For instance, the second screen of the static version depicts a picture of Winnie reading a book sitting in her kitchen chair. Except for Wilbur's green eyes and Winnie herself, everything in the kitchen (e.g., the stove, kettle, and all other objects) is black. The scene reflects the text content, which says that Winnie lives in a black house with her black cat, Wilbur, and states that this is how the trouble begins. The text is rendered orally after a click on an icon, without additional music or sounds. In the video version of the same story, the backgrounds, as well as the story characters, look exactly the same as in the static version except that the figures are animated. Cinematic techniques like zoom, pan and edits were used to create the impression of a film. There is accompanying music and sound that matches the scenes. For the most part, representations are to the point so that animations do not distract children's attention from main story events (as may happen with inserts that are incongruent or inconsiderate with the story text) (de Jong & Bus, 2002; Labbo & Kuhn, 2000; Unsworth, 2003). In line with the principle that story context is the best aid to learning new vocabulary (Stahl & Fairbanks, 1986), the motion pictures were designed to represent events described by the text. Thus, the basic principle of the video book's design was to highlight story content rather than instruct difficult words.

In sum, the story content and story language, the voice in which the story was told and the presentation on a computer screen were identical; the only difference between the two presentation formats was that one included a video representation of events with matching music and sounds and the other just static illustrations. The esthetic and artistic qualities of the visual representations were similar. Neither of the two versions included distracting animations or games unrelated to the story content.

The story of Heksenspul [Winnie the Witch] had all the characteristics of a classical story scheme of children's stories: A problem (everything in the house is black, including the cat, causing the witch to stumble over her cat time after time), a series of solutions (the witch first transforms the cat into a green cat and later into a cat with all colors), and then new problems and new solutions to these problems until the most obvious solution is found (transforming the house into a house with colors and the cat into a black cat). The text of Winnie the Witch is a good example of typical book language, with a rather sophisticated vocabulary with a high number of rare words (e.g., purring, furious, worrying, ridicule, magic wand, rose bush, carpet) and complex phrases (e.g., "One day, after a nasty fall, Winnie decided something had to be done").

Selection tests

Children's language development was assessed with a standardized test, the *CITO Language Test for Senior Kindergarten Children* (CITO [Centraal Instituut voor Toets Ontwikkeling], 1996), encompassing competencies like vocabulary, listening skills or listening comprehension, print knowledge, and phonemic awareness. Children scoring at or below the 50th percentile of the norm group were included. About 70% of tested low-income immigrant pupils met this criterion.

Nonverbal intelligence was assessed with the Dutch version of *Raven's Colored Progressive Matrices* (Van Bon, 1986). Only children scoring within the normal range were included.

Familiarity with the target book was tested by presenting pictures from picture storybooks, including Winnie the Witch. When children's responses indicated that they were familiar with Winnie the Witch, they were excluded from further participation.

Vocabulary Tests

To test vocabulary prior to and following the intervention two tests, a receptive and expressive vocabulary test, were constructed. Out of all 95 different story words (encompassing all nouns, verbs, and adjectives in the story) 42 low frequent words were selected (Schrooten & Vermeer, 1994), among which were 21 nouns, 7 adjectives, and 14 verbs. This selection procedure allowed us to test the differential effect of static versus video on the most difficult words of the text.

Receptive vocabulary – Among three distracters, children chose the illustration that represented the target item. The target item's position on screen varied across test items. To familiarize children with the test format one practice item preceded the actual test items.

Expressive vocabulary – Children filled in the last word of a stimulus sentence that the experimenter orally presented while the computer screen showed a matching picture from the digital storybook. For instance, "the cat sat on the….. (carpet)" with a picture of Wilbur the cat sitting on the carpet. One practice item was used to familiarize children with the test. Pre- and post test were identical.

The inter-rater reliability for both tests was high, on average .99.

Test order. To diminish the chance of word learning from testing the expressive vocabulary test was administered in the first test session and the receptive vocabulary in the second test session.

Statistical Analyses

ANCOVAs were carried out on two dependent measures separately, receptive and expressive vocabulary, after adjusting for preexisting group differences (Tabachnick & Fidell, 2007). Covariates were scores on the respective pretests as well as contrast coded ethnicity. Ethnicity was included as covariate because overall, Moroccan children scored higher than Turkish children, indicating that the Moroccans were better prepared for learning L2 from book exposure (cf. Leseman et al., 2009). Two a-priori contrasts were tested: one contrasting the two treatment groups with the control group and the other contrasting the video with the static group.

Results

Descriptive results

In Table 2 means and standard deviations on the receptive and expressive vocabulary pre- and posttests, broken down by condition, are reported. Similar to findings from previous research, (e.g. Laufer, 1998; Nation, 1990; Van Kleeck, 2003), receptive vocabulary was more than three times larger than expressive vocabulary. At the outset of the experiment children knew 53.4% (*SD* = 9.42) of the words on the receptive test, compared to only 15.9% (*SD* = 6.17) of the same words presented on the expressive test. On the receptive vocabulary measure, students identified on average 3.6 (8.5%) more words correctly on posttest than they identified on the pretest. On the expressive vocabulary measures, students named on average 4.2 (10.1%) more words correctly on the posttest than they named on the pretest.

Effects on receptive vocabulary

Assumptions of analysis of covariance (ANCOVA) were met (Tabachnick & Fidell, 2007). After adjusting for pretest score (F (1, 87) = 79.72, p<.000, η_p^2 = .48) and ethnicity (F (1, 87) = 6.25, p<.01, η_p^2 = .07), there was a statistically significant treatment effect found for receptive vocabulary, F (1, 87) = 14.26, p<.000, η_p^2 = .14, MSE = 11.91. An η_p^2 of .14 equals a Cohen's d of .85, which indicates a large effect of treatment (Cohen, 1977). Mean score for treatment groups was 26.94 words (*SD* = 3.46) compared to 23.98 words *(SD* = 3.48) for the control group. No significant difference was found in receptive vocabulary between the video (*M* = 27.15, *SD* = 3.46) and static group (*M* = 26.73, *SD* = 3.45).

Effects on expressive vocabulary

After winsorizing one multivariate outlier on the expressive vocabulary test (Hampel, Ronchetti, Rousseeuw, & Stahel, 1986), assumptions for ANCOVA were met. After adjusting for pretest score (F (1, 87) = 65.49, p<.000, η_p^2=.43) and ethnicity (F (1, 87) = 4.34, p<.04, η_p^2=.05), a significant effect was found for expressive vocabulary, F (1, 87) = 17.50, p<.000, η_p^2 = .17, MSE = 8.36. The magnitude of the partial eta-squared is similar to a Cohen's *d of* .96, meaning a strong effect size (Cohen, 1977). Mean score for the treatment groups was 11.72 words (SD = 2.92) compared to 8.91 words (SD = 2.96) for the control group. Statistically significant differences were also found between the video and static condition, with children in the video condition scoring higher on expressive vocabulary (M = 12.55, SD = 2.94) than children in the static condition (M = 10.89, SD = 2.89), F (1, 87) = 5.08, p<.03, η_p^2 = .06, MSE = 8.36. The effect size equals a Cohen's d of .57, a medium to large effect size (Cohen, 1977).

Table 2

Mean Scores and Standard Deviations on the Receptive and Expressive Vocabulary Pre- and Posttests (max = 42)

Vocabulary		Video (n=34)	Static (n=29)	Control (n=29)
Receptive	pre	23.00(3.77)	22.62(3.59)	21.59(4.48)
	post	27.62(4.33)	26.85(4.93)	23.31(5.22)
	post[1]	27.15(3.46)	26.73(3.45)	23.98(3.48)
Expressive	pre	7.44(2.31)	6.72(2.84)	5.69(2.39)
	post	13.32(4.00)	10.93(4.55)	7.97(2.93)
	post[1]	12.55(2.94)	10.89(2.89)	8.91(2.96)

Note. [1] The posttest scores adjusted for the pretest scores and ethnicity

Qualitative Results

To address the question of whether expressive vocabulary skills build on receptive skills, we focused on children in the two treatment conditions (N = 63). As shown above, children in both conditions significantly improved both receptive and expressive vocabulary but results also revealed that children learned few words both receptively and expressively. Out of the 42 words, children learned on average only 1.25 (SD = 1.64)

words both receptively and expressively. Children were more likely to learn a word receptively but not expressively, with children across the two treatment groups learning 6.79 (*SD* = 1.84) words receptively but not expressively. Children were least likely to learn a word expressively but not receptively (*M* = 0.62 words, *SD* = 0.77). A Wilcoxon test of the differences revealed that a significant greater number of words were learned receptively than were learned both receptively and expressively, $z = -6.82$, $p < .000$. In sum, words that were completely unknown to the children on both the receptive and expressive pretests tended to be learned receptively, but not expressively.

In our final analysis, we addressed the question of whether children are more likely to learn words expressively when they already know those words receptively. Results revealed that, on average, only 1.87 (*SD* =1.88) of the words learned expressively during the study were words not in the children's receptive vocabulary. This compares to an average of 3.73 (*SD* = 2.10) words learned that were in the children's receptive vocabulary. A Wilcoxon test revealed a statistically significant difference, $z = -4.78$, $p < .000$, supporting the hypothesis that the chance to learn words expressively is raised substantially when children understand those words and already have them in their receptive vocabulary. Findings thus support the hypothesis that development proceeds from more superficial receptive knowledge to deeper expressive knowledge.

Discussion

Our results revealed that video books are more beneficial to young second-language learners' expressive vocabulary development than static books. Children learned 6 words (*SD* = 3.22) expressively in the video condition compared to 4 (*SD* = 3.40) in the static condition, a gain of 14% and 10%, respectively. The additional effect of video is rather impressive, especially when compared to the effects of teacher-led book reading sessions, which did not include explanations or instruction, but did include reading intonation, facial expressions, and an adult who corrects distractive behavior (e.g., Biemiller & Boote, 2006; Elley, 1989; Penno et al., 2002). For example, after four adult-led whole class readings, Biemiller and Boote (2006) reported gains on an expressive vocabulary test of 9%, a number comparable to the gains we found for the static storybooks, but less than what we found for the video storybooks.

Both the video and static format resulted in vocabulary learning, but more knowledge about words was acquired via the video format. No differences were seen in receptive vocabulary learning between video and static conditions, implying that receptive

vocabulary knowledge is formed more easily than expressive vocabulary knowledge. Thus, for an initial understanding of words it is sufficient to have static pictures as an aid (Bloom, 2001), a finding similar to that of Sénéchal's (1997). It may be the case that, as described by Stahl (1999), children might remember something about an unknown word in a text such as an illustration or the context in which the word appeared. Such memory traces may not be strong enough for the children to use the word in response to a picture, but may be sufficient for them to recognize the picture that matches the word.

The effectiveness of video storybooks for learning expressive vocabulary corroborates Paivio's (2007) cognitve model predicting that visual images, and probably also sound and music, have a profound influence on learning vocabulary. When nonverbal representations and language are bound together as in video storybooks language exposure sets up more effective memory traces that result in heightened scores on an expressive vocabulary test. However, based on the present findings we cannot exclude an alternative explanation, namely that animated pictures or additional sounds and music are superior in holding children's attention thereby promoting more learning (Alwitt, Anderson, Lorch, & Levin, 1980).

We have to conclude that age-appropriate picture storybooks are difficult to comprehend for low-income immigrant kindergarten children and for that reason especially this group may need video support in learning new vocabulary. The results indicate that age-appropriate books for kindergarten children include many words that are hard to understand for 5-year-old second language learners from low-income families. About half of the 42 selected words were not known receptively and more than 35 words were not known expressively at the outset of the experiment, indicating that they were difficult words for the immigrant groups in this study. Based on our results we estimate that a minimum of almost 4% of the 530 words in the Winnie the Witch text would not be understood by low-income immigrant children. This percentage of unknown words amply exceeds the permitted maximum quantity of 2% unknown words to be able to understand a text (Carver, 1994; Hu & Nation, 2000; Stahl, 1999). To keep up with the more transient nature of an oral rendition of the story text, an even higher coverage is most likely needed (Nation, 2006). Similar to first language learners, expressive vocabulary skills are less advanced than receptive vocabulary skills for immigrant children (Van Kleeck, 2003). A 16% score on the expressive vocabulary pretest implies that an estimated 7% of words in the Winnie the Witch text were not a part of children's expressive vocabulary, even though the children might have some knowledge of the meaning of some words.

Digital book reading bolstered learning new vocabulary both receptively and expressively. On average, scores on receptive vocabulary improved more than 4 words (*SD* = 3.81) and scores on expressive vocabulary more than 5 words (*SD* = 3.31). Studying individual vocabulary acquisition patterns, we found that the set of words that were learned receptively differed from the set learned expressively, with only a few words from the extensive set of story words acquired both ways. Thus, to estimate the effects of book reading, words should be assessed both ways, receptively and expressively. Surprisingly, many book reading studies assess either receptive or expressive vocabulary, but not both.

A unique result of the present study is that, for the most part, words are learned expressively only after children are, to some extent, familiar with their meaning. Despite helpful visualizations like video, words that are unknown receptively are rarely learned expressively. This suggests that the words most likely to be learned expressively from storybook reading are the ones that are known receptively (Stahl & Stahl, 2004), indicating that vocabulary acquisition occurs step by step, and that synchronizing phrases in the narration with portions of the picture is vital for young L2 children to learn new words expressively.

Limitations and future directions

As both Moroccan as well as Turkish children suffer from word poverty, findings suggest that children benefit from promoting visualizations in learning vocabulary, independent of language and culture. Effects of video in groups less behind in linguistic skills awaits further research.

Initial associations between word and scene may have been sufficient to make correct choices between four pictures in the receptive vocabulary test, with the result that there were no differential effects of the video and static book. Another format of the receptive test might be more favorable to video. For instance, making a choice between visual details that refer to the same scene might have resulted in more variety between the two experimental conditions.

By assessing vocabulary acquisition from digitized storybook readings, we concentrated on accuracy of word knowledge, receptively as well as expressively. However, there are other ways of testing vocabulary, for example, vocabulary fluency. Using such measures might have provided richer information about word acquisition in these young children and about differential effects of book format (Meara, 2002).

Practical implications

While the virtue of book sharing is widely accepted as an avenue for expanding vocabulary, video storybooks with extra features working as scaffolds for learning vocabulary have only rarely been acknowledged to have the same value as book sharing. What we now know is that video storybooks bolster learning of expressive vocabulary, which is associated more with literacy acquisition than receptive language (Snow, Tabors, Nicholson, & Kurland, 1995; Scarborough, 1998). A growth rate on expressive vocabulary of 6 words per book accounts for an estimated gain of about 300 new words per year. This rate is impressive considering that the increase was seen after only four encounters with a video story. If one considers that one book takes approximately 5 minutes, two computer sessions of approximately 40 minutes in total would result in 12 new words per week. Thus, children's expressive L2 vocabulary could expand about 600 words per year if they were to watch video storybooks for approximately three quarters of an hour a week. Of course, this assumes that conditions are favorable: children are as attentive even when there is no adult sitting next to the child, and the stimulus books include a large diversity of words such as found in Winnie the Witch. We imagine, and have found in other ongoing experiments, that children like to "read" a series of books in one session, similar to the format of children's television shows, thus raising practicability of living books as part of the preschool and kindergarten curriculum. As Internet sites offering a growing number of digitized storybooks are becoming more and more available in the Netherlands, kindergarten children can virtually roam through these digital libraries, select books and "read" and "reread" storybooks to their hearts' content, independent of adults. The use of video storybooks might be an important addition to classroom practices especially classrooms with many low-SES L2 learners.

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