



Digital picture storybooks

Online ‘living books’ combine the traditional storybook with animation and sound. Experts from Leiden University have been exploring their potential, particularly for struggling readers

IN THE NETHERLANDS websites offer digitised versions of recently published, award-winning picture storybooks for three- to six-year-olds. Additional features such as animations, music, and sound not only increase young children’s reading pleasure, but may also support story and text comprehension. Unlike the first generation of “living books” recent additions are designed to dramatise the story text, rather than simply adding amusement. For example, in one animated story the “reader” can clearly see the feats of a daredevil dad trying to rescue his son, Tim. The animation directly reflects the narrative, with dad taking enormous risks

racing through traffic and jumping from a bridge. Researchers from Leiden University have been exploring ways to make living books interactive, and using children’s responses to adapt content. As the number of living storybooks available on the internet increases, this type of research is imperative.

Living book websites may offer new opportunities for young children from families with low literacy levels, who suffer from word poverty when they enter school. As semantics play a major role in learning to read, many pupils from poorly educated families need book reading as a vocabulary acquisition device. Semantics are not only

important to comprehend text from Key Stage 2 and beyond, but also very early in the word-recognition process. Reading interventions familiarise young children with language beyond the basic level of lexical knowledge for informal, everyday communication. Based on our research, we estimate that making reading books part of children’s lives would substantially reduce the 100,000 Dutch children between two and five who are at risk of reading problems.

The economist Heckman demonstrated in his 2006 paper that the financial return from early literacy intervention may be much higher than the return from language promotion later in a child’s schooling. Digitised picture storybooks may offer a way of intensifying book reading without high costs or creating too great a burden for teachers. Texts can be “read” without adult support because an oral rendition is available instead of, or in addition to, the printed word. Internet sites with a substantial number of digitised books thus enable children to virtually roam through digital libraries, select books, and “read” and “re-read” storybooks to their hearts’ content, independent of adults. However, the sites do offer interactive benefits for teachers, with the possibility for them to be informed by email or SMS about book exposure and therefore intervene as necessary. Our research over the last five

years has revealed another advantage of living books. The extra features in animated picture storybooks work as scaffolds for learning the many words that are unknown to children suffering from word poverty. Book sharing was shown to affect vocabulary knowledge especially when reading was combined with clarification about the meanings of words, by pointing at pictures and highlighting details mentioned in the text. Animations in living books seem to be an alternative, promising way to clarify unknown words in a book, especially when vocabulary is lacking.

How do living books bolster learning new vocabulary? In traditional printed picture storybooks illustrations cement language, and thus support learning. However, it is often hard for children to connect illustrations to the story text, unless they receive ongoing support from an adult in shared book reading sessions.

Take, for instance, a static illustration in *Winnie the Witch*, depicting the witch with her wand and her green cat. Facets of the scene described in the text are shown in the picture, but it is hard to connect the image with the narration that explains how the cat was turned from black to green by waving the magic wand and reciting the magic spell. In the video version, by contrast, the process is made visible and we see how Winnie picks up her wand, waves it, uses the spell, and turns the cat from black to green, thus illustrating the successive sentences in the narration.

In fact, in living books visual elements that are normally compressed into just one static illustration are instead split into several smaller portions, each representing one element of the narration. By synchronising phrases in the narration with portions of the picture there is a higher probability that connections will be made between words and non-verbal information.

From a series of randomised experiments with children aged five and six with a limited-Dutch background, it appears that living books promote vocabulary growth more than books with just static illustrations. We found that, after 20 minutes, the time it takes to “re-read” one living book about four times, children’s vocabulary gained six out of the 42 complex words in the focal book. Pupils’ word knowledge did also improve as a result of spending the same time reading a static version of the same book, but growth was less substantial.

Similarly, video outperforms exposure to adult-led whole class readings that include reading intonation, facial expressions, and an adult who corrects disruptive behaviour. Critics have argued that video and other multimedia additions to storybooks are so overwhelming that children forget to listen

to the story text and just focus on actions in the video, thus not learning new vocabulary. However, our research has not supported the hypothesis that video distracts children or overloads their memory. By contrast, our findings corroborate Allan Paivio’s cognitive theory that language learning builds on the foundation of nonverbal representation, and that cementing language sets up effective memory traces resulting in heightened

Texts can be ‘read’ without adult support because an oral rendition is available instead of, or in addition to, the printed word

scores on vocabulary tests.

While the virtue of storybooks is widely accepted for expanding vocabulary, reading routines that include video storybooks tend not to be acknowledged as a further opportunity for young children suffering from word poverty. Our findings, so far, indicate that children’s expressive vocabulary may expand by more than 300 words per year when they watch video storybooks for 20 minutes a week (therefore by about six words per week), provided all relevant conditions are fulfilled:

- Children are attentive even without an adult sitting next to them, as happened in our experiments;
- The stimulus books include a large diversity of words thus enabling vocabulary growth; and
- Digital libraries include a sufficient number of books to expose children during a longer period to a variety of stories.

With two book reading sessions per pupil, per week, we would expect an increase in vocabulary to be twice as large, and amount to 600 words. As most living books do not take more than five minutes, we would recommend that children “read” two or more books per session. This is comparable to the format of children’s television shows, and a practical possibility for Reception and Key Stage 1 curricula.

A longitudinal experiment tested the predicted effects in a group of 135 Dutch pupils. Over a three-month period, five-year-old Dutch children struggling with early literacy skills were logged on to a digital library once a week. During sessions of 15 minutes children “read” and “re-read” two different storybooks without any help from the teacher or researcher. In some cases children were sitting in their regular classroom using earphones in order not to disturb their peers, and in other schools the

sessions took place outside the classroom because computers were in separate rooms. To prevent the children “reading” only two or three different books out of the five available, the site was programmed to allow a maximum number of repetitions. This experiment demonstrated that the children, after about 2.5 hours of “reading” and “re-reading” living books on the computer, had made significantly more progress on the Peabody Vocabulary Test (PPVT) than equally poorly performing control pupils from the same classrooms who did not use the living books. However, we noticed that when pupils’ vocabulary substantially lagged they benefited less from exposure to the digital library, probably because the selected books were rather complex to this group. We have, therefore, begun to experiment with a digital library that adapts the selection of available books to children’s comprehension levels, by including questions about the text and creating a feedback loop from their score to the book menu.

In conclusion, new routines with living books may not only enhance children’s enjoyment of reading, but also help them to comprehend storybooks and prepare them to become competent and avid readers later in life. Furthermore, the internet sites open up new possibilities for teachers in terms of monitoring young children’s reading activities.

About the authors

Adriana Bus, Marian Verhallen, and Verna van der Kooy-Hofland are based at Leiden University in the Netherlands. Adriana Bus, professor of education and child studies, has written about storybook reading among parents and children and the impact of multimedia storybooks on children’s reading skills. Marian Verhallen and Verna van der Kooy-Hofland are completing their PhD research on the efficacy of computer programs for young children at risk.

Further reading

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