# Understanding adult-child shared reading on the screen in a public preschool

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## Abstract:

*This research project aims to examine both the process and outcomes of preschool children's reading on the screen. Research questions included: what features of multimedia storybooks potentially contribute to children's reading, to what extent reading multimedia storybooks affects children's story comprehension, and how children enjoy reading multimedia storybooks. Twenty-four children aged five and six years (including 6 boys and 18 girls) participated in this project. Preliminary findings suggested that not only did multimedia elements (e.g. animation and background sounds congruent with the storyline) support children's comprehension, but they also contributed to children's enjoyment while reading on the screen. The paper adds to the current literature that explores electronic books in relation to children's learning outcomes by examining an affective dimension, i.e. enjoyment.*

**Keywords:** preschool children, multimedia storybooks, multimedia learning, story comprehension, enjoyment

## Introduction

Today's children increasingly own, access and use new technologies (e.g. tablets and handheld devices) on a daily basis. Surveys have also shown children's increasing exposure to fictional stories through television, Internet sites and videotapes. Various research studies have compared the effects of different media presentations (e.g. printed picture storybooks, television, audio and electronic storybooks) on preschool children's learning outcomes. Whilst acknowledging that not all on-screen stories are created equally, research has revealed that multimedia features (including animation, background sounds and music) in on-screen storybooks may be supportive of emergent literacy development (Bus, Takacs, & Kegel, 2015; Takacs, Swart, & Bus, 2015). Consistent with an evidence-based theoretical framework for multimedia learning (Mayer, 2005), empirical evidence supported the hypothesis that children's story and language comprehension can be promoted via multimedia. This evidence also highlights the importance of the congruence of the visual and auditory effects and nonverbal forms of representation with verbal representations (Verhallen, Bus, & de Jong, 2006).

Elsewhere, research has examined children's affective engagement with technologies. For example, McEwen and Dubé (2016) examined child-tablet interaction, engagement and enjoyment in Grade Two students using mathematics applications. Kucirkova, Littleton and Cremin (2015) conceptualised how children might feel when reading a digital storybook, where feelings could involve pleasure, enjoyment, and a sense of belonging and inclusion. They argued that this characterisation of young children's reading engagement could enrich the current knowledge on the affordances of digital books in relation to reading for pleasure (Kucirkova, Littleton, & Cremin, 2015).

Therefore, this research project examined both the process and outcomes of preschool children's reading on the screen. Specifically, this project exploress:
- the features of multimedia storybooks that potentially contribute to children's reading;
- the extent reading multimedia storybooks affects children's story comprehension; and
- how children enjoy reading multimedia storybooks.

**Method**

*Participants*
Participants included children aged five and six years (including 6 boys and 18 girls). Participants were recruited from a single preschool in Taichung City and were primarily Taiwanese. In terms of the frequency of parent-child shared reading, 37.5% of the participating children's parents reported reading to their children more than once a day, 16.7% 4-6 times a week, 33.3% 2-3 times a week, 8.3% less than once a week, and 4.2% never. All of the parents (N=24) said they used printed books for shared reading, with one also using electronic books and one using oral narratives. In terms of the frequency of parent-child joint usage of media (e.g. smartphones, tablets and computers), 8.3% of the parents reported using these more than once a day, 4.2% 4-6 times a week, 33.3% 2-3 times a week, 41.7% less than once a week, and 12.5% never.

Ethics approval was obtained from the ethics committees of National Cheng Kung University. All children who had parental consent were included in the study.

*Materials*
Based on the cognitive theory of multimedia learning, research suggests that stories presented with animation, background sounds and music that are congruent with the storyline help promote children's comprehension (Bus, Takacs, & Kegel, 2015; Takacs, Swart, & Bus, 2015). In accordance with this suggestion, TellyBear™ was selected and used as a tool to support adult-child shared reading in this project. TellyBear™ is a new e-picture book reader for children. It plays animations adapted from print books published by Grimm Press in Taiwan. Children can navigate through animated stories by touching the screen or by using a special pen. Three stories from Aesop's Fables in TellyBear™ were selected for use. Stories in TellyBear™ are presented with story-related animations, music, background sounds, text and oral narration of text. Only one child in the sample had a brief experience of using TellyBear™ at a hospital before participating in this project.

*Procedure*
This project took place in a quiet room in the participating preschool in March and April 2017. Twenty-four children participated in a session as individuals. Each session consisted of an adult-child shared reading mediated by TellyBear™ and a child retelling the same story

(including text and illustration) from the material used, as suggested by de Jong and Bus (2004). Every child read one multimedia storybook with adult support twice in one session. In order to maintain consistency, every child participated in shared reading with the researcher and retold the same story to a storytelling volunteer. All children completed one session of adult-child shared reading and child story retelling. After completing the session, every child was asked if they liked reading stories on TellyBear™ and what factors contributed to their liking. The entire procedure was video-recorded for later transcribing and analysis.

### Measuring tools
*Multimedia feature.*
Content analysis was conducted to identify the frequency of distribution of multimedia elements presented in the three selected stories. The coding scheme (Table 1) comprises the multimedia elements of simultaneous presentation, zoom shots and background sounds. These elements were found by Bus, Takacs and Kegel (2015) to be supportive of emergent literacy development.

**Table 1. Examples of each code** (examples taken from *The Dog and His Reflection*)

| Info type | Multimedia elements | Explanation | Examples |
|---|---|---|---|
| Visual | Simultaneous presentation | This element captures simultaneous presentation of animated pictures and oral text, in particular salient actions. | • So he leapt in the water (the action of a dog leaping in the water with a splash) <br> • His own piece of meat floated away in the river (the action of the meat floating away) |
| Visual | Zoom shots | This element captures motion that directs children's attention to a particulary element by zooming in or zooming out. | • So he leapt in the water (zooming in on the details of a dog leaping in the water) <br> • He saw his reflection in the water (zooming out to show the view of the dog and his reflection) |
| Auditory | Background sounds | This element captures auditory information, in particular sound effects. | • So he leapt in the water (the sound of a water splash) <br> • The greedy dog thought, "the meat in that dog's mouth looks even bigger than mine." (changing voices in dialogue) |

For each story, the researcher divided the oral text into phrases which formed the dataset for analysis. The researcher initially identified whether each phrase was presented in any multimedia elements. Only multimedia elements congruent with the oral text were identified. If the phrase was presented in the selected multimedia elements, the reseacher assigned one or more codes to each phrase.

### Story comprehension
A story retelling method was used to assess the level of children's story comprehension. This method has been found to be a reliable method when testing preschool children (Neuman, 1989; Shamir, Korat, & Shlafer, 2011). Children's accounts were analysed in two ways, story plots and story details. In terms of story plots, children's accounts were analysed to see if they included a beginning, middle and end of the story. In terms of story details, children's accounts were analysed based on the degree of comprehension of the key idea per phrase in the story (instead of per page as used in Shamir, Korat and Shlafer (2011) due to the short length of the

stories selected). A tick was marked against each phrase if the child mentioned the key idea of that phrase.

*Enjoyment.*
Children's responses to what factors contributed to their enjoyment when reading stories on TellyBear[TM] were analysed using a content analysis approach. Codes were generated in an inductive fashion from the data as factors that contributed their enjoyment during adult-child shared reading mediated by TellyBear[TM]. These codes were then grouped into main themes following a thematic analysis approach.

## Prelimiary findings and discussion

*Multimedia features in TellyBear[TM]*
Table 2 shows the frequency distribution of multimedia elements (i.e. simultaneous presentation, zoom shots and background sounds) in the three stories selected from TellyBear[TM]. It is clear that TellyBear[TM] dramatises stories with animated pictures and sound effects. To take a concrete example from *The Dog and His Reflection*, the oral text that describes a dog leaping into the water is shown with visual (e.g. leaping in the water with a splash) and auditory information (e.g. the sound of a splash). The shot zooms in on details of the event and motion is added to direct focus to the event.

**Table 2. Frequency distribution of multimedia elements in the three selected stories**

| Multimedia elements \ Stories | *The Dog and His Reflection* (N* = 14) | *Country Mouse and City Mouse* ( N* = 21) | *The Dog and the Wolf* (N* = 14) |
|---|---|---|---|
| Simultaneous presentation | 11  (78.6%) | 12  (57.1%) | 10  (71.4%) |
| Zoom shots | 9  (64.3%) | 10  (47.6%) | 7  (50.0%) |
| Background sounds | 4  (28.6%) | 8  (38.1%) | 11  (78.6%) |

* N indicates the number of phrases in each story.

*Effects of reading multimedia storybooks on children's story comprehension*
Children's story comprehension was tested immediately by asking them to retell the same story they just read. The effects of multimedia elements in the three selected stories on children' story comprehension are shown in Tables 3, 4 and 5 respectively.

**Table 3. *The Dog and His Reflection***

| | Phrases \ Multimedia elements | Simultaneous presentation | Zoom shots | Background sounds | Child's story comprehension (N* = 8) |
|---|---|---|---|---|---|
| Beginning | One day | | | | 0 |
| | A dog stole a big piece of meat from a butcher | ✓ | ✓ | | 7 |
| | He wanted to find a safe place to enjoy his meat | ✓ | ✓ | | 7 |
| Middle | While crossing a bridge | ✓ | | | 4 |
| | He saw his reflection in the water | ✓ | ✓ | | 7 |
| | Thought it was another dog holding a piece of meat in its mouth | ✓ | | | 1 |

| | Phrases | Simultaneous presentation | Zoom shots | Background sounds | Child's story comprehension |
|---|---|---|---|---|---|
| | The greedy dog thought | ✓ | ✓ | | 6 |
| | The meat in that dog's mouth looks even bigger than mine | ✓ | ✓ | ✓ | 8 |
| | I should grab it | | | ✓ | 1 |
| End | So he leapt in the water | ✓ | ✓ | ✓ | 8 |
| | But he couldn't find the other dog | ✓ | ✓ | | 4 |
| | Nor could he find the other dog's meat. | ✓ | ✓ | ✓ | 7 |
| | Even worse | | | | 0 |
| | His own piece of meat floated away in the river | ✓ | ✓ | | 7 |

\* N indicates the number of children participating in the session.

Note: Grey shades indicate that those phrases were mentioned by more than 75% of the child participants in story retelling.

**Table 4. *Country Mouse and City Mouse***

| | Multimedia elements / Phrases | Simultaneous presentation | Zoom shots | Background sounds | Child's story comprehension (N = 8*) |
|---|---|---|---|---|---|
| Beginning | One day | | | | 2 |
| | City Mouse visited his old friend in the country | ✓ | | | 5 |
| | Seeing Country Mouse's simple life | ✓ | ✓ | | 8 |
| | City Mouse said | ✓ | | | 4 |
| | I feel sorry for you, you live in a cave and eat roots | | | ✓ | 3 |
| | There are many better foods in the town for you to try | | ✓ | ✓ | 1 |
| Middle | City Mouse invited Country Mouse to the city | ✓ | ✓ | | 6 |
| | As soon as they arrived at City Mouse's place | | ✓ | | 5 |
| | City Mouse gave Country Mouse lots of things to eat | ✓ | ✓ | ✓ | 8 |
| | Country Mouse was touched | | | | 3 |
| | Country Mouse was saying how wonderful City Mouse's life was | | | | 0 |
| | When a human pushed the door in | ✓ | ✓ | ✓ | 8 |
| | Both mice escaped into a hole | ✓ | ✓ | | 4 |
| | For the following days | | | | 4 |
| | Every time they were trying to eat something | ✓ | | | 3 |
| | There were always footsteps coming near | ✓ | ✓ | ✓ | 7 |
| | Country Mouse was nervous all the time | ✓ | ✓ | | 1 |
| | And could not eat anything | | | | 0 |

| | Multimedia elements / Phrases | Simultaneous presentation | Zoom shots | Background sounds | Child's story comprehension |
|---|---|---|---|---|---|
| End | It said to City Mouse | ✓ | | ✓ | 6 |
| | Thank you for being nice to me | | | ✓ | 1 |
| | But I think I would rather nibble roots in the country | ✓ | ✓ | ✓ | 8 |

* N indicates the number of children participating in the session.

Note: Grey shades indicate that those phrases were mentioned by more than 75% of the child participants in story retelling.

**Table 5. *The Dog and the Wolf***

| | Multimedia elements / Phrases | Simultaneous presentation | Zoom shots | Background sounds | Child's story comprehension (N* = 8) |
|---|---|---|---|---|---|
| Beginning | One day | | | | 5 |
| | A very thin wolf was nearly starving with hunger | ✓ | ✓ | ✓ | 8 |
| | When he came upon a dog that looked to be well fed and fat | ✓ | ✓ | ✓ | 8 |
| Middle | The wolf said | ✓ | | | 7 |
| | Ah, buddy, you look great | | | ✓ | 0 |
| | Who feeds you so well | | | ✓ | 6 |
| | My master | ✓ | ✓ | ✓ | 8 |
| | Replied the dog proudly | ✓ | | ✓ | 7 |
| | And who makes you wear that heavy ring around your neck then | | ✓ | ✓ | 6 |
| | Also my master | ✓ | ✓ | ✓ | 5 |
| End | When the wolf heard this he said | ✓ | ✓ | | 8 |
| | Goodbye, my poor buddy | ✓ | ✓ | ✓ | 8 |
| | I would rather remain skinny and free | ✓ | | ✓ | 3 |
| | than be a fat slave | ✓ | | ✓ | 4 |

* N indicates the number of children participating in the session.

Note: Grey shades indicate that those phrases were mentioned by more than 75% of the child participants in story retelling.

All child participants were able to retell the story plot, which included a beginning, middle and end. However, the extent to which they retold the story details varied. An examination was conducted to see if there are any relationships bewteen the occurrence of multimedia elements and chidren's story comprehension scores. It was found that a high retention of oral text tended to occur when the story phrase contaoined two or more multimedia elements. In particular, the oral text sychronising with both visual and audio expression tended to be mentioned by all participating children in story retelling. Similar findings were reported by Bus, Takacs and Kegel (2015), Verhallen and Bus (2009), and Verhallen, Bus and de Jong (2006). As Bus, Takacs and Kegel (2015) drawing upon the cognitive theory of multimedia learning (Mayer, 2005) explained, electronic books that optimally enable dual-coding by integrating both the visual and verbal channels help reduce preschool children's mental effort and promote story comprehension.

*Children's enjoyment*

This section examines how children felt when reading multimedia storybooks using TellyBear™. All children (N=24) indicated that they enjoyed adult-child shared reading experiences mediated by TellyBear™. Among them, three children clearly indicated a preference for using TellyBear™ alone and two for using printed books for shared reading. Table 6 summarises the factors that contributed to children's enjoyment during adult-child shared reading mediated by TellyBear™, with an explanation and illustrative examples. The factors are shown in the order of occurrence in the dataset.

**Table 6. Factors that contributed to children's enjoyment from children's perspectives**

| Factors | Explanation | Examples |
|---|---|---|
| Sound (N* = 20) | This factor captures the responses that indicated the oral narration is pleasant, sound effects (e.g. animals' sounds) are cute, and the volume of the sound is fine. | • "TellyBear is cute… It has animal sounds… sheep's sound." (Child 14)<br>• "TellyBear tells stories in a pleasant way, and it's interesting." (Child 23) |
| Automatic support (N* = 19) | Responses in this category highlight the automatic support of a machine for storytelling. | • "When you turn it [TellyBear] on, it shows images directly." (Child 5)<br>• "With TellyBear, you don't need to turn pages." (Child 11)<br>• "It [TellyBear] tells stories itself. It doesn't require human beings… Very convenient." (Child 25) |
| Images (N* = 12) | Responses in this category indicate that the images are very beautiful, bright, and large. | • "[The images in TellyBear] are very bright… good-looking." (Child 6)<br>• "I like looking at images in TellyBear." (Child 19) |
| Animations (N* = 12) | This factor highlights the animation feature of electronic stories, especially actions. | • "I like the story that describes a dog leaping in the water. It's funny, because the dog couldn't find the meat when leaping in the water." (Child 3)<br>• "[TellyBear] combines a lot of images together." (Child 7)<br>• "This shows movements… TellyBear is interesting. I prefer the one that moves. Movement is interesting." (Child 23) |
| Self choice (N* = 8) | Responses in this category indicate the value of children's self choice of reading. | • "I use it [TellyBear] myself. In this way, I can learn a lot of stories." (Child 1)<br>• "It allows you to choose what you want." (Child 12) |
| Adult support (N* = 7) | This factor recognises the value of adult mediation and support for children's usage of technologies. | • "It's easier… I don't need to control [TellyBear] myself." (Child 14)<br>• "I prefer listening to stories with Little Bear [the researcher] because I can listen very clearly." (Child 18) |
| Touch (N* = 4) | These responses recognise the tactile nature of touchscreens and highlight its playful nature. | • "I use the pen to tap on the story." (Child 10)<br>• "It's playful. I can tap on it and watch stories." (Child 17) |
| Appearance (N* = 2) | This factor captures children's preference for a machine with a child-style appearance. | • "The TellyBear has two ears on its head." (Child 14)<br>• "This one [TellyBear] has [the shape of] a cute bear." (Child 19) |

* N indicates the number of children participating in this project.

Three broad main themes were derived from merging related codes. The themes are multimedia, interaction and touchscreen. The theme 'multimedia' captures children's enjoyment with the multimedia features of stories, as indicated by the codes sound, images and animations. The majority of the child participants said that the multimedia storybooks used in this project were presented in a pleasant way for viewing and listening. Some children were also attracted to the animated pictures because of the movement. For example, Child #3 child found it funny to watch "a dog leaping in the water". Bus, Takacs and Kegel (2015) explained that "a balanced set of motion pictures enriched with music and sound may help young children to stay attentive while listening to the story, thereby enjoying books more" (p. 85).

The second theme interaction relates to how children felt when they read on the screen with an adult, which is different from the current literature that tends to focus on measuring children's learning outcomes with or without adult support. Some children indicated that they liked the self-choice of reading, echoing Kucirkova, Littleton and Cremin (2015). Some liked adult support for story reading for learning purposes. Child #18 explained that she preferred listening to stories with an adult, because she could listen very clearly.

Finally, children indicated their enjoyment through playing stories by touching the screen, as captured by the theme touchscreen. Child #17 stated, "It's playful. I can tap on it and watch stories". This confirms findings by Flewitt, Kucirkova and Messer (2014), who observed that children's emotional engagement with a narrative in electronic books can be enhanced through their affective engagement with digital resources which afford a sensory experience of touch.

**Conclusion**

The preliminary results resonate with current research that suggests stories presented with animations and background sounds congruent with the storyline help to promote children's comprehension. In addition to examining the effects of reading multimedia storybooks on children's story comprehension, this project shows that children generally enjoyed reading on-screen stories due to their inherent multimedia elements and their affordance of the sensory experience of touch.

Although child participants were given different stories to read, the analysis focused on the multimedia elements in the stories and their effects on children's story comprehension and enjoyment. In other words, the focus on affordances of multimedia storybooks rather than specific stories or products which enhances the stability of the results derived from this project. Furthermore, it should be noted that this paper focuses on the positive effects of adult-child shared reading mediated by multimedia storybooks on preschool children. Results reported in this paper were taken from a larger project that compares preschool children's engagement with printed books and multimedia books with and without adult support, where both engagement process and learning outcomes were examined.

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