

# Interactive e-Books for Children **IBooC2013**

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# INTRODUCTION

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## ABSTRACT

This one-day workshop is going to bring together top researchers and practitioners working in the area of interactive e-books for children. The goal of the workshop is defining key directions for future research in the design process and implementation of this kind of books. The workshop will critically explore opportunities and challenges for making interactive e-books effective for children's learning and entertainment.

## GOALS

The aim of this workshop is to investigate all those topics related to the design and implementation of electronic books (e-books) for children.

Within the workshop the discussion will focus on how to design interactive e-books for children in order to create effective tools for increasing the achievement of educational and cognitive benefits, as well as fostering children's engagement, enjoyment, and fun. The workshop is also going to discuss aspects concerning possible paradigms, methodologies and approaches to be used in designing, developing and evaluating e-books.

We would like to bring together researchers from a wide range of disciplines - HCI designers, computer scientists, technologists, educators, linguists, pedagogists, psychologists, graphic designers, editors - who work in interactive e-books for children or are interested in exploring the challenges of this domain. Our wish is to promote an interdisciplinary exchange collecting participants desiring to integrate different views and ideas, findings and experiences.

## EXPECTED OUTCOMES

The workshop intends to provide a venue to share the participants' expertise in interactive e-books field, address open questions, identify emerging trends and challenges in this field, and explore unified approaches.

In particular, submitted papers and discussion during the workshop presentations will let us:

- obtain a good picture of the current technological solutions and empirical evidence;
- identify requirements and constraints to develop interactive e-books supporting the claimed benefits;
- identify novel design concepts that extend the boundaries of what interactive e-books can offer to children from the educational and entertainment viewpoint;
- foster and motivate appropriate design and evaluation methodologies;
- outline possible directions for future research in the field.

Furthermore, through a peer-to-peer review and a careful selection of submitted workshop papers, we aim to provide a suitable stage for discussion that will both push forward the state of the art and generate follow-up interest and ideas.



# Part 1

## What are *Interactive e-Books*?



# Do Animations in Enhanced eBooks for Children Favour the Reading Comprehension Process? A Pilot Study

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## ABSTRACT

Textual eBooks and enhanced eBooks are becoming an important learning tool. However, very few studies have been performed so far to assess their effectiveness. This paper aims to provide a small contribution to this research area. More specifically, its goal is to study the effects of animated eBooks on the reading comprehension processes in children attending Elementary School. A pilot study was organized with four girls 7-9 years old, who were asked to first read an enhanced story using a tablet PC and then answer ten comprehension questions.

## CATEGORIES AND SUBJECT DESCRIPTORS

H.5.2 [Information Interfaces and Presentation]: User Interfaces.

## GENERAL TERMS

Human Factors.

## KEYWORDS

eBook, reading comprehension, Child-Computer Interaction.

## 1. INTRODUCTION

The circulation of tablets and eReaders has increased exponentially in the last few years, directly influencing the spread of eBooks, both as entertaining and educational applications.

An eBook, i.e. a book in digital format, may have purely textual content, or could be enriched with any type of multimedia material, such as pictures, animations, sounds, videos, games, etc. In this case, we talk about enhanced eBooks. An example is FLIPS [5], a set of books created for the Nintendo DSTM. Ebooks for children are also spreading out more and more. See for example the International Children's Digital Library promoted by the ICDL Foundation [6], a free collection of over 900 children's books from all around the world. Schools are also affected by

this phenomenon. See for example the recent Italian law [4], which aims to create a digital school, where traditional printed books would be substituted with digital books by 2015. However, few research studies have been performed so far to assess the effectiveness of eBooks on learning.

This paper aims to provide a small contribution to this research area. More specifically, its goal is to study the effects of animated eBooks on the reading comprehension processes in children attending Elementary School.

This paper is organized as follows: Section 2 describes previous work on the topic, Section 3 presents our pilot study and Section 4 concludes the paper.

## 2. RELATED WORK

In this section we report on some studies that have compared the effects of electronic storybooks and printed books on the reading comprehension of children, also looking for those characteristics of eBooks that may improve comprehension and enjoyment in children.

A few beginning studies by Torgesen [18] supported the idea that suitable software applications help improving word identification skills, which are preparatory to high level comprehension skills in children. Lewin [12], Matthew [14], Miller et al. [15] pointed out how features such as the pronunciation of words, narration, sound effects and animations, that support the written text, allow children to focus on meaning, thus opening the way for high level reading comprehension. More recent experiments by Korat and Shamir [10] showed that not only children enjoy more electronic books with respect printed ones, but also that they remember the content more clearly and answer comprehension questions more quickly. In particular, children from 3 to 5 years learn more quickly to recognize sounds and words, as compared to books read aloud by an adult. Mostow et al. [16] demonstrated that children who worked with an automated Reading Tutor that let children pick stories to read, and listened to them read aloud, gained

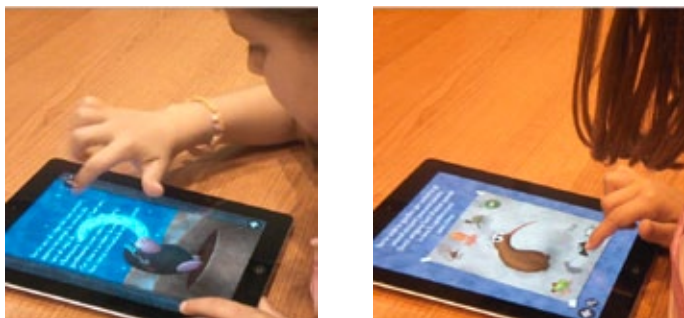


Figure 1: Two moments of our testing with children.

significantly more in Passage Comprehension than the control group. Greenlee-Moore and Smith [7] in a study conducted in the U.S. found that children reading an eBook achieved higher comprehension scores and showed more fun and enthusiasm for the task with respect those children who read a printed book.

However, other studies came to opposite conclusions. Vaala & Takeuchi [20] found that children recall fewer details of an enhanced eBook, because when using it they are often too busy with something else (games, hotspots).

Also a study by De Jong and Bus [3] with children aged 3 to 6 years affirmed that the traditional book supports better learning of the content of stories and phrasing, even if the electronic books favour a certain independence from the adult and better support the focusing of attention on the characteristics of the text (highlighting, underlining or colouring words when they are spoken).

A recent American study [1] found that enhanced eBooks for kids distract children from the story and disrupt their memory of narrative details, contrary to what happens with print versions and with textual eBooks based on the same story. Enhanced eBooks are great to play and for motivating children to read, but they are not the best for enjoying a story in its simplicity [13].

Animations in eBooks do not always produce benefits in learning and are extremely expensive to design and implement [9]. However, they are fascinating, they capture the eye and the mind, even if they may cause misunderstandings [19].

Landoni et al. [11] proposed guidelines to design usable electronic books which minimize cognitive overhead. They affirmed that an electronic book should be consistent with some aspects of the book metaphor such as the page metaphor and the logical structure.

Grimshaw et al. [8] found that electronic books benefit more children's reading comprehension if

they incorporate the following features: (a) the story is also narrated, (b) it is improved with animated pictures and sound effects related to the storyline, and (c) it is enriched with an on-line dictionary with definitions matching the reading level of the child.

### 3. OUR PILOT STUDY

The pilot study aims to identify some evidence as to whether third and fourth grade children (7-9 years old), who interact with a digital story in enhanced format, are able to understand and memorise the story's content.

Our hypothesis is that the massive presence of hotspots in narrative eBooks does not favour the memorisation and comprehension of the text. The case-study is described in more detail in [2].

#### 3.1 Material

For our test, we decided to use the Apple iPad, with a 9.7 inch Retina display and multi-touch screen (see Figure 1). As reading material, we selected the electronic version of the story "Who stole the moon?" [17], due to its beautiful images, the fine audio material and the high number of animations, hotspots and interactive games (on average, 7 per page). Moreover, it is short (22 pages, each with little textual content) and, for this reason, suitable for a short evaluation session.

#### 3.2 Participants

We involved four girls, each 7-9 years old. They are used to reading books by themselves, whereas they rarely use computers. They have occasionally used a tablet computer at home, together with an adult, to watch pictures or listen to music. None of them had read the chosen story before.

#### 3.3 Study Design

During the evaluation session, only a single participant at a time was in the room, together with the researcher. The tablet PC was put on a table (see Figure 1). At the beginning of the session, the observer first asked if the participant knew a story titled Who stole the moon? and then she invited the child to guess what the content of the story might be. This was useful to understand if the story was really new to the child.

Afterwards, the observer gave short instructions about how to navigate through the story. Each participant was asked to read the entire story, preferably without interrupting with questions for the observer. The initial idea was that the observer should be totally passive, but she sometimes had to intervene to stimulate the participant. At the end of the session, a written questionnaire, consisting of ten comprehension questions, was given to the participant. Graphics

(see Figure 2) and language of the questionnaire was suitable for children aged 7-9.

### 3.4 Method

We used two different methods for evaluation, the quick and dirty paradigm and usability testing. More specifically, we adopted the method of direct observation, from which we obtained several qualitative data points and some information about performance, such as the time spent on the task, as manually measured by the observer. Then, opinions were requested of the participants at the end of the test, in particular about the pleasantness of the story read. Finally, we measured the text

Rispondi alle seguenti domande facendo una croce sulla risposta giusta.

1. Bertie è un bambino molto fortunato perchè:

☐ A ha tante belle astronavi giocattolo

☐ B può vedere il cielo quando si sdraia nel letto

☐ C ha una stanza tutta sua

---

2. Il primo animale che vede Bertie è:



A



B



C

Figure 2: The comprehension questionnaire.

comprehension level by means of a written questionnaire, given to the participant at the end of the reading.

### 3.5 Results

We have two types of results: quantitative data - the duration of the test session, the number of activated hotspots, the number of (partially or totally) skipped pages and the number of correct answers to the comprehension questions (see Table 1), and qualitative data - the notes taken by the observer.

The participant C1 completed her work session in seven minutes, which is exactly the duration of the audio narration of the story. However, this does not mean that C1 listened to the entire audio narration. Indeed, it is coincidental that her elapsed time is equal to the entire audio narration, because the observer noticed that C1 partially skipped the narration of five pages, whereas she spent time in carefully looking at the pictures, when the audio narration was finished,

without activating any hotspots. She correctly answered all the 10 comprehension questions.

The other participants spent nine minutes each completing the test. C2, C3 and C4 activated some hotspots (5, 17, and 2, respectively), (partially or totally) skipped pages (4, 3 and 1), and gave 9, 8 and 10 correct answers.

The observer noticed that C2 and C3 were more interested in looking for hotspots than in following the audio narration and the printed text. C1 and C4 carefully followed the text when they were listening to the recorded audio narration, whereas C2 and C3 watched the pictures or looked for hotspots.

All four participants affirmed that they enjoyed the application.

Table 1: Quantitative data.

	Time (min)	#activated hotspots	#skipped pages	#correct answers
C1	7	0	5	10/10
C2	9	5	4	9/10
C3	9	17	3	8/10
C4	9	2	1	10/10

### 3.6 Discussion

The results of our pilot study seem to confirm the initial hypothesis: the massive use of hotspots, combined with a greater attention towards figures, animations and games, led the children to a lower memorisation and understanding of the text (see Table 1).

Obviously, this is only an indication of a trend, due to the low number of children involved in the experimentation and due to some limitations of our experimental design, which we will highlight below. However, this study allowed us to gather some interesting information on how children use an enhanced eBook and also some useful indication on how to organize a more significant experiment.

The first relevant point of information to note is that two children out of four activated no or very few hotspots. This seems quite strange, because usually children like animations. Future studies should investigate if animations and hotspots were sufficiently visible to children. Even if our results seem to demonstrate that animations may distract the reader from the textual content, it would not be intelligent to not take advantage of all the features that the new technologies make available.

As future work, it would be interesting to make a comparative study with two groups of children (i.e. 30 + 30 students, mixed male and female), where half of the children have to read the same text, but on



paper, and let them also do the comprehension test for comparison.

To be able to have more experimental data, it would be useful to film the user, both the face and the hands, to have information about the children's engagement and attention on the task.

Then, it would be important to implement a way to automatically detect which and how many pages are totally or partially skipped by the user.

Also, information about which animations and hotspot children prefer to activate would be relevant. Finally, it would be essential to employ different stories, with different content and different graphical style.

#### 4. CONCLUSIONS

EBooks in all their shapes - as mere digital text or enriched with multimedia material - are rapidly spreading out. The scholastic environment is also touched by this quick revolution. However, few research studies have analysed the impact of eBooks on learning and these studies have often come to opposite conclusions.

This paper aimed to give a small contribution to this discussion presenting the results of a pilot test with four children. We found that (1) not all the children activate animations when reading an enhanced eBook and (2) those who activate no or very few animations are those who better understood and memorised the story. As future work, we propose a longitudinal test with at least 30 children, reading more than one enhanced eBook.

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# HaKIDemia - The Story Tree

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## ABSTRACT

The immersion of interactive digital books has brought the experience of reading to a whole new level. The reader can today touch elements of a story, play games, and solve small challenges that enrich the overall experience. During the Hackidemia workshops we decided to design a storytelling hands-on workshop for linking the reading experience with real life problem solving. We wish to present the experimental initial activities and results in are looking for a way to increase engagement beyond the traditional reading experience, video game play, and school writing assignments.

## CATEGORIES AND SUBJECT DESCRIPTORS

K.3.2 Computer and Information Science Education: Literacy. K.3.1 Computer Uses in Education: Collaborative learning.

## GENERAL TERMS

Literacy; Design; Experimentation; Human factors; Languages.

## KEYWORDS

Immersive storytelling, role-playing games, interactive writing, collaborative writing, augmented reality, literacy.

## 1. INTRODUCTION

During the HackIDemia workshops we have created digital stories with kids where they write their own collaborative stories, we plan to develop a side project, the e-book of the future: an ever-growing interactive story for children aged 10 to 14 that integrates principles of storytelling, role playing games and virtual reality, making each of its participants an actively immersed author in their own generative plot. The goal of our new model is to enable artists, parents, teachers and students to work on cooperative

projects at large distances while using the power of imagination to solve challenges.

## 2. SYSTEM DESCRIPTION

### 2.1 Stories, Games and Non-traditional Learning

Learning by playing and learning by doing are two learning models that have proven their efficiency in creating and maintaining children motivation. Wang and Aamodt (2011) describe that play activates the brain's reward circuitry but not negative stress responses, which can facilitate attention and action. Through play, children practice social interaction and build skills and interests to draw upon in the years to come. Moreover, encouraging children to use their given base knowledge and experiences to create networked real-time stories empowers them to build the world of the future.

Games and stories can enable education from elementary school all the way through college as they teach skills such as analytical thinking, multitasking, strategizing, problem solving, and team building. One of the key elements in learning and playing is the motivation and therefore we wish to explore how are we able to motivate learners to deal with complex learning content at any age, by their own choice? One of the key theories referring to self-regulated behavior is the self-determination-theory (SDT) by Ryan and Deci (2000). It addresses basic conditions that are relied to the process of self-motivation.

The authors postulate three basic needs: competence, autonomy and relatedness. If these needs are satisfied, deeper forms of motivation emerge: "no single phenomenon reflects the positive potential of human nature as much as intrinsic motivation, the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" (Ryan & Deci, 2000). Intrinsic motivation can be regarded as prerequisite for deep learning processes. Perceived autonomy, competence and relatedness also play a major role in the process of interaction with games (Przybylski et al., 2010).

## Povestea Orasului de Hartie



**Figure 1. Capture of story created by children at Hackidemia Bucharest, March 2013.**

This active participation leads us to the concept of proximal development (ZPD) is another theory applicable in the context of game based learning. It defines the difference between a child's actual and potential levels of development (for example, what a child can do alone and with the assistance of his peer or an expert/computer). According to Vygotsky (1978), play creates a broad ZPD, both in cognitive and socio-emotional development. This finding bears a lot of potential regarding the application of games in the school context.

Another important concept, which is directly linked to intrinsic motivation, is the flow experience. "Flow" is a mental state that occurs when persons are fully immersed in an activity, like listening to a story or writing one. The flow theory basically states that activities can be per se rewarding, with no need for external regulation (Csikszentmihaly, 1990). Fun of play is highly correlated with experiences of flow, enhancing the enjoyment of media consumption (Vorderer, 2004).

## 2.2 Experiments and field evaluation

Through our experience with HaKIDemia, a platform that encourages a new type of alternative STEM learning for children of all ages and social ranges, that has trained over 3000 children and 200 mentors around the world in the past 8 months, we have learned that children get extremely open and creative about their problems, and get instantly immersed in their creation.

The two authors of this paper have joined forces at the Hack The City Event (Bucharest, 16-17 March, 2013), after analyzing the feedback of the Storytelling workshop that involved a varying number of the 75 children that participated in the event. We used a web-based story layout system in which users could actively choose their illustrations and enter text. Our approach was to let children enter the story building process at any given time, while the mentor only briefly interfered with asking them questions;

solutions and making them choose a range of imagery that would take their story further.

While not all children were old enough to be able to write, once encouraged to believe in their own solutions, they were keen on finding out more interactive means of dealing with their characters. They were excited to bring their favorite objects from real life as characters into the story. Moreover, they were extremely responsive to the challenges the other children would bring to the development of the storyline and came with very creative solutions to the narrative problems raised, always wanting to take the story even further.

This workshop resulted in a 23-pages story and turned to be a huge success without meeting any problems or obstacles for children. This is where we began thinking of a project to raise the bar in terms of creativity and involvement and "The Story Tree" interactive e-book idea came to our minds. This is yet a project in its very early stages of research, that we are constantly working on, so that we can come up with more hands-on relevant data regarding its development by June by using the Processing software for linking children stories and references and show them how their individual paragraphs are connected and can create a story tree together.

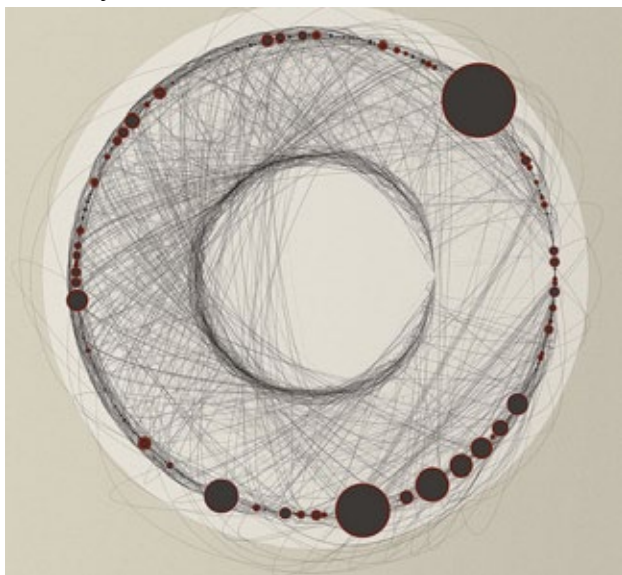
## 2.3 The Story Tree Main Idea

HacKIDemia will offer children an augmented reality type of world, adequate levels of difficulty and a profile system similar to social network profiles. The reason for opting for an augmented reality massive collaboration e-book is because it enables situated learning, which is where students learn in a relevant context and see how changes affect their system of interest, which is extremely important for learning, and encourages social active participation.

The Story Tree will be based on the idea of role-playing games (RPGs), allowing players to create, play and evolve along with their character from the beginning, while building the storyline with the real-time participation of other users. Mixing storytelling with the power of web-based, open-end game play, the end result will be ever changing and equally intelligently unique.

Thus, stories will follow a tree shape system to become more complex. This will become possible once each user connects and interacts with the storyline created by another. Players will develop these using a reference-inspired reply system that unifies collaborative work. For the technical implementation we start deploying a processing library<sup>1</sup> for connecting all different entries and determining the level of connections between

children's story entries and creating a visualization of the story evolution.



**Figure 2. Capture of tree data sets created from children stories with Processing.**

## 2.4 Inspiration

Currently top innovative interactive e-book apps such as The Fantastic Flying Books of Mr. Morris Lessismore or Alice for the iPad use a lot of game-play inspired action yet revolves around movement and object play and less interaction at the storyline level. Each page of these stories has a wormhole of interaction: reading about a song will take you to a screen where you can play it, for example, immersing the reader into the experience, while the narrative takes him/her farther. However, the reader could become fully immersed into the experience, getting to learn more with every page, once he/she becomes both its author and its main character, just like in the case of real life role-playing games.

Massive game platforms, such as Spore or World of Warcraft have been built on generative storyline premises, creating the frame of two games that are virtually never-ending. However, they are based on other principles than e-books. Concentrating on building a collaborative storyline of similar principles and dimensions could, on the other hand, actively put the narrative creativity of an endless amount of users to the use of learning, leading to the creation of the creation of a never-ending e-book written in real-time.

In Spore, gamers can create and evolve life through a wealth of creative tools that allow them to customize nearly every aspect of the universe, from creatures, to backgrounds, buildings, or vehicles. All of these can be shared online and explored by other players, as well. Such an experience can be further developed into a way more personal experience through the use of

innovations in the field of augmented reality, through scanning real-life objects and transforming them into 3D virtual characters. While so far this whole idea seems just like a more immersive version of Second Life, a background computer-programmed system playing the role of the storyteller would correlate everything to fit a story-like structure, randomly choosing tasks for the participants to creatively solve in their chosen settings.

## 3. CONSIDERATIONS AND FUTURE WORK

Children, parents, trainers and teachers are asked to join the project from the very beginning. We're presently asking them contribute to a fun and highly interactive "Wiki of Making" brainstorming targeted to the young public. This is to result in small projects that lead to character creation and an array of powers that can trigger their development. We are also looking for more clear inputs of what it is that children want, what gets them engaged, and how free the story structure can get before they lose their interest.

The next step would be to gather all created content into a database of visuals and inputs that would bring about the building of a story tree system formation. Concentrating on a tree-structure storyline can customize the difficulty level of the story to the level of each participant. This will be regarded the following design criteria as prerequisites for a meaningful playing experience: immanent feedback of the game system, immersive game environment, narrative context and scalable levels of difficulty.

We're also considering that our trees will become maps of personalized literacy learning and could be used for further semantic research on language and literacy. The language is evolving and our kids' perception of language does the same. Here, the Duolingo site stands as an example of good practice providing personalized learning paths for language learning and a possible source to our inspiration in the implementation of this project. Our e-book narrative tree will allow them to explore and create new blueprints for future literacy.

Following this research feedback, we will proceed to the second stage of developing this project. The trainers, parents, and children's inputs will be used to evaluate different aspects of applicability and structure creation and coordination. This will lead to discussions with programmers on the development of the gaming objects and storyline prototypes. Further discussions with augmented reality builders will give us more clear understanding of how it will become best incorporated in an alpha test of the entire system. To allow the children to be aware of the whole research

process, they will get feedback on how the findings are implemented in the development process of the gaming objects and storyline. Following definition and integration in the virtual reality, we will eventually develop this massively multiplayer augmented reality e-book built for and by children. Thus we will provide students with a tailored interactive learning experience composed of gamified inquiry-based activities that will allow improving individual and collective 'learning-curves', as well as a feeling of real-life experience of the created story. Web-based interaction is expected to speed up the paradigm shift, intensify the experience and education process and increase the potential of participating children.

Bearing that in mind we will build the e-book mechanics around the information given by the participants, concentrating on the optimization of the playing experience. Furthermore the e-book creation system will consider design principles commonly used by game developers (Salen & Zimmerman; 2003). The development process, based on an interactive didactic design approach developed by Wagner (2009) and open-source independent design and programming, is following three primary principles of game play: freedom to learn from errors, freedom to experiment, and freedom to make an effort (Osterweil, 2007).

#### **4. CONCLUSIONS**

We will continue to develop the The Story Tree in HacKIDemia workshops both on content and technical components and allow children, parents and teachers to participate in the design and implementation process while using the open sources software and libraries from Processing for realizing the visual representations of the tree in an interactive e-book. This process is extremely flexible, allowing everyone to develop their imagination while maintaining and

enriching their identities. This will lead to an evolution of teaching designing strategies based on models of user innovation and meta-cognitive learning. Our e-book could serve as a catalyst for all the innovative learning and research initiatives and will create future designs of learning through creativity in the cloud. The game will also enable us to explore many opportunities in developing AR projects and engaging learners in creating games. As more fully featured mobile devices become ubiquitous, AR books & games can be more than a standalone experience and instead integrate into the daily lives of children, challenging them to think differently about their communities and themselves. AR has the potential to engage children by seeing information in context and providing a platform through which they can creatively explore content by designing and exploring scenarios and narratives through the lens of games.

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# Material for the first workshop practical session.

## Interactive E-books for Children: what are they?

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### DEFINITION OF E-BOOK

an electronic book (variously: e-book, eBook, ebook, digital book, or even e-edition) is a book-length publication in digital form, consisting of text, images, or both, and produced on, published through, and readable on computers or other electronic devices (*extracted from wikipedia - <http://en.wikipedia.org/wiki/E-book>*).

### DEFINITION OF *ENHANCED* E-BOOK:

new digital publications that allow easy integration of video, audio, interactive features and multimodal content more than a simple e-book but not necessarily an app, **enhanced e-books (EEB)** are a challenge for book marketers, who are not always sure that consumers want or use the extra content or even understand the difference (*see HarperCollins' informational video, called "Have You Heard of EEBs?"*)

### WHAT DO *INTERACTIVE* EBOOKS OFFER?

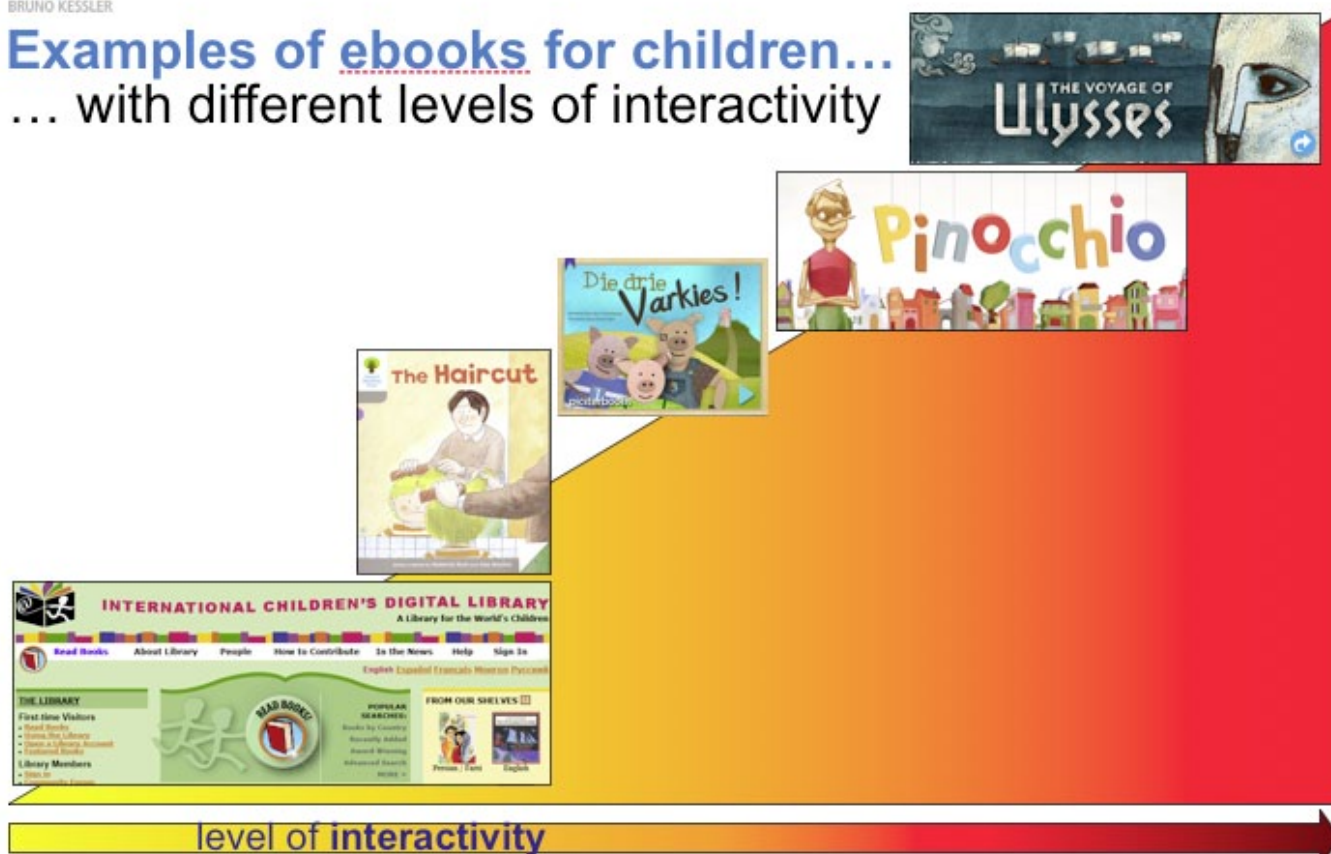
- Exploiting the powers of PC tablets, interactive e-books enable users to interact with the storyline in sight, sound, and touch.
- Ebooks go from simple electronic versions of printed books to sophisticated interactive versions.
- Ebooks market offers thousands of examples (*see <http://www.bestinteractiveebooks.com/>*)
- 

### EXAMPLES OF EBOOKS FOR CHILDREN WITH *DIFFERENT LEVELS OF INTERACTIVITY*

Children's library	<a href="http://en.childrenslibrary.org/">http://en.childrenslibrary.org/</a>
The Oxford Owl	<a href="http://www.oxfordowl.co.uk/EBooks/The%20Haircut/index.html/">http://www.oxfordowl.co.uk/EBooks/The%20Haircut/index.html/</a>
Demibooks	<a href="http://demibooks.com/portfolio-item/die-drie-varkies/">http://demibooks.com/portfolio-item/die-drie-varkies/</a>
elastico.com	<a href="http://www.elasticoapp.com/index.html">http://www.elasticoapp.com/index.html</a>



## Examples of ebooks for children... ... with different levels of interactivity



Mana & Mich  
2013

IBoC Workshop at IDC2013 - New York City - June 24,

## Hands-on some ebooks

- *Die drie Varkies?*  
by Demibooks

<http://demibooks.com/portfolio-item/die-drie-varkies/>



- *Snow White*  
by G4M3 Studios

<http://www.g4m3studios.com/en/>







## **Part 2**

# **How do we build interactive e-Books?**



# Bilingual Storybook App Designed for Deaf and Hard of Hearing Children Based on Research Principles

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## ABSTRACT

The Baobab is a storybook app for the iPad that was designed and developed based on research in visual learning, visual phonology, bilingualism, and Deaf children's cognitive development by the National Science Foundation-funded Science of Learning Center on Visual Language and Visual Learning (VL2) at Gallaudet University. Developed by an all-Deaf team, the storybook app is designed for early and emerging readers, bridging design principles in ASL storytelling and English text to research foundations, in order to facilitate reading and language acquisition for children who rely heavily on the visual modality for learning.

## CATEGORIES AND SUBJECT DESCRIPTORS

D.3.3 [Programming Languages]: C++ and HTML

## GENERAL TERMS

Design, Theory, Legal Aspects

## KEYWORDS

App, iOS, iPad, storybook, interactive, bilingual, deaf, American Sign Language, ASL, visual phonology, reading, learning, language acquisition, fingerspelling, Gallaudet University, VL2 Storybook Apps, videos, user characteristics, data tracking, whole language approach, top-down theory, hard of hearing

## 1. MOTIVATION

Nearly 96% of the deaf children are born in a family whose parents are not deaf (Mitchell, 2002.) Language acquisition and development are of a concern among those deaf children whose parents do not sign at a early age. Early language exposure is crucial to children's ability to become lifelong learners (Mayberry & Lock, 2003).

Released on Apple iTunes and App Store in early 2013, The Baobab is an interactive and bilingual (American Sign Language and English) storybook app for the iPad designed to facilitate language acquisition and reading for all young children, especially Deaf and hard of hearing children who are emerging and early readers (ages four and up). With an interplay between a real life person using American Sign Language (ASL) and eye-catching animations, the app showcases ASL storytelling at its best, with accompanying English story text for reading along, an interactive feature that brings children from printed English words to an ASL (including fingerspelling) and spoken English glossary of 170 signs, as well as vivid watercolor illustrations. It is the first of planned ASL and English bilingual storybook apps for the iPad from Gallaudet University.

What makes this app unique and different from any other storybook apps currently available? The design foundations and core approach in development is directed by research findings made in the learning labs of the Science of Learning Center on Visual Language and Visual Learning. (See <http://vl2.gallaudet.edu>). Research studies conducted by the VL2 center team demonstrate that early visual language experience using American Sign Language strongly facilitates the acquisition of learning to read in English and offers other far-reaching advantages for a deaf child's linguistic, communicative, cognitive, academic, literacy, and psychosocial development.

Engagement in both a visual language and printed text (literacy) in an interactive and visually rich format wasn't possible before the emergence of touchscreen tablets (the iPad in this regard).

By integrating videos and text seamlessly on the same screen, this provides deaf children with advantages of learning bilingually. Before the touchscreen technology, the common practice was to use DVD-accompanying storybooks to learn bilingually, in ASL

and English. Deaf and Hard of Hearing children would have to look at the book, then alternate their gaze to a screen (TV or computer) to see the video. This is supported by previous research that demonstrated a significant correlation between ASL skills and reading skills (Padden 1996; Mayberry 1993; Wilbur 2000; Padden and Ramsey 1998; Prinz and Strong 1998; Singleton et al. 1998).

By providing vivid illustrations as context clues, children will be able to enjoy the experience of reading and discovering the meaning of the printed and signed word. Using the iPad, the learners are allowed to control the pace of the presentation, which has been demonstrated to significantly impact learning (Balci, 2009).

## **2. RESEARCH-BASED DESIGN**

The incorporated components in the design of the app are built using an evidence-based approach to increase motivation for children to read. The key design features include the promotion of vocabulary learning and comprehension within context of the whole story with support of video, fingerspelling, and brilliant illustrations. The research-based approach regarding to exposure to dual language and use of Top-Down Theories (K. S. Goodman, 1986; Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2002) or Whole Language Approach (Heymsfeld, 1989) were used to support bi-literacy development.

The dual language exposure is expected to enrich vocabulary development. With this app, a child (or parent) will have the opportunity to enjoy a story and see the vocabulary words in English print, hear the word in English, and see the storyteller signing and fingerspelling the word. Educators may use this app as a resource in their instructions when promoting metalinguistic awareness, especially in an ASL Language Arts curriculum. Our ASL story includes many complex linguistic structures, range from role shifting to locative and depicting classifiers, verbs, and adverbs. Once young and emerging readers comprehend the grammatical structures in ASL, metalinguistic awareness can help in English language learning (Cummins, 1996, Krashen, 1992).

The design is based on Top-Down or Whole Language Approach. Top-down theories influenced the whole language reading instructions by first comprehending the whole and then interpreting parts of the whole. Children can watch the whole ASL translation in “watch” mode and view illustrations in “read” mode of the app. Next, children can view the ASL translation of each page with English text in the “Read” section of the app and read English text independently or with

teacher/peer support. They can tap on the “active” (hyperlinked) vocabulary words for additional support with comprehension (see figure 1). The child has an array of options, from reading and re-reading the English text, to watching and re-watching the ASL story, with or without a peer. Grimshaw, et al (2007), found that comprehension scores of children listening to narration were significantly higher than the children who read the story only. We would expect a similar result; that is, children who view narrative stories in ASL would likely be able to answer comprehension questions with greater accuracy than those who only read the English story text, absent the ASL narration. Research has shown an increase in motivation among children in reading if they are able to listen to the stories being read out aloud. The same principle goes for supplying definitions during reading (or, in the case of this app, in form of signed/fingerspelled/voiced word) for selected vocabulary words (Herzig, 2009).

For reading fluency and high-level comprehension processes to take place, lower level processes such as rapid word recognition need to occur which aids reading fluency (Torgesen, 1986). As the vocabulary knowledge base accrues, or leveraging knowledge from ASL to English, the child can benefit from topdown reading processes. Research studies on fingerspelling conducted by Sharon Baker (2010) and Carol Padden (1996) emphasizes the importance of fingerspelling for reading. The studies suggest that early fingerspelling exposure helps deaf children become better readers, fingerspelling and literacy development are interrelated, and it facilitates vocabulary growth. This app includes finger-spelled and signed words for vocabulary words listed in the app. Further vocabulary and spelling practice with sign and fingerspelling are offered at the end of the storybook glossary in the “Learn” section. We also know that in general children using e-books use the online dictionary feature significantly more than a printed dictionary related to the same books (Grimshaw, et al., 2007). The glossary tool in this storybook app will be useful for promoting the vocabulary development among children.

In sum, the use of the VL2 bilingual Storybook in iPad app supports deaf children’s dual language development because:

- The children need to SEE written English text
- The children need to SEE ASL
- The children need to SEE illustrations
- The children need exposure to fingerspelling

- The children will experience agency by interacting with the book by tapping or sweeping
- iPad apps promote visual engagement and literacy enjoyment.

### 3. DEVELOPMENT

The introduction of touchscreen tablets has revolutionized our ability to integrate scientific findings with principles and aesthetics of design to create a seamless user experience, especially for Deaf children, to facilitate the development of literacy. Text and video are integrated into a single interface, which means designing a bilingual app is now possible.

#### 3.1 Supported Platform

This app was built to run on an iOS framework, in C++. For increased flexibility, Webkit was integrated in the code for the text box area. Text sizes, font, color, and background can be modified in HTML. This app runs on iPad (all versions) and iPad Mini. Images have been optimized and resized for retina display.

We encountered issues related to the size of the app in memory capacity with the heavy video-integrated design. Future productions will focus on reducing app size. Current app size is 850 MB.

One of the main goals of the app design is to keep the experience as intuitive as possible, which led us to develop two possible ways to view the vocabulary videos. Users would have to touch/or tap on the highlighted word to open a “pop-up” video to show the sign and fingerspelling of the particular word. One way is to tap on the word and it will automatically open a video, which will play to the end. Users can go ahead and tap anywhere on the screen while the video is playing; doing so will cause the video to close. The other way is to touch and hold on the selected text.

#### 3.2 Content Development

The Baobab was developed first in ASL, with the whole narrative visualized, mapped out, and recorded on film. The narrative was then transferred to a storyboard, where we started to identify page by page, structuring the sentences. The ASL narrative changed several times (influenced by focus groups), the final version was determined, we used the storyboard to help structure the translation into English.

It was a process that went trifold, from the ASL version on film, to the English translation on paper, and the visual images in work on the storyboard. A Deaf artist was hired to do the illustrations for the story, which was done by hand in watercolor. With the content in English set, the next stage was identifying which vocabulary word would have a video, thus become “active”. During the film production, we had

the storyteller sign and fingerspell each word at least three times, including all possible regional variations and signing versions of the word. Then, we screened the vocabulary videos to select the ones were the most clear and nationally used. This required an index support, which we decided to make visible through creating the third feature of the app, the Glossary section, which is also called “Learn”. Our framework for The Baobab supports 170 vocabulary words.



Figure 1. Read mode: Highlighted vocabulary videos.

#### 3.3 Not a “read-along” storybook app

It is imperative to note that the VL2 Storybook App framework is designed to support two languages with different grammatical structures, and the goal is to encourage reading fluency for children. We determined to reserve audio support only for vocabulary words to encourage concentration and comprehension fully immersed in one language.

The “Watch” mode comes with an animated background to heighten understanding of the story itself, and as well to engage young readers. In the “Read” mode, both languages can be presented on the same screen if users tap on the play button, which opens up the sentence video. Children can alternate their gaze from the video in ASL to the text below, or choose to focus on the video. It is because of the array of choices, we refrained from adding animation in the sentence video. This also influenced our decision not to add audio to the sentence videos, as the text is already presented. In addition to the busy interface in “Read” mode, grammatical structure of ASL and English is different that an audio voice-over would not be in the same order as the way ASL signing is. Audio in all vocabulary words appears as word for word and letter for letter. (For instance, “Tree” will appear as “Tree, T-RE- E, Tree”.)

It is with the grammatical structure and nature of two languages influenced the design of this app, and

this is not a regular “readalong” book where text is supported by a voice-over. Instead of a voice-over, we have American Sign Language videos. Early feedback and reports have indicated that this format is also successful with young hearing children who are fascinated by the visual and spatial nature of ASL, and would follow along in sign.

### **3.4 Focus Groups**

During development and production, we had two stages of focus groups. The first stage focused on the context of the narrative and the presentation of it in ASL. The second stage of focus groups focused on the user experience and interface design.

For the first focus groups, we assessed whether the story is comprehensible enough for students in that age range (3-7 years old), and if the story is of high-interest level. We showed the story in video to deaf children using ASL at different grade levels (preschool, pre-kindergarten, kindergarten, and first grade) at two different schools for the deaf. One school was in Washington, DC, and the other was in Fremont, California.

The students were then asked to retell the story, explain the main idea of the story and the moral implications, and interpret the emotions of various characters and to support the answers with evidences. Based on the feedback by students’ behavior while viewing the story in American Sign Language, we were able to gauge whether or not this story is age-appropriate and the story were of high-interest level.

For the second stage of focus groups, which evaluated the user experience, especially for young children, we contacted families of approximately 10 deaf children of all ages (3-8 years old) and visited their homes. We decided on home visits because we wanted a natural environment where the child would be handling the iPad individually. Our protocol was to simply hand the iPad (with the app) to the child without explaining anything. From the second focus groups, we learned that the “active” vocabulary was not obvious, and that children gave no indication that any “blue” highlighted text led to a pop-out video. We changed from blue to red, and set the opacity levels to make the color appear to glow twice every time a page is turned. In the subsequent visits following the changes, we saw that children responded differently, immediately tapping on the text to activate the videos.

## **4. LEGAL OBLIGATIONS**

### **4.1 Benefits and Risk Assessment Review**

We needed clear procedures in place to evaluate the impacts and effectiveness with The Baobab

app. We also needed clear procedures to evaluate the risks of providing parents and teachers with information and applications, which have not been evaluated. To ensure a plan for evaluation and risk assessment, we established, with guidance from our External Translational Research Consultant, Dr. Kristine Chadwick, and from Gallaudet’s Office of Risk Management, a process for setting evaluation priorities. The Benefits and Risk Assessment Committee was established within Gallaudet University to evaluate the risks any products we plan to release to the public. Potential risks involve marketing a product whose efficacy had not been fully demonstrated, being wrong or misunderstood in the manner with we interpret research findings in the design of the product, and causing undue financial expenses for product purchasers who may have unrealistic expectations regarding the benefits of the product. Before releasing The Baobab, an evaluation was submitted and approved by the committee.

## **5. EVALUATION**

### **5.1 User Characteristics and Experiences**

With the release of The Baobab, plans are underway for the evaluation and assessment of this app, and to determine the efficacy. We implemented data tracking using Localytics (a platform designed for “e-books” tracking) to track the user experience. All data is anonymous, but we are able to see which vocabulary word has been tapped on, and on which page, and for how long. Users have the option of “opting out” of data tracking through settings. Based on the data collected through Localytics, we will determine user characteristics, which is the first step before planning and executing efficacy studies. Our planned studies include tracking the eye-gaze behavior of users through Tobii Eye-Tracking equipment, outfitted for mobile devices.

Observing and videotaping age-selected participants using The Baobab in a classroom, both with and without adult intervention, will assess the user experience. The participant can end his/her use of the app at any time, but after the participant has used the app for fifteen minutes, we will start on a short interview asking them (and their parents/guardians) about the app, and their experience with it. After the participant has used the app for 15 minutes, we will ask them to stop. Prior to participating, parents/guardians will fill out a standard questionnaire about the characteristics of their child, such as age family signing background, sign skills, and school placement. Initial planning for efficacy study design involve quizzing participants on vocabulary words pre-test and post-test (before

and after the app use) and evaluating comprehension. The results will help guide our design for subsequent apps and to help create guidelines and lesson plans for teachers and parents.

## 6. LINKS

To download The Baobab, please go here: <http://bit.ly/15XN7ev> or visit [www.vl2storybookapps.com](http://www.vl2storybookapps.com) for further information on the next two storybook apps currently in production.

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## 8. ACKNOWLEDGMENTS

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# Creating Social Books

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## ABSTRACT

In this paper, we describe a new approach to digital textbooks: The textbook as a participatory and social experience. By meshing reader-generated commentary with the original text, the textbook becomes a dynamic documentation of the course material and the discussion around it. The author or teacher maintains control over the narrative by approving and promoting important comments to integrate into the original text, and by deciding the location and frequency of comment-enabled areas. This allows for leadership, collaboration and active learning for students of all ages.

## CATEGORIES AND SUBJECT DESCRIPTORS

I.2.7; H.4.3; H.3.4

## GENERAL TERMS

Management, Performance,  
Design, Human Factors, Theory.

## KEYWORDS

Social books, social textbooks, interactive textbooks.

## 1. INTRODUCTION

Social media is everywhere, yet books are still understood to be static, unidirectional documents, and reading them to be a solitary activity. This does not reflect current expectations of dynamic information and new approaches to collaboration, nor does it take into account the importance of discussion and group learning in education.

This project explores the pedagogical potential of social books. We want to advance students from being passive consumers of textbook content to socially engaged participants who create, collaborate and contribute.

The key points are:

1. The textbook as a participatory and social experience.

2. By meshing reader-generated commentary with the original text the textbook becomes a dynamic documentation of the course's text material (multiple texts could be compiled into one textbook) and the discussion around it.

3. The author or teacher maintains control over the narrative by approving and promoting important comments to integrate into the original text.

Ebook formats have emerged that let users place comments in the book, but only relegated to a sidebar near the referenced text. The comments in these ebooks are either private or shared to external social channels and lack their original context. Additionally these marginalized comments clutter and limit the reader's interface and impede an uninterrupted reading experience.

This article explores the possibility of integrating shared reader commenting directly within a textbook and discusses the design considerations made to accommodate presenting what the author or teacher considers important and relevant comments without disrupting the reading experience.

## 2. BACKGROUND

While marginalia notes and comments are acknowledged as useful to readers and essential for learners (Wagstaff 2012), most current ebook formats don't allow for shared comments, remaining essentially static, one-way documents. If the author

wishes to develop a community around the book, they create online communities (Facebook and Twitter, for example) that the reader must locate, join, and sign into, in order to participate in the discussion. (Biñas, Štancel, Novák and Michalko 2012)



Figure 1 "50 Years Of Life Online" Once online, the problems don't stop



there. Current ebook formats make it difficult to cite the exact locations of passages (Richardson and Mahmood 2011), so comments are often untethered to the text they reference.

Annotations can be an essential part of an ebook textbook; the platform should be able to incorporate comments and additional content to the original content (Wilde and Glushko 2013).

Ebook formats have emerged that can place comments in the book, but only relegated to a sidebar near the

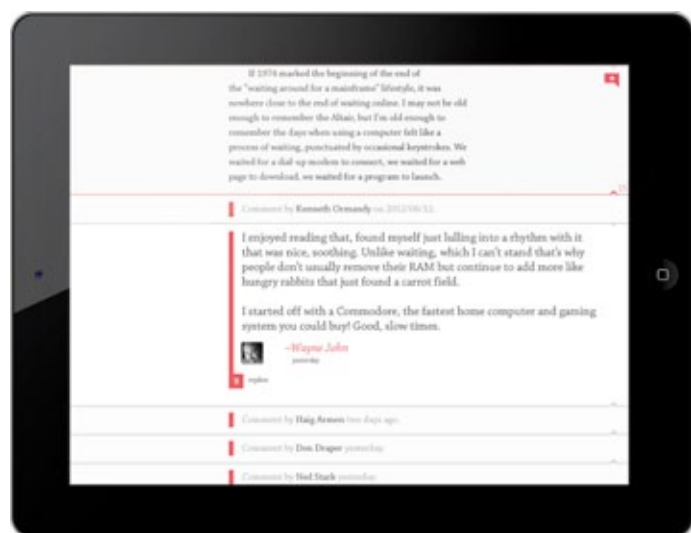


Figure 2 “50 Years Of Life Online” showing comments.

referenced text. This still separates comments from text, limits the interface design to boxed frames, and makes the book’s reading area smaller.

### 3. A CASE STUDY: 50 YEARS OF LIFE ONLINE

In order to clearly describe our ideas about the evolution of the digital textbook we’d like to present you with a case study. Our social book framework comments was originally created to hold a book called “50 Years of Life Online” by Alexandra Samuel. The book discusses the history of the Internet



Figure 3. “50 Years of Life Online” showing promoted comments. as juxtaposed to her own history, and is structured in

articles on a timeline broken into decades and years. We present screen captures of interfaces from the “50 Years” book to illustrate a number of concepts throughout this article. (see Figure 1) This book’s central interactive metaphor is a continuous scrolling

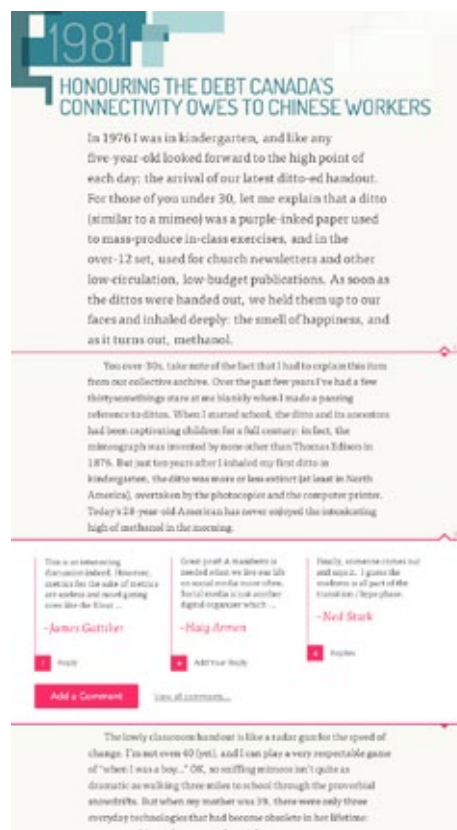


Figure 4 “50 Years Of Life Online” wireframe”

page that unfolds at key points to reveal a threaded social commentary relevant to that specific content. The unfolding is facilitated by the familiar reverse pinching gesture, which reveals a deeper layer. (Although almost ubiquitous, the reverse pinch has not yet been used in this context.) This reinforces the metaphor of digging deeper, creating an interaction where readers can find more information or become participants in the book itself.

We designed the platform to exploit tablet technology, specifically network-enabled tablets. They allow a mobile book application to communicate with its online comment repository via an Application Protocol Interface (API). The API seamlessly sends contributors’ comments back to the server and syncs thebook app to include the latest comments. (see Figure 2)

This social book framework is ideal for school texts. The original authored text remains, while the book becomes a living learning network. Students can work at their own pace, self-evaluate (test) when they think they are ready, return and review as necessary, add to the class discussion, and support co-learners. Teachers can tell from the comments and questions

in each lesson or pedagogical area where to apply clarifications, individual assistance, or further group teaching and/or exercises. Students support each other's learning and cement their own knowledge acquisition by adding examples and insights that helped them understand or retain concepts and facts. This supports the variety of learning acquisition types in group learning situations.

Right now, most ebooks support only highlights or private annotations. Social ebook platforms hide comments away in a sidebar. In our model, the most insightful or useful comments—as determined by the teacher or author—are promoted to the top of the list. (See Figures 3 and 4) A number assigned by the teacher determines whether the comment is displayed as a prominent pull quote or a concealed (folded away) comment. This provides extra value to the book, and offers an opportunity to engage with the discussion surrounding that portion of the text.

Readers are able to see both public comments and their own private comments in the same dedicated areas. The two types of comments are differentiated by colour. In the high fidelity wireframe (see Figure 4), all the public comments are marked with the colour red while private comments are indicated with blue.

After tapping on the comment in the previous slide, the comment has expanded and is shown in a list of all the comments on a particular section of the text. From there, the thread of replies can be viewed or a new comment can be added. Original content is still the primary element of the book, so the majority of public comment areas are not presented like this. Instead, they are “collapsed” with the opportunity to visually and conceptually “dive in” to the discussion. This is done using the reverse-pinch “zoom in” gesture on touch enabled devices.

**HOW IT WORKS:** As a prototype our Social Book System was built using some existing open source software tools. Here's a breakdown of how one would build a social book.

1. Install Wordpress on a web server—a relatively simple task if you're web savvy.
2. Install the JSON-API plugin for Wordpress (<http://wordpress.org/extend/plugins/json-api/>).
3. Determine the Book's information structure and build sections accordingly.
4. Input text from the book into commentable segments.
5. Specify Social Book App's configuration file to include API address and Wordpress segmentation labels.

6. Save original JSON file from Wordpress and include into Phonegap package with SocialBook files.

7. Style your book using CSS and images.

8. Compile Phonegap software into desired mobile platform: iOS, Android, Windows or Blackberry.

3.1 The Benefits of Social Books Social Books provide multiple benefits to students of all ages, including but not limited to:

- Ease of use by the reader. “50 Years of Life Online” complies with the invocation that navigation should be simple and effortless (Mod 2012). We followed basic information architecture principles of breaking content down into understandable categories with clear ways of visually

communicating the content structure. Because comments remain inline with the associated content, navigation is simple and intuitive, creating books that are easier to use.

- Granularity of commenting. In our Social Book Framework we use Wordpress as the content management system for a book. This allows the author to determine which passages of text can be commented on. The big innovation here is the granularity of commenting—the author or teacher has the ability to control exactly where in the text comments can be added, whether it is at a sentence, paragraph, section or article level. Each commenting area can be individually set; there is no global setting that must be conformed to.

- The ability to promote comments that the author/teacher sees as especially valuable, insightful or useful, and give them prominent status within the original text, for example as pull quotes.

- Ease of administration. At the end of the course, semester, or school year, the instructor is able to wipe the slate clean, if desired, for the next batch of students. This can all be done without much technical knowledge on the part of the author/teacher/administrator.

- The book as a micro network. As opposed to crowdsourcing textbooks, the author or teacher controls who can participate and contribute, and can invite readers to participate in the book in early stages of development.

- The book can be output to multiple formats. When a book is contained within an online digital repository (Wordpress as a content management system) there is the opportunity for the content to be distributed in a number of formats. From Wordpress we can output to the web as a “Book in a Browser,” a Social Book application, a standard eBook format, and even a

printed document via PDF that is output and sent to a print-on-demand system. (see Figure 5)

- Ease of bookmaking. Building a social book will require only a basic understanding of Wordpress and standard web technology like HTML/CSS. The flexible structure of the platform allows authors to easily add tiers (chapters or sections—the author chooses the label), to choose where comments are included, and where the promoted comments are placed.

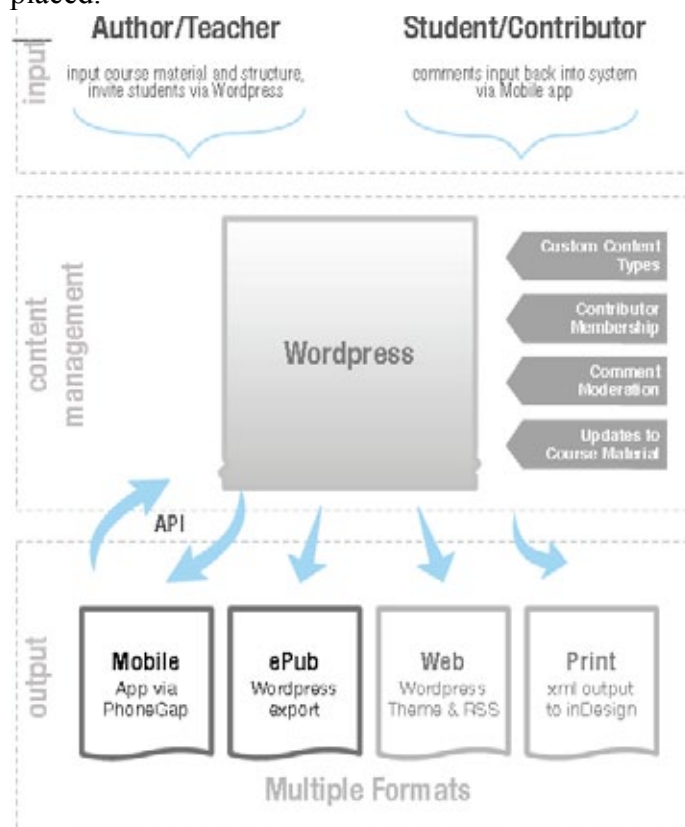


Figure 5 The Social Books process

#### 4. FUTURE CONSIDERATIONS

The final project will include documentation for building a social book using a number of open source software tools. Creating a social book using these tools will require only a basic understanding of Wordpress and standard web technology like HTML/CSS. Once set up, an author/teacher can use the same framework for a number of books without any coding skills at all.

There are a number of aspects of the Social Book project that can be developed further and were only touched upon within the project yet were taken out of our goals for this phase of the project and this paper. Here are the components that could be refined:

1. A clear navigation system—The gestural folding navigation points to a new way to interact with a book, yet in its current iteration needs refinement to make it more intuitive and easier to use.
2. Place-holding and bookmarks—Helping readers understand where they are in a digital book has

become a challenge for digital book design. Many of the ways of understanding where in a book someone is are based on the physicality of a book—new visual affordances must be established to help communicate this important aspect of book reading.

#### 5. CONCLUSION

We are just beginning to think of a book in terms of a larger ecology of content, authors and audiences. This project represents the first step in engaging the audience of a book through their participation as commenting contributors. The idea could be taken much further by having a book's audience contribute other kinds of relevant content, for example maps, images, audio or video.

Additionally, audiences could be asked to participate in activities within a book, and their results presented back to the larger book's audience. Teachers will be able to see and manage students' participation and contributions. As textbooks become able to incorporate the discussions and contributions of select collaborators, learners will be able to participate more fully in their education.

#### 6. ACKNOWLEDGMENTS

Our thanks to: Jonathan Aitken, Celeste Martin, Alexandra Samuel, Kenneth Ormandy, Katherine Pihl.

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# Using Demibooks Composer to Create Remedial Learning Apps for the Profoundly Deaf

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## ABSTRACT

The iPad has opened the doors for innovation in digital storytelling, and helped unleash the power of storytelling as an aid in remedial learning. Demibooks Composer is an authoring platform for interactive book apps where content creation happens on the device itself and without the need for coding. Our system makes it easy for designers to create interactive stories quickly and inexpensively on a tablet device, and combine artistic creativity with computational thinking without actual programming. Innovative and powerful apps such as those useful for remedial learning are possible. We will demonstrate how our system can be used to create learning tools for the profoundly deaf. We will describe the motivation for the application and explain its functionality. The application will be implemented in the field in South Africa and elsewhere, and a formal study of the impact and outcomes of introducing these remedial learning apps is forthcoming.

## ACM CLASSIFICATION KEYWORDS

H.5.1 [Multimedia Information Systems]: Evaluation/methodology;

K.4.2 [Social Issues]: Assistive technologies for persons with disabilities;

## GENERAL TERMS

Language, Design, Human Factors

## KEYWORDS

Storytelling, mobile, remedial learning, apps, authoring tools, deaf, literacy

## 1. INTRODUCTION

Demibooks Composer is an authoring application on the iPad that is used to create interactive book apps directly on the tablet device. Publishers, storytellers and educators use the platform to create interactive apps such as those for remedial learning.

Communication is a fundamental key to a person and group development, taking thought process, object and word association for granted, most hearing people do not grasp the challenge that the deaf community face in learning to associate objects with words, words with concepts and concepts with conversation and exchange of ideas.

Our system allows deaf children the opportunity to learn words through the association of images and sound vibrations for the words. Sound vibrations are created by the use of the intuitive iPad interface and portable resonance speaker. A series of words forming a sentence thus have a corresponding series of associated images and sound vibrations, producing a sentence structure that can help the deaf child improve her functional literacy.

The goal of this study is to start education in the formative years, as oppose to the standard method of basic skills training that is implemented towards the end of the deaf individual's education cycle.

## 1.1 CHALLENGES IN DEAF EDUCATION

There are many challenges in educating the deaf that have to be considered when designing the applications. We discuss a few key challenges here.

*Visual learning* - All learning must be done in a visual format.

*Syntax* - What complicates learning of written and spoken text for sign languages users even more is the fact that sign language's syntax is different to reading and writing syntax. Example writing syntax: The man walks in the street. Example of sign language syntax: Man street walk.

*Simplified text* - Text must be simplified to exclude words that are not in the sign language vocabulary.

*Diagnoses of Deafness* - Often times made later in a child's development only once developmental milestones are not reached and red flags go up. Many deaf children in 3rd world countries miss out on the very important development of language from infancy to age two. As a result many deaf children have little to



no language when they have to start formal schooling. This in turn means that teachers have to first teach the deaf child language before they can start teaching a child the curriculum which is required by the state.

*Learning at their own pace* - By using the iPad in a class of mixed abilities each student can work at their own pace [4]. This also encourages communication between students, asking questions and showing each other how to use the iPad or the application.

*Sign Language parental reinforcement* - This is a crucial part of the establishment of sign language for deaf children. By using this application parents alongside their deaf children can learn sign language.

*Teachers who can sign* – Sign Language is a vast language to learn. Hearing teachers who teach deaf children can also use this application as a tool for expanding their own sign language vocabulary.

*Technology language barrier* – There is a significant barrier that deaf students face in taking the first steps towards using technology devices for learning. Before a deaf child can use a computer, she has to learn the language and terms for the computer and computer related devices. Substituting the computer with an iPad simplifies the learning process of how to use the device. The child can use their fingertips to guide themselves through a lesson on the iPad making the experience of using technology to learn much less intimidating. The iPad is an intuitive tool ideally suited for a deaf user.

## 2. MOTIVATION AND RELATED WORK

[7] The Scratch system invented at MIT Media Labs provided a web-based platform for interactive content creation. It has been a successful implementation (over 3M projects shared from around the world) where programming has become accessible and engaging for children. [8] Kelleher and Pausch describe the Storytelling Alice environment to learn programming through storytelling.

What about authors, illustrators, and visual artists? [9] Roosen writes about the design principles for a system for authoring directly on the iPad that targets this more niche but demanding audience. Newer authoring platforms for interactive books emerging in the publishing industry tend to be on the web and desktop. Aerbooks, Aquafadas, Moglue and Kwik are examples.

The immediacy of authoring on the device in which the application will be used provides the designer a unique perspective as well as affords rapid iteration and prototyping.

An advantage of Composer over existing approaches

to creating interactive digital books is that it does not require familiarity with programming languages or



Figure 3.1. Composer workbench

animation techniques. Educators and content creators for remedial learning apps don't usually possess familiarity with programming languages, complex animation techniques. Thus, if they wish to create an interactive book, they must hire outside help from programmers and animators, which makes creating an interactive book into a very expensive proposition. Our system reduces the expense, time and effort of creating an interactive digital book by obviating the need for expertise in programming.



Figure 3.2. Preview mode

Research has shown that most hearing parents cannot communicate with their deaf children. Many studies have shown the value of early intervention of hearing parents with deaf children learning to communicate via sign language and finger spelling. [4] Chen finds a measurable increase in student engagement in a case study on integrating iPads into Special Ed classes.

The idea for this system came about primarily from working closely with a Deaf School in South Africa to develop new digital curriculum. The children used

a basic iPad application for learning of shapes, colors alphabet in written text, sign language and finger spelling. There are many examples of the use of tablet technologies by children with special needs. In general the impact of technology in remedial learning has been a topic of research and discussion for some time. We sought to create a system that would accommodate the complex issues facing the deaf community.

Upon presentation of the iPad and the initial project to the pupils at the school, noting the interaction and reaction of pupils, we decided to expand the scope of the project and design a more specialized and comprehensive educational application in the form of interactive books combining image and animation, sign language video, finger spelling, audio and text.

### 3. SYSTEM DESCRIPTION

The system consists of two main components. There is an iPad app for content authoring, and a series of remedial learning apps on the iPad that are created by the authoring tool. The learning apps are downloaded to the student's iPad and no server access is required for accessing content.

Demibooks Composer is an iPad app available in the App Store.

The application consists of three modules: a MyBooks library of projects, a Workbench for editing, and a Preview mode for playback and reading of the interactive content. MyBooks is library of all projects being worked on and allows for export and import of book files, as well as backup/restore to/from the iPad. New book apps may be created in portrait or landscape orientation.

In the workbench, media assets that can be added to an interactive book include images, photos from the iPad, voiceovers, sound effects and music audio, movies, animations, and hot/touch zones.

A behavior system provides rich functionality accessed by a series of logical IF THEN statements. Effects are triggered by user actions/gestures such as touch, pinch, swipe, shake etc. Effects include transforms (motion, rotation, opacity, etc) to complex functions that are contextual. Waits and hyperlinks can be added, and one IF clause can have multiple THEN clauses in cascading order. Our system also includes a Physics engine meaning multiple physics related action can be applied to objects, which can also easily be dragged by the reader from one location to another in the app.

Objects can be inspected on the workbench (Figure 3.1) to reveal their attributes and any associated behaviors. Certain functions can be added at the

object level using the Inspector. The system supports master and index pages which allow for actions to be applied across multiple pages. Pages can be added, deleted and reordered.

Composer has many more features which enhance the reading experience such as particle effects, jumping to a different page in the story, the ability to do motion eases, physics joints, change the friction between colliding objects, and so forth.

The third major module of the system is a Preview (Figure 3.2) mode, which allows for the book app to be rendered right on the iPad for playback and testing by the app author. This speeds up the development time and improves the design process considerably. Quick playback and viewing of functionality as it is being created allows the designer to make iterative incremental changes to the app.

The next section describes the specific remedial learning app created with Composer that has implications for the deaf community.

Schools can either adopt these applications as part of the literacy curriculum or hearing parents who have deaf children can use them. Many hearing parents have a limited vocabulary when it comes to communicating with their deaf child using sign language. This application serves as a tool for both furthering a deaf child's literacy skills and teaching the hearing to use and understand sign language and sign language syntax.

Functioning of the application is as such using (Figure 3.2) as reference. The user can trigger (by touch) multiple animations

giving a visual clue or a visual representation of the story text (Figure 3.3).

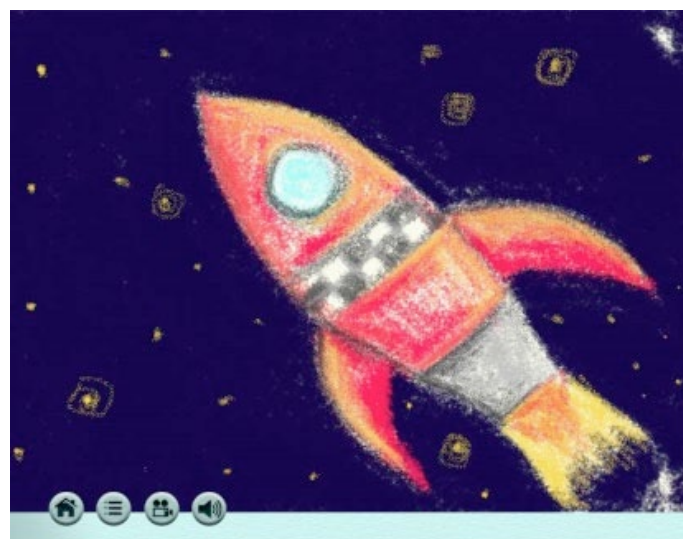
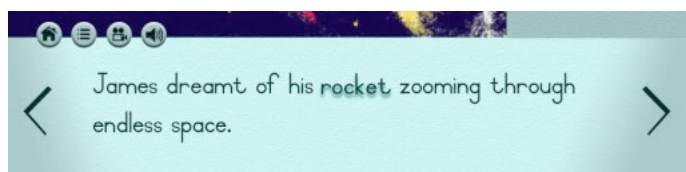


Figure 3.3. Interacting with animations.

The text of the story can be either listened to, read by the user or the user can watch a sign interpretation video of the story (Figure 3.4) by touching the video



icon. The user can also select the sound button to play the audio of the story text. The audio function is designed for users who are hard of hearing as well as users with cochlear implants and hearing aids.



**Figure 3.4. Story texts with highlighted spot words.**

Users touch highlighted spot words (Figure 3.4) to reveal an explanation on the right side of the page with sign language video interpretation of the word or concept. The sound and video icons play audio recording and sign video recordings respectively or simultaneously.

The user can select words (Figure 3.2) that are read aloud by the iPad and are followed by a (Figure 3.5) sign video interpretation, static image or animation describing the word highlighted spelling, as well as finger spelling. Thereby addressing all possible visual input needed by deaf users in the complete description of objects and concepts on the page.



**Figure 3.5. This figure serves as the explanation and elaboration of either the story text or the highlighted spot words of Fig 3.4**

Sign Language is a dynamic visual language that constantly evolves. It has regional dialects; users in the south of a country might not use the same gestures for the same objects as the north of a country, which complicates creating visual aids for the deaf.

Demibooks Composer is very well suited to creating multi language versions of the same book, with very little cost to iterate the original book. For this specific book to be converted to another language or edited for another dialect of sign language the video sign gestures, text and audio needs to be replaced, which

normally would take months of traditional coding with our system the new iteration could be completed within weeks.

The system provides deaf children the 5 critical elements: context in which a word is held (by the story text as well as the main animation), text (our ABCs), finger spelling (deaf ABCs), what the word looks like as a physical picture or animation, and Sign Language gesture in the designated sign language of the deaf user.

#### **4. FUTURE WORK**

This is a long-term project starting with preschool, foundation phase and intermediate phase pupils. The project will have to be continually adjusted and improved upon as pupil's literacy skills become better, creating more challenging work for pupils as they progress to the next phase of education.

Our plan is to implement the application concepts in multiple partner deaf schools. The first will be a series of 12 applications in a South African specialized Deaf School by the summer of 2013, grades 1-6 and with 24 students. We will work with a local research university to prepare a study of the project over the 2013-2014 academic year. We are also looking for other deaf schools in South Africa and the United States to partner with and hope to use the IDC conference to generate interest in and awareness of the project.

#### **5. ACKNOWLEDGMENTS**

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# Interactive E-books for Children: how to build them

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## WHAT DO WE NEED?

- creation tools and platforms that allow the author to write, create and publish interactive eBooks to mobile phones and pads without programming knowledge
- possibly a standard format

## WHAT IS AVAILABLE?

- There are already many tools available
- For example, more than 50 are listed here: <http://www.softpedia.com/get/Authoring-tools/Help-e-book-creators/>

## SOME EXAMPLES

- **Pubbsoft (<http://pubbsoft.com>)**
  - Designed for nontechnical users.
  - Help create, publish and sell animated stories on mobile devices.
  - Interface based on drag, drop, point and click.
  - Earn 50% royalty on each purchase of your book.
- **Ibooks Author (<http://www.apple.com/ibooks-author/>)**
  - free but only for Mac users
  - a lot of templates to make textbooks
  - allow to create books that also people with disabilities can read and experience

- **KindleGen** (<http://www.softpedia.com/get/Authoring-tools/Help-e-book-creators/KindleGen.shtml>)
  - command line tool
  - System requirements: Windows XP, Vista or 7, Intel Mac OSX 10.5 or later, Linux 2.6 i386
  - content created by KindleGen is compatible with all Kindle devices and apps
  - eBooks can be sold through Amazon's Kindle platform.
  
- **Sky Reader Media** (<http://skyreadermedia.com/>)
  - interactive children's book apps for iPads and other mobile devices.
  - web browser-based authoring platform
  
- **My Story – Books maker for kids** (<http://www.mystoryapp.org/>)
  - the simplest story maker and book creator in the App Store
  - children can draw, use photos, record voice, type, and then send their finished creations to family and friends.



## **Part 3**

# **How do we evaluate e-Books?**





# An approach to the evaluation of eBooks from a User Experience perspective

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## ABSTRACT

In this paper we propose a possible approach to evaluate interactive eBooks from a User eXperience (UX) perspective using flow theory as a framework. We start with the definition of eReading experience then we discuss what are the UX dimensions most significant to describe an optimal experience with eBooks. We then describe the Experience Sampling Method (ESM), which we believe to be the most appropriate for our purposes. Lastly, we provide a broad outline of the ESM iPad™ application we developed.

## CATEGORIES AND SUBJECT DESCRIPTORS

H.5.1 [Multimedia Information Systems]: Evaluation / Methodology.

## GENERAL TERMS

Human Factors, Measurement, Experimentation.

## KEYWORDS

Children-Computer Interaction; Experience Sampling Method; ESM; flow theory; interactive eBooks.

## 1. INTRODUCTION

Many education stakeholders often consider promoting reading and developing lifelong reading habits amongst children a priority. In recent years teacher, educators and parents started looking at new technologies as an opportunity to increase children's motivation to leisure read, and this contributed to increase the popularity of interactive eBooks. Indeed, most of the recent research is consistent in the fact that eBooks can help to motivate and encourage young readers to read more in their spare time [21,27,36]. However "it is still unclear if the entertaining, interactive features of e-books only foster a positive attitude toward literacy temporarily – until the novelty wears off – or if the motivational aspects of eBooks can sustainably support increased engagement" [36].

The lack of knowledge about children's engagement with interactive can be explained by the fact that most of the studies about the evaluation of eBooks for children focused on the comparison of electronic books vs. traditional books from an educational perspective [13,16,29]. While for what concerns Human-Computer Interaction (HCI) research field, most of the studies about eBooks involved the evaluation of usability [19,20,22,25,34,35] – with adults participants most of the times.

The increased popularity of interactive eBooks for children and the recent evolution in ePublishing industry calls for novel approaches in the evaluation of eReading experience. Thus we believe it is time to start considering and evaluate eBooks from a User eXperience (UX) perspective, following the current main trend in the discipline. The overall goal is to understand how to provide children with a better reading experience in order to motivate also those who are reluctant to read traditional books.

For this reason in the following sections of this paper we will discuss the concept of eReading experience. Based on our observations as well as previous literature on the matter we will propose a possible approach to evaluate UX with eBooks.

## 2. A DEFINITION OF E-READING EXPERIENCE

EReading experience can be seen as a particular case of UX where the mediator – interactive product – is an eBook. eBook is defined as "a digital publication consisting of text, multimedia and interactive content, where the majority of this content – i.e. more than 50% – is text" [3].

Even though a universal definition of UX does not exist, most researchers and practitioners agree that UX is dynamic, contextdependent, and subjective [23]. UX with eBooks has some additional peculiarities that need to be taken into account:

- it has a long duration: for children – and adults as well – it takes from few days to few weeks to read an entire book;

- it is fragmented over time: a book is almost never read from the beginning to the end at once, it usually takes many reading sessions to reach the end of a book;
- it has a sequential and cumulative nature: each of the above mentioned reading session usually starts from the point where the previous one ended cumulating with all the sessions that preceded in a sequential way;
- the context can be very variable: a previous study [3] revealed that despite the high portability of eReading devices children usually read eBooks in a fixed context – at home at usual times. Still these results cannot be generalized and exceptions are possible.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. This is our definition of eReading experience. Needless to say that integrations or other interpretations of the same concept are possible.

### 3. THE EVALUATION OF E-READING EXPERIENCE

Now that we explained our definition of eReading experience, another question remains: when can reading experience be considered to be good or, even better, optimal? This question is important because once we have defined the characteristics of the “optimal” experience we can understand which dimensions need to be observed in order to establish which design solution provides the better user experience – that is the most close to the optimal one. Generally speaking, at least for what concerns immersive reading – for a definition of immersive reading see [4] – we can say that one has an optimal reading experience when he “gets lost in a book”. This happens when one is completely engaged/involved in what he is reading, so involved that time flies without him noticing it; moreover one can keep concentration effortlessly on what he is reading, and self-consciousness fades away.

Interestingly enough, if we compare the state of “being lost in a book” with the description of flow state as outlined by Csikszentmihalyi [5], more than one similarity can be found.

Reading is also reported to be “one of the most frequently mentioned enjoyable [i.e. most likely to lead someone in a state of flow] activities the world over” [5]. So, among the commonly assessed

dimensions in UX research [1], the engagement/flow dimension seems to be the most suitable for our purposes.

In the HCI field engagement is defined as “a quality of user experience characterized by attributes of challenge, positive affect, endurability, aesthetic and sensory appeal, attention, feedback, variety/novelty, interactivity, and perceived user control” [30] while Flow can be defined as an intense state of engagement. Specifically, flow involves intrinsic motivation, while engaging experiences may be extrinsically motivated. Further, flow requires sustained, long-term focus and loss of awareness of the outside world, whilst engagement does not [30].

Looking at these differences, it appears that flow is more descriptive of an optimal reading experience if compared to the definition of engagement. Studies about leisure reading [7,28] already used flow theory as framework. Other studies in the HCI research field did the same – a review of HCI studies involving flow theory can be found in [9,15,32].

For these reasons, we believe that the dimension of flow can be a good “metric” to evaluate the eReading experience from a UX perspective. In our opinion the generic concept of UX is still too broad and fuzzy and it can be hard to operationalize.

#### 3.1 Method

As previously written, eReading experience is a particular case of user experience with some peculiar characteristics. It goes without saying that the more a UX data collection method would adapt to those characteristics the more it will be effective in providing a clear picture of the phenomena evaluated.

As for the eReading experience we would need a method that can adapt to its long-term, fragmented and sequential/cumulative nature. Moreover, since we decided to observe eReading from a UX perspective the method should allow collecting subjective responses from the users and should preserve the context of use.

This forces us to exclude all those methods that require the evaluation to take place in a laboratory or another formal setting – thus not preserving the context of use.

According to [26] in Children-Computer Interaction research three main approaches are used to investigate the user experience on the field: observation methods, survey methods and diaries. In our case, observations would require a disproportionate amount of time – due to the peculiarities of eReading experience which is usually a long-term and fragmented experience –

and surveys could suffer from recall biases. For all the above mentioned reasons we deem that the best approach to evaluate eReading experience is to use a diary-like method, and the most appropriate for our purposes seems to be the Experience Sampling Method (ESM).

Originally developed by Csikszentmihalyi [14], Experience sampling is an ecologically-valid contextualized data collection method in which participants' experience is repeatedly assessed in real-time through questionnaires. According to [6] ESM has two main advantages, namely the possibility to assess the experience in real-time – thus avoiding recall biases – and to repeat the assessment over the time – thus improving the quantity and quality of gathered data. We can mention a third advantage, highly relevant when participants are children: without needing on site facilitators for running the evaluation, ESM minimizes suggestibility – interviewers' influence on respondents [26].

However, according to [6], ESM also has two main disadvantages: attrition – e.g. dropout, nonresponse – and obtrusiveness – activity interruption. In the following section we explain how we will deal with these issues to avoid compromising the effectiveness of ESM.

For its benefits, with respect to other approaches, ESM is gaining popularity in the HCI field, and it has been used for many different purposes such as understanding people's information needs while on-the-go [2], building predictive user models [17], capturing users feedback on mobile phones' usage [11] or investigate the user experience in virtual environments [12].

### 3.2 Instruments

Now that we have outlined our approach to evaluate the eReading experience, it remains to describe which data collection instruments we are going to use.

In simple terms, Experience Sampling Method consists in sending a signal to the participants to remind them to fill out a questionnaire. This can be implemented in different ways – e.g. usually by providing participants with a pager and paper forms – but in our case we decided to exploit the potential of the eReading device we chose for our study (iPad™), and for this purpose we developed a ESM iPad™ application.

The application works in the following way. When the device is in use some notifications are scheduled at pseudorandom intervals – experimenters can set the expected duration and the range of variation of the interval between each notification. At the scheduled

times each notification is shown on the device in the form of the banner at the top of the screen followed by a sound.

The user can decide whether to answer to the notification immediately, at a later time or not to answer at all – unanswered notifications are stored for a fixed amount of time to allow late response. When the user answers a notification by tapping it, a questionnaire is presented on the screen – experimenters can customize the questionnaire's items. As additional features of the application we implemented video recording and automatic logging. With video recording users have the opportunity to enrich information collected through the questionnaire with their personal thoughts about the experience – a sort of “additional comments” field. As for automatic logging, the device registers the timestamp, its geographic coordinates and its orientation in the space every time a notification is answered.

In order to provide a usable data collection instrument and to reduce its interference with the activity being assessed, in addition to what recommended in [10] and [18], we developed our application with the following guidelines in mind: notifications to fill the questionnaire should not be disruptive – i.e. the alert should be a subtle stimulus in the periphery of the attention; users should be allowed to answer to a notification whenever they prefer – yet within 20 min from the triggering of the notification; the time needed to fill the questionnaire should be minimized to reduce activity interruption.

Table 1. The adapted version of the Flow Short Scale (FSS)

<b>Factor 1: Fluency</b>
I have not had any issue with what I am doing.
I can easily concentrate on what I am doing
I am not thinking about something else
I enjoy what I am doing
I do not need help for what I am doing
I feel that I have everything under control
<b>Factor 2: Absorption</b>
I think I'm quite good in what I'm doing
I do not notice time passing
I am totally absorbed in what I am doing
I am lost in thought.

To comply with the last of the above guidelines, we decided to measure flow by using an adapted version of the Flow Short Scale (FSS) [8] where some items have been rephrased with the help of teachers and

educators to make them more understandable for children between 9 to 11 years of age – see Table 1.

FSS asks participants to report the activity they are currently performing and to evaluate it in relation to the components of optimal experience. The questionnaire consists of 10 items – 7-point Likert scales – that can be grouped into two factors: the fluency of the examined activity and the absorption while conducting the activity [8]. The participants' level of optimal experience is commonly calculated as mean value – or as summation – of the items [6]. FSS has already been validated and successfully used to evaluate optimal experience with computer games [8,33] and with the web [24].

In addition to the information we would be able to collect through our ESM application, we planned preliminary and follow up semistructured interviews with the children. The main aim of the preinterview is to assess children's expectations about the eReading experience while with the post-interview we aim to assess durability – i.e. the willingness to repeat the experience. These two dimensions are inspired by the work of Read & MacFarlane about the Fun Toolkit [31].

#### 4. CONCLUSIONS

In this paper we discussed the concept of eReading experience and we proposed a possible approach to evaluate UX with eBooks. We then described why ESM can be a suitable method to assess UX for long-term and fragmented activities such as eReading and how flow can be an effective and appropriate metric to evaluate the eReading experience.

We are now in a preliminary phase of our user study where we are running a pilot study in order to test and adjust our tools.

Although it is too early to judge the effectiveness of our approach to the evaluation of eReading experience, we are quite confident it will improve our understanding of children's experience while reading interactive eBooks.

#### 5. ACKNOWLEDGMENTS

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## **Part 4**

# **Food for thought**



# **Facilitating Infant, Toddler, and Pre-K Learning with Interactive e-books**

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# CONCLUSION

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## WHAT HAPPENED AT THE WORKSHOP

*This section will summarize what have been presented and discussed during the workshop.*

*At the moment, we have just put here the notes taken during the discussion. We will exploit them as soon as possible.*

## SHEET 1

### Ethics >> Mass-communications

Which are the ethics aspects to be taken into consideration?

What does the legislation say?

- COPPA -- Children's Online Privacy Protection Act (<http://digitalmediadiet.com/?p=1249>)

### Learning >> personalization

To make learning more effective by personalization.

To personalize according to:

- special needs
- groups
- cognitive styles
- individual preferences

### Terminology

- Is "EBooks" an appropriate term?
- Are ebooks still based on pages or rather (differently from paper books) on scenes or units?
- Might "E-Stories" be a better term?
- When we talk of "Enhanced EBooks", are we actually talking of "Book-Apps"?

- In case, might "StoryBookApp" be the most appropriate term?

**When an ebook is designed we must take into consideration:**

- usability
- goals
  - motivation to read
  - learn content of text
  - learn "language"
  - entertainment
  - leisure fun
- parent/child interaction
- child-friendly perspective

## SHEET 2

### STORY | CHILDREN

Design / pedagogic heuristics

What are the missing things?

>> best practices >> reading >> designing

- embed eBook into eco-systems
- Who can use it?
- Hardware
- UX -
- What level of complexity?
- building community?

## SHEET 3

>> e-Literacy

### cluster1

1.

UX >> difficulty of building

UX >> reward of results

2. visual affordance

3. interaction affordances

4. visual languages

5.

more specifics on animation

/ \

educational      entertainment

\ /

reinforcement in narrative

6. why is audio narration in ebooks always disembodied? why not have videos of a person reading aloud to you?

7. discover vs. signal hotspots

### ||| cluster 2

1. which are the parameters to evaluate an ebook for children?

2. specific parameters for children ebooks, different from generic ebooks?

### ||| cluster 3

1. what about the creative phase?

### ||| cluster 4

1. play vs. learning?

2. role of games in learning/reading

games= reactive

reading= processing

(with different "skills")

3. line between learning and play

4. learning by playing?

### ||| cluster 5

1. taxonomy of ebooks?

- interactive vs. not??

- content / age-level

2. does anyone else think that the term e-books is outdated and needs to be changed?

### ||| cluster 6

1. which are the parameters to evaluate an ebook for children/

2. specific parameters for children ebooks, different from generic ebooks?

### ||| cluster 7

1. appropriation

2. deaf ebooks examples: why story?

what's between words + stories??

3. ebooks for children with special needs but fine for all??

4. - multiusers ebooks?

- cooperative e-books?

- collaborative learning?

5. how / should we encourage conversations between parent/child or groups of children around ebooks?

6. has anyone worked or researched including materials for parents & teachers into ebook apps?

### ||| cluster 8

1. app to support

- teaching development

- esl

- video teaching

- adaptability for other languages + other disabilities

2. using children books to teach literacy. do you think children books are the best tool to teach children literacy?

why not using the traditional classroom?

3. bilingualism/second language

4. multilingual ebooks

5. how to apply it to other language?