# The Multiplayer Storybook

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**DIPLOMA CANDIDATE:**
Carl Rustung

**INSTITUTE:**
Institute of Design

**SUPERVISORS:**
Jørn G. S. Knutsen
Mosse Sjaastad

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Interaction Design

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# 1 | Introduction

"The Multiplayer Storybook" explores shared reading on digital devices, and how to design an interactive storybook with a focus on shared reading. The project concludes in a set of ideas and guidelines for what should be expected and required of such a product, as well as an interactive framework prototype.

An open-ended project from the beginning, it examines current research on shared reading and children's media, and explores ways in which to apply that research when designing an interactive children's book. It did not start out as a response to established problems or needs (keeping in mind that they might not even exist), instead looking for possibilities, potential and opportunities through research and testing. The project has followed a (somewhat unpredictable) "design-by-doing" process, explorative in the sense that the specifications for the final delivery were formed during the project, through sketching and prototype work.

The final leg of the project was used to develop a prototype based on these specifications, to test the ideas from this thesis on real users. The prototype is the beginning of a multiplayer storybook, featuring a branching story with interactive role play for two participants, told simultaneously on two devices.

# 2 | Background

I became a father for the first time just a few months before starting this project[1], and found a new interest in children's learning and development. I'm curious about children's books and what goes into making them – not to mention why it seems the digital variety just isn't living up to its potential.

I hope my daughter grows into one of those children with endless supplies of questions about everything, and I hope I am the kind of dad who'll always do my best to give her answers. I know: That's easy for me to say when she hasn't even started talking yet, but this idea of inquisitive children was what became the starting point for this entire diploma.



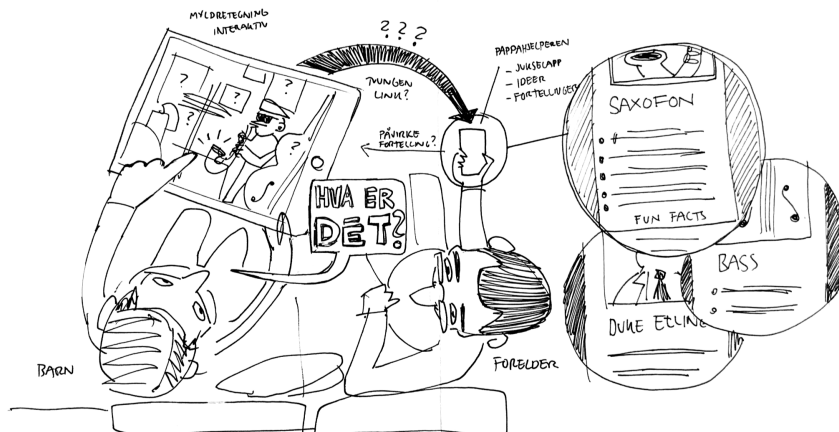**Fig. 2.1** | Project origin napkin sketch, "The Knowing Parent"-app

The very first sketch *(fig. 2.1)* depicts a child and parent using an iPad app together. The app has a bunch of clickable hotspots (illustrated with a '?'), each triggering an action. The parent's phone acts as the ultimate cheat sheet: displaying fun facts about whatever's been clicked, ensuring there's always an answer to "what's that?" at hand. I

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won't say it's a particularly great idea, but it made me want to take a closer look at digital interactive products for children.

# 2.1 | A short history of children's media[2]

The history of children's books is said to begin with the philosophers Locke and Rosseau some time around the early 1700s. They argued that children were, in fact, *different* from tiny adults, and should get to read literature that was appropriate for children – they should have some fun to go with all the morals of the day. Thus, fables became all the rage.

After about a hundred years of hares and tortoises, "Robinson Crusoe" was adapted for children[3] and sparked a new genre: the boys-to-men "robinsonades". European folk and fairy tales also had their golden age in the 1800s, with long oral traditions finally being adapted for children and collected into books by authors like the brothers Grimm and H.C. Andersen.

Girls, as their own audience, were more or less ignored until books like Joanna Spyri's "Heidi" started appearing in the early 1900s. That really got the proverbial ball rolling, children characters kept becoming more and more well-rounded, often used as critical reflections of their adult surroundings. Eventually[4] realism starts creeping in, with child-friendly depictions of war, sexuality, family conflicts and grief.

With all the improvements in print technology during this entire period, illustrations evolved from woodcuts to full-color artwork. Children became a valuable audience, and children's books started leaking into new media, from magazines and comic books to adaptations for radio, movies[5] and television. The 90s influx of home computers brought on the short-lived "age of multimedia", with children's books adapted for "edutainment" CD-ROMs.

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[2]   Birkeland & Mjør, 2000, p. 14–27
[3]   "Robinson der Jüngere" (1779), J. H. Campe
[4]   Around the 1970s
[5]   Circling back to fables, with cartoons like "The Wise Little Hen" (1934)

Neither books nor iPads have become less popular lately[6] – children's media, apps and games are huge industries – but even the most "enhanced" e-books haven't evolved much from their CD-ROM ancestors. With the technological and computational advances of the last 20 years – just look at computer games, the internet and touch-screen devices – it's strange that we don't see more imaginative takes on digital children's books. What iPad app will be held in the same regard as "The Very Hungry Caterpillar" in 60 years?

## 2.2 | Digital children's books and shared reading

The iPad – for which children's games, apps and e-books are usually designed for solo use – is notorious for "pacifying" children, with parents and researchers reacting to this still-quite-young medium with optimism and alarm in equal measures. There doesn't yet seem to be a definite answer to the question: Do iPads help or hamper children's learning and development?

The one thing everyone seems to agree on is that children's books, no matter the format, aren't just entertainment – they can have a large and lasting impact on children's development. They improve general knowledge and understanding about the world[7], and are important for language acquisition, memory, feelings, motor, social and intellectual skills, and executive function.[8]

The positive effects of reading are boosted by the presence of an adult. This two-person "unit" of parent and child is often referred to as the "dyad", and dyadic reading is as important as it is pleasurable: it's a social activity giving children opportunities to ask questions and discuss the stories, which improves "the parent-child relationship and children's socio-emotional development". [9]. Greenhoot et. al (2017)

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6      medienorge, 2014
7      Horst & Houston-Price, 2015
8      From & Mølbak, 2017
9      Takacs et al., 2014

proposes that parent-child interaction "may be critical for helping children to process and retain narratives or other material from storybooks".

Interestingly, another study argues that there is no real learning advantage to parental "scaffolding" that can't be replicated using multimedia. Clever use of animation can be as effective at guiding attention as a parent pointing at things, and whether the text is read by a parent or a recorded voiceover has no bearings on learning or story recall. [10] If so, shared reading is all about social development: if you need help, it's healthier to ask your mother than your iPad-app. (At least for now.)

That said, it's unclear what impact the iPad has on shared reading. Some studies report that digital children's books "engage and motivate children to practice new literacy skills, such as cooperation, creativity or self- revision."[11] The same studies point to interactivity and animation as potentially distracting and negatively affecting story recall.
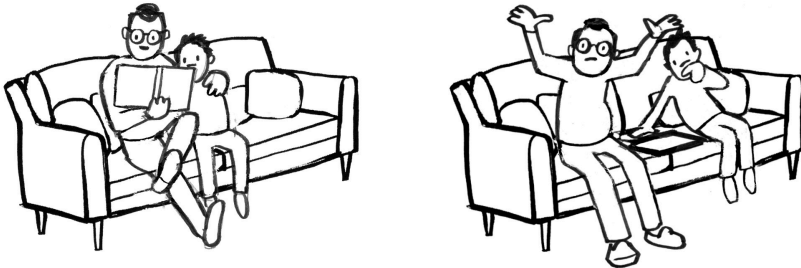


**Fig. 1.2 | Left:** Shared reading with a traditional (paper) book. | **Right:** Shared reading with an iPad – how does it work?

Takacs et al. (2014) suggest that digital stories with few interactive features are better for learning literacy skills, while many "are more advantageous for engaging children and prompting physical interaction". Yuill & Martin (2016) point out that

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[10]    Takacs et al., 2014
[11]    Kucirkova, 2013

collaborative activities and shared emotional experiences are all the more important "in a context where digital media could reduce face-to-face sharing."

In her article *"Is Reading on a Tablet Better for Young Children, or Should They Stick to Paper Books?"*[12], Nicola Yuill has a suggestion for designers that seems relevant to this project:

> *"We believe that designers could think more about how [e-books] can be designed for sharing [...] Book Trust figures report a drop from 86 per cent of parents reading with their five-year-olds to just 38 per cent with 11-year-olds. There is a possibility that the clever redesign of e-books and tablets might just slow that trend."*

# 2.3 | The decline of shared reading

The trend Yuill refers to, is not limited to the U.K., it's visible in Norwegian statistics[13] as well. The time children spend reading books declines sharply around the end of primary school, with a simultaneous increase in their use of digital devices (more than 90% of Norwegian 11-year-olds have their own smartphone). This includes shared reading; fewer parents read with their children when they get skilled enough to read on their own. For Norwegian children, the percentage spending two or more hours with their family per day drops ≈40% between the ages 11 and 13.

Though a significant number of households own iPads[14], it seems very few children use them for reading[15]. Researchers have linked this to the transition to independent reading, which is generally a solo activity – the children are expected to read by

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[12]   The Independent, December 16th 2016.
[13]   Medietilsynet, 2016
[14]   72% in Norway. (SSB, 2017)
[15]   Yuill & Martin (2016), p. 8

themselves.[16] Nevertheless, many children find shared reading to be a pleasant social activity that they would like to continue.[17]

# 2.4 | Problem definition

Shared reading is a fairly common family activity, and there are plenty of children's books adapted for and published on tablet devices like the iPad, so where do these fit into the equation? **Is there room for iPads in shared reading?** Why aren't they as popular as paper books? Are the apps ill-suited for shared reading, or is it the format? In any case: how can a digital storybook be designed with shared reading in mind? Or in other words: **what does a multiplayer storybook look like?**

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[16]    Ibid.
[17]    Merga, 2017

# 3 | Research

## 3.1 | Reading on paper and screens

### Digital natives and new media literacy

There's nothing novel about tablets and smartphones any longer. Children are "likely to be exposed to technology at times even before they are exposed to print or traditional books"[1] and "digital natives" has become a household term. Some parents report that sharing a paper book has become a pleasant novelty.[2]

Educators are starting to worry less about digital devices negatively impacting learning and development, instead widening the young field of "new literacies" (participatory media like sharing photos and videos, social media, online shopping etc.).

> "[...] we regard literacy learning as social in origin and mediated through action and interaction using cultural artefacts. These artefacts evolve over time as societies develop, and in the current era, we argue that literate activity is characterised by the use of both print and digital media. Particularly when using digital devices, meanings can be expressed through multiple modes of symbolic representation, such as combinations of spoken and written language, images, icons, sounds, layout and animation."
>
> —Flewitt et al., 2015

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[1]    Vanderschantz & Timpany, 2012, p. 32
[2]    Yuill & Martin, 2016, p. 11

## Trans-literacy

Trans-literacy is the idea that skills gained from reading in one medium, translates to other media.

> *"Reading e-books promotes traditional literacy skills and is particularly supportive in the area of vocabulary development, and young children's interaction with enhanced digital books also advances their facility to communicate and comprehend across modes and platforms, sometimes called trans-literacy development."*
>
> —Cahill & McGill-Franzen, 2013

This would suggest that if you want children to become book-readers, there are advantages for digital narratives to stay close to a book-like format. Trans-literacy is not only promoted by similarities between printed and digital reading environments, it is also important for children to learn the differences between them.[3]

## Why digital devices are bad

It seems almost intuitive, at least for those of us who were introduced to tablets and smartphones as grown-ups, to view digital devices as potentially harmful. One study found mothers to have a strong "preference for reading on paper, whether this was reading themselves or for their child", while their children don't really care that much. It also found that the mothers reading paper books made more story-relevant comments with a higher "interaction warmth" than when reading digital books.[4]

Several studies point out how interactive features, though engaging, are often distracting. This usually means it affects story recall negatively, i. e. the child is too busy clicking buttons to remember what the story was about later. Interactive features can even cause "cognitive overload" in young children when they have to switch between listening to a story, getting words explained, and playing games – all within a

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[3]    Vanderschantz & Timpany, 2012
[4]    Yuill & Martin, 2016, p. 8

few moments.[5] Some educators also worry apps and games lead to addiction and over-stimulation, as well as having "negative consequences for the kinds of patient and persevering learning dispositions needed for the occasionally arduous process of learning to read and write."[6]

Children touch and press everything, and features that were designed to be in the background can suddenly become foregrounded[7]. Glitches, bugs and interface quirks can become fun toys on their own. For instance, a cool page turn animation can end up being more interesting than what's on the page itself. Marsh et al. argues that this is a new type of play that only happens on digital devices. They call it *transgressive play*, "in which children contest, resist and/or transgress expected norms, rules and perceived restrictions in both digital and non-digital contexts".[8]

## Why digital devices are good

The pairing of text narration and multimedia elements strengthens verbal comprehension and story recall by reducing cognitive load (younger children aside). [9]This is true for both single and shared reading, and taken advantage of in pre-schools, schools and at home.[10]

Teachers report that iPads can help children with motivation, consentration, and classroom communication. It also facilitates "collaborative and independent learning in playful and creative ways."[11]

> "[...] well planned literacy-related iPad activities stimulated children's motivation and concentration, and offered rich opportunities for communications, collaborative interaction, independent learning and enthusiastic learning dispositions. [...] immediate feedback, along with

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5    Takacs et al., 2014
6    Flewitt et al., 2015, p. 10
7    Yuill & Martin, 2016, p. 11
8    Marsh et al., 2016, p. 250
9    Takacs et al., 2014. Cahill & McGill-Franzen, 2013
10   Vanderschantz & Timpany, 2013
11   Flewitt et al., 2015

*tangible and satisfying end products, motivated children to engage deeply
with iPad-based literacy activities, which as one practitioner commented,
attracted their attention like 'bees to a honeypot' "*

—Flewitt et al., 2015

Animations are better for explaining difficult words and concepts than still
illustrations – some words, especially verbs, really benefit from some motion. Music
and sound effects can also be important when depicting more abstract expressions or
emotions and feelings[12], for instance a sad-sounding minor harmony.

# 3.2 | Parent-child interaction

## Shared reading

As mentioned earlier, shared reading is about the social connection and interaction
between parent and child. In broad terms, this interaction consists of parents'
"scaffolding" (guidance) and discussions around story, illustrations and interactive
elements.

Several studies [13] suggest that illustrations generally make parents and children
interact more with each other, both verbally and non-verbally. (In some cases, the lack
of illustrations make parents compensate by reading with more emotion.)
Illustrations are very effective at capturing children's attention to the stories being
read to them, and help "familiarize children with situations that they might otherwise
reject". When the dyads have illustrations to talk about, it's easier to keep the children
interested and focused, leading to strengthened story recall. (Surprisingly,
anthropomorphic illustrations and language are the exception, leading to lower levels
of learning.[14])

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[12]    Takacs et al., 2014
[13]    Horst & Houston-Price, 2015. Greenhoot et al. 2014
[14]    Horst & Houston-Price, 2015

The parent and child's body language and their positions relative to each other is called "dyadic posture".
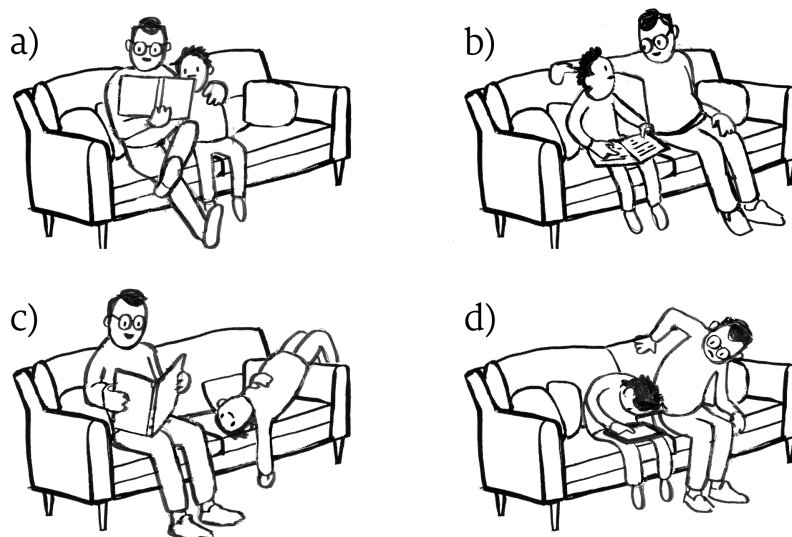


**Fig. 3.1** | Shared reading and dyadic postures.

*(Fig. 3.1)* illustrates some typical dyadic postures during shared reading. The first is the "curled-up" position, where the dyad sit close to each other while looking at the same page. This occurs whether the parent *(fig. 3.1, a)* or child *(fig. 3.1, b)* is reading out loud. When the child is reading, the parent may participate by "scaffolding", i. e. guiding, providing help and information.

The second posture *(fig. 3.1, c)* occurs when there's nothing but text on the page (or illustrations are non-essential), and comfort matters more than proximity. Typically when a parent reads a storybook to the child:

> *"[...] when a mother read from paper, she often held the book between herself and the child, with the child very close to her, either tucked under her arm to facilitate visual sharing or in a very relaxed posture with audio sharing, but little sight of the book."*
>
> —Yuill & Martin, 2016, p. 6

On-screen shared reading on a tablet device *(fig. 3.1, d)* is known to present some challenges, related to children's perceived "ownership"[15] of the tablet as a medium, and their closeness to the screen obstructing their parents' view of what's happening on the display.

> *"When children read from a screen, they tended to hold the tablet in a 'head-down' posture typical of solo uses [...] leading [the mothers] to curl round behind the child in order to 'shoulder-surf' the screen, rather than adopting the 'curled-up' position common when reading the paper book."*
>
> —Yuill & Martin, 2016, p. 6

# 3.3 | Games and play

There have been several broad classifications of the ways children play. A couple of famous ones, Roger Caillois' definitions from 1961 and Corinne Hutt's categories from 1979, more or less agree[16] that the main groups are:

- Games for learning, or epistemic play
- A variety of role play, or ludic play, where children draw from their experiences – from their own life, fantasy and drama (TV, movies etc.)
- Games with rules, play based on skills or chance, often competitive

Hughes' taxonomy of play from 2002 expand these into to 16 play types that can be used to describe most activities children are engaged in.[17] The study "Digital Play: a new classification" (Marsh et al., 2016) updates Hughes' taxonomy for "on-screen" play, and adds a 17th play type that "occurred when children used features of the apps that were not part of the design, thus transgressing the app producers' intentions". (Something to look out for!)

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[15] "...we have found that children are often reluctant to cede control of a digital device, perhaps because they justifiably see themselves as 'digital natives'" (Yuill & Martin, 2016, p. 10)

[16] Marsh et al., 2016

[17] Ibid.
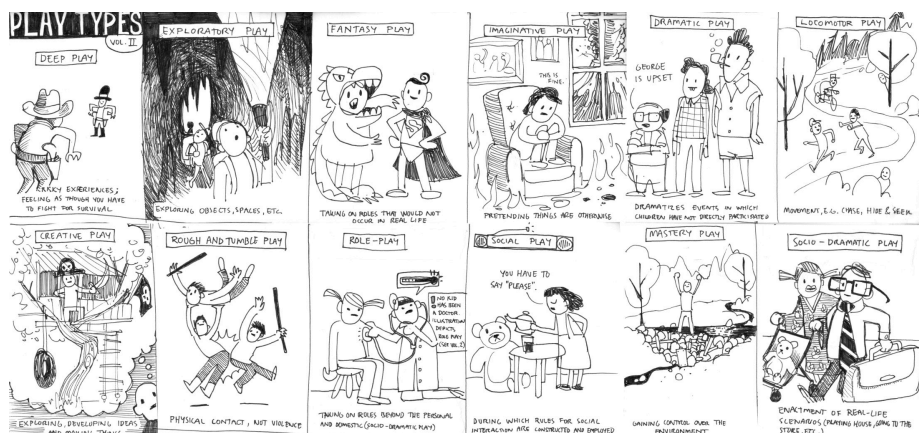
Fig. 3.2 | Some of the play types from Hughes' taxonomy

The authors argue that there is no play type that cannot be replicated digitally, with detailed examples of iPhone-games turning into life-and-death situations. Comparing it to traditional play:

> "[...] contemporary digital cultures provide rich opportunities for the promotion of play that is rooted in children's everyday experiences. This is not [...] an inferior form of play; rather, it sits alongside more traditional play activities and is important for creative development"
>
> —Marsh et al., 2016

The list goes a long way to explain the popularity of games like Minecraft, in which most of the 16 types are catered to, from mastery of environments to various kinds of role play. I found Hughes' taxonomy and Marsh' new classification to be very handy both for reference and inspiration, as I could generate ideas by going through the play types and think of ways to apply each one to my own storybook.

# 3.4 | State of the art

Looking at interactive children's media, the products range from books to games – from game-like paper books to digital games inspired by children's picture books – with a whole spectrum of categories in between.

Printed books are alive and well, with no decline in sales over the last 20 years.[18] According to one author I spoke to[19], a normal first edition is printed in 2500 copies, with expected sales around 200 books a year.

It's hard to gauge how well children's apps sell based on the app store charts, but throughout this project, they have taken up 80–90% of the "paid app" bestseller lists. (Poio, a constant chart-topper, has reportedly "helped 30.000 kids learn how to read"[20], but since their software is used in schools, that doesn't translate to sales figures.) Google's Play Store distinguishes between sales numbers and highest grossing apps, but Apple's algorithms are unknown.

The charts are localized, so we can make one of two assumptions about the Norwegian market:

1. We spend a lot of money on children's apps.
2. We buy very few apps, but when we do, they are for our children.

I suspect the latter is more plausible. (As a sidenote, I saw an obscure and quite expensive iPad app shoot right up into the top 25 "best-selling" paid apps only hours after I had purchased it.)


## Paper books

Though their themes and topics are as diverse as adult books, traditional children's books are normally categorized by age, ranging from picture books to "middle-grade" books.[21]

- **3–5 years, Picture books:** Books teaching fundamental language and concepts[22] through big letters and colorful pictures. Often "interactive"

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[18] Norwegian market. (medienorge, 2014)
[19] Einar Wist Øyen, author of "Sigurd og de flyvende dinosaurene" (Aschehoug, 2017)
[20] https://poio.no/omoss/
[21] I do not include "young adult" (ages 12–18) literature in this study.
[22] For instance: vocabulary, numbers, emotions, civic services

features using paper in novel ways, like the holes eaten by "The Very Hungy Caterpillar" (Eric Carle, 1969) or the paper flaps in Eric Hill's "Spot" series.

- **6–8 years, Storybooks:** More focus on text than on pictures, though most often illustrated. Classic books by Roald Dahl & Quentin Blake ("The BFG", "Matilda"), Astrid Lindgren ("Pippi Longstocking") and Ole Lund Kirkegaard ("Gummi-Tarzan").
- **9–12, "Middle grade" books:** Novels, pretty much, where pictures are mostly reserved for their covers. Lots of fantasy and comedy, often serialized. The fact books for this age group are more advanced and diverse, both related to school and children's interests. Current best-selling series about "Captain Underpants" (Dav Pilkey), "Diary of a Wimpy Kid" (Jeff Kinney), "Harry Potter" (J. K. Rowling).

## E-Books and "enhanced" digital storybooks

In its simplest form, an e-book is the screen version of its print sibling, with static text and illustrations. Cahill & McGill-Franzen (2013) mention four minimum criteria for classifying an e-book:

1. Text presented visually on a screen
2. Book-like configuration (table of contents, pages, etc.)
3. An organizing subject matter or topic
4. Multimedia enhancements

Several Norwegian publishers have their own "bookshelf" apps[23] where their books can be purchased and viewed. (You'd think the publishers could work together on this one, but I've yet to see a bookshelf-app that covers several publishers' children's books – it seems troublesome to have a large library of digital children's books when you have to remember on which publisher's bookshelf to find a given book.)

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[23]     Gyldendal: App name, Aschehoug: App name etc.

**"Enhanced" storybooks** make more use of their interactive platform, and usually contain animated elements, interactive "hotspots", music and sound effects, and voice-acted narration. These seem primarily made for solo use, where the children can explore the books on their own.[24]

Audiovisual and interactive features can even be effective stand-ins for parental "scaffolding":

> *"As motion and zooming may direct children's attention to a detail of the illustration in a similar way as an adult pointing at the detail and providing comments or explanations, multimedia may be just as beneficial in supporting story and language comprehension as interaction with an adult explaining the meanings of the story and sophisticated words in the narration."*
>
> —Takacs et al., 2014

Adaptations of the classics (Dr. Seuss' books, for instance) are well represented on the iPad, but stories specifically written for the format still seem to be rare.

## Educational apps and games

Apps with a focus on teaching: often ABCs and math, but also about topics like space and dinosaurs. The iPad has become a common teaching tool in Norwegian primary education, and there's a whole ecosystem of software designed for classroom use and as support for school textbooks, not always found on the app stores. Some of these apps stay close to a book-like presentation, while others are closer to games.

**"Poio"** *(fig. 3.3, top)* is part game and part storybook with a unique approach to teaching 4–9-year-olds how to read. The children control a character that collects alphabet letters, and can then spell words with these letters and use those words in a story. Getting rave reviews, Poio has topped the paid app charts[25] for the entirety of

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[24]    Yuill & Martin, 2016
[25]    iOS App Store and Google Play charts, January–May 2018

this project, even at a quite high price point (kr 199,-). It's compatible with the curriculum for Norwegian first graders and used as a teaching tool in schools.[26]

**"Dragonbox"** *(fig. 3.3, bottom)* is a series of mathematics games for children of all ages that teach basic and advanced maths in fun ways. Developed by WeWantToKnow AS in collaboration with the publisher Aschehoug, it comes in a school edition where the app is bundled with textbooks and manipulatives (i.e. building blocks).[27]



**Fig. 3.3** | **Top:** Poio *(Source: Poio press kit)* | **Bottom:** DragonBox BIG Numbers *(Source: DragonBox press kit)*

## Pretend play

Games that have more in common with toys like LEGO or Barbie than books. These "sandbox" games have no set goals and leave the storytelling up to the player via interactive play sets. These are entertainment products, but valuable for social interaction and fun to play with others[28]. Some apps have features that let the players record and share their stories.

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26     https://poio.no
27     https://dragonbox.no/skole
28     Not multiplayer, but playing together with the same device

**Fig. 3.4** | Pretend play in Toca City

This is the best-selling category on the paid app charts, with series like "Toca Life" *(fig. 3.4)*, "Sago Mini" and "Dr. Panda" filling several of the top spots.[29]

## Computer/video games

I've chosen not to examine the whole field of video games in detail, as it's huge on its own – broadly speaking, every game with a story can be said to be an interactive narrative. Still, there are some genres to take note of (and inspiration from), mainly stemming from the adventure games of the 90s.

Some adventure games back then tried to play with live-action video ("Under a Killing Moon", "Voyeur", "Phantasmagoria"), earning the moniker "interactive movies". With adventure games enjoying somewhat of a renaissance lately, with games exploring novel takes on interactive storytelling, we have come full circle back to movie-like games like the "Uncharted" series and this year's "A Way Out". They exist alongside games that are visually removed from Hollywood blockbusters, but first and foremost tell a story.

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[29]      iOS App Store and Google Play charts, January–May 2018

**Fig. 3.5 | 1:** Grim Fandango Remastered | **2:** Kentucky Route Zero | **3:** Puzzle Agent | **4:** Burly Men at Sea

**Adventure games**

Adventure games *(Fig. 3.5, 1)* had their heyday in the 90s and early 2000s, with titles by Lucasfilm/Lucasarts ("Monkey Island" series, "Grim Fandango") and Sierra On-Line ("King's Quest" and "Leisure Suit Larry" series) now regarded as classics. The genre has had somewhat of a revival in later years, with a lot of new games and "remasters" of old ones.

These "point-and-click" adventure games tell semi-linear stories and requires the player to solve puzzles and problems. Progression is typically made through exploring environments, talking to NPCs[30] and collecting items in an inventory. Inventory items can then be used with environments and NPCs to solve puzzles.

> *"I enjoy games in which the pace is slow and the reward is for thinking and figuring, rather than quick reflexes. The element that brings adventure games to life for me is the stories around which they are woven. When done right, it is*

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[30]    Non-player character

*a form of storytelling that can be engrossing in a way that only interaction can bring. [...] If any type of game is going to bridge the gap between games and storytelling, it is most likely going to be adventure games. They will become less puzzle solving and more story telling, it is the blueprint the future will be made from."*

—Ron Gilbert, "Why adventure games suck" (1989) [31]

**"Stories you play"**

A collective term for games that focus solely on telling a story, with various degrees of interactivity. Usually quite linear stories with little problem solving, the gameplay is closer to reading a book or watching a movie.

*"I have nothing against stories you play, though they're currently shelved with video games only because we privilege unreliable terms like "interactivity." [...] in all cases they involved me watching some things happen, clicking a button, then watching some more things happen. [...] That's put the burden of invention on audiovisual novelty."*

—Matt Peckham, "Review: 'Burly Men at Sea' Is a Whimsical Romp Worth Taking", TIME magazine online, Sept. 29th, 2016 [32]

These are nothing new – laserdisc games like "Dragon's Lair" were popular in the 80s, and CD-ROM brought on a wave of "Full Motion Video"-games ("Voyeur", "Phantasmagoria") – but there's been a lot of interesting releases over the last few years. Advances in graphics might have made "interactive movies" viable in new ways (see: "Uncharted" series, "A Way Out"), but it's could also be seen as a sign of video games maturing as a medium. Not everything is about action, horror and adventures anymore: "Kentucky Route Zero" *(Fig. 3.5, 2)* is a surreal and poetic story about loss and death, "Firewatch" is a romantic thriller and "Night in the Woods" is a drama comedy about returning to a the dying small town you grew up in.

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[31]     https://grumpygamer.com/why_adventure_games_suck
[32]     http://time.com/4510322/burly-men-at-sea-review

More to the point: just like "Robinson Crusoe"-like adventure novels a became genre popular with children, these story-focused games are starting to become more children and family friendly. **"Burly Men at Sea"**[33] *(Fig. 3.5, 4)* is a "story you play" presented like a children's book. It was very well received, with reviewers bringing up shared reading:

> *"It's a gentle seafaring tale I'm looking forward to playing through with a child when I next see my smaller family members but which I'm more than happy to play for my own enjoyment as well. I think I'm on my sixth distinct playthrough at the moment and still discovering new things."*

It's the dreaded "product you discover during the diploma that you wish you had thought of first", but it's at least comforting to see how far you can take interactive children's books and that there seems to be a big interest in them.

## Case studies:

I took a closer look at a few enhanced e-books, thinking they were the closest to my own project.

I was surprised (and nostalgic) to find **"Arthur's Teacher Trouble"** (Marc Brown, 1986) on the App Store. This is part of Bröderbund's catalogue of "Living Books", a popular CD-ROM series from the mid 90s, now ported to the iPad as "Wanderful Interactive Storybooks"[34]. It is literally, pixel by pixel, the exact same digital book from my childhood, with the same voiceover. I had a lot of fun with this book when I was a child, and it was instrumental in teaching me English.

There are two modes, with and without voiceover. Every word on the page can be clicked to hear it out loud, and almost every little element in the background illustrations can be interacted with, triggering sounds and animations. The pictures are pixellated and the voiceover is compressed into a crunch, but the title is more

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[33]     Brain&Brain, 2016 (http://brainandbrain.co)
[34]     Wanderful, Inc. (http://wanderfulstorybooks.com)

than 20 years old. (I'd say it's still a charming book, but then again, I'm wearing rose-colored glasses for this one.)

**Jakten på Teddy** is the only storybook-app I found that I know was specifically written for iPad. It was "Jakten på Teddy" tells the story of Theo, whose teddy bear gets stolen by the evil witch Ipswitch. Theo gets transported into a magical realm where all his toys have come to life, and has to search for Ipswitch to rescue Teddy.

Theo travels through three locations before confronting the Ipswitch in her castle. In each location, he meets a living version of one of his toys, all broken in different ways by the witch. The locations all have interactive hotspots that reveal short animations. Theo and the toys have a short talk, the reader plays a little minigame to mend the broken toy, and it's off to the next location. When confronting the witch, the toys you have mended come to your help in defeating her.

**"Kubbe lager skyggeteater"** is the least "enhanced" of the case study e-books. It tells the story Kubbe, a piece of wood, who is spending a day with his grandmother in the forest. Grandma tells Kubbe about the art of shadow theatre, inspiring him to make his own play.

"Kubbe..." has beautiful illustrations and excellent voice acting, even a long animation about shadow theatre, but interactive hotspots are few and far between. There's very little to do but listen to the story and turn the pages.

I've included **"Puzzle Agent 1 & 2"**[35] *(Fig. 3.5, 3)* because it's presented like a children's book and has a lot of minigames. It tells linear, humorous mystery stories interspersed with brain-teaser puzzles, with full voice-acting and illustrations by Graham "Grickle" Annable. The player can travel between locales and talk to NPCs, but progression is made by solving puzzles with increasing difficulty. The minigames are well suited to touch controls, and both Puzzle Agent games have been ported to the iPad.

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[35]    Telltale Games, 2010–11 (https://telltale.com)

# Findings

These enhanced e-books are well executed products, but not taking full advantage of the all the opportunities of interactive storytelling.

**Dynamic stories**

In the case of "Jakten på Teddy" the story branches, but only slightly. The app is inspired by "Choose Your Own Adventure"-books and its marketing really plays up how the story is different each time you play, but the truth is that there is very little variation between each playthrough. There are six different locations to visit, and four different orders in which to complete the story, but the climax is always the same. Player choices have very little impact, it doesn't matter what choices you've made or which toys come to your help in the end, the ending plays out exactly the same.

 "Arthur…" has a ton of interactive hotspots, but the story is the same every time. "Kubbe…", though a charming e-book, might as well have been a movie. "Puzzle Agent" has a linear story, but progresses like an adventure game, making it *feel* like it's based on player actions.

If the story is completely linear, it's a good idea to break it up with events that require player input (beyond turning a page) to progress. Branching stories must be linear enough to write, but to offer any real replay value to anyone but the youngest children, they need to be dynamic enough to offer up some real variations based on player input.

**Interactive elements**

In "Jakten…", the interactive hotspots are telegraphed with a distracting sparkle animation, yet offer little in return for pressing them. Neither "Kubbe…" nor "Arthur…" gives any special focus to hotspots, but where almost every element on the screen (including words) offer a reward when clicked, almost none of Kubbe's do. "Kubbe…" makes it worse by having very detailed illustrations, at times with tons of elements that you *want* to interact with, but very few that do anything.

It might be hard to predict what the user thinks, but everything that *looks* like an interactive element, should *be* an interactive element. At the same time, a hotspot should manage to look like one without drawing too much attention to itself, for example using odd-looking borders or animations. Both "Arthur…" and "Puzzle Agent" gets this right.

Interactive elements and minigames should not be active or playable while the story is being read, but become available during the break between pages. This is easy to solve when using a pre-recorded voiceover, but is a tricky problem for "live" shared reading.

# 3.5 | Conclusions

- Children aren't awed by iPads any more.
- All kinds of play types can be recreated digitally
- There is nothing indicating that iPads are inherently bad for children, children's books or shared reading, but one needs to be aware of distracting elements and decide on when to teach and when to entertain. Younger children are especially sensitive to distractions.
- Interactive media for children has its uses in the classroom.
- If the app's interface is *too* fun to use, it will be used for transgressive play. Keeping close to a paper book format lets the children develop trans-literacy skills.
- The biggest challenges with shared reading on iPads, are children obstructing the parent's view and children's perceived "ownership" of the medium.
- Digital children's books are seeing some interesting developments, but the evolution comes from interactive narratives circling back from games, not growing up from e-books. The genre of "stories you play" is starting to come into its own, with a lot of novel takes on interactive storytelling.

# 4 | Divergence

To figure out how to tell stories in an interactive fashion, I felt it essential to work with the stories themselves. This turns out to be a two-way street: the interactive features should both support and enhance the story. The story dictates what interactive features are needed, but the interactive features affect how the story should be told, and further what *kind* of stories fit the features.

The process, in short, was a long, divergent phase full of enthusiastic sketching, story writing and basic prototyping, which resulted in a ring binder full of sketches, exploring interactive storytelling and story development, looking at locations, characters and interactive sequences.
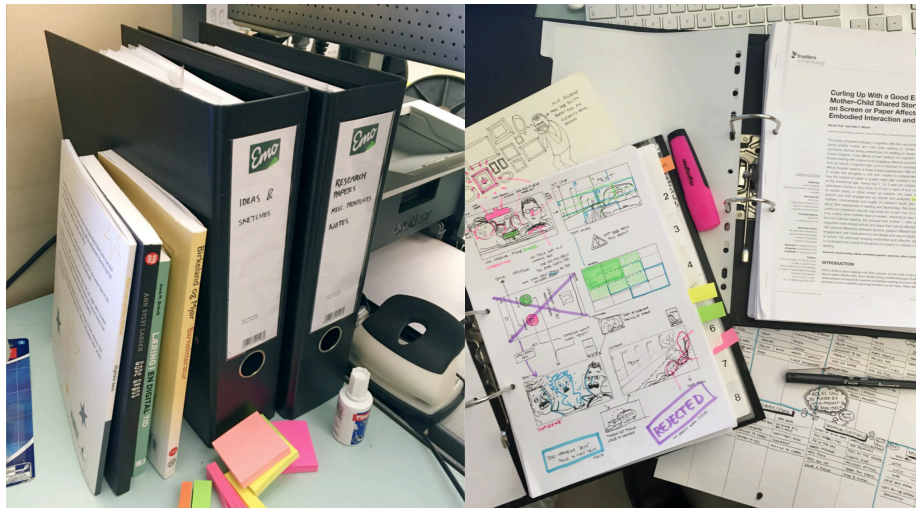


**Fig. 4.1** | The paperless office can wait! The project binders containing research papers and idea sketches.

This ended with the transition to a convergent phase, trying to make sense of my ballooning sketch binders *(fig. 4.1)*. Thankfully, some patterns emerged, resulting in some "dos and don'ts" and eventually the foundations of a framework for interactive storybooks.

# 4.1 | Multiplayer

Interactive shared reading is inherently "multiplayer", with two participants engaging in a common activity. Multiplayer games can be local or online, turn-based or real-time.

I went on a short tangent looking at the possibilities for online multiplayer, where parents could engage in *remote* shared reading with their children. The prototype devices ended up talking to each other via an online server anyway, so it would "only" require some means of communicating via text, audio and/or video. In the end, I felt that it led to an entirely different project; I would design for local multiplayer, as it felt more relevant for conventional dyadic reading.

For a local, turn-based game, there is only need for one shared set of controls and one shared screen. With actions happening in real-time, there might be a need for a second controller and, in some cases, a second display.

Since the first computer game[1], "Tennis for Two" (1958), through "Pong" (1972) and a heap of arcade machines, from the first Nintendo (1983) to the latest Playstation (2016[2]): the convention has been separate controllers for each player. In the case of the iPad, I felt it would be fair to assume that households that own an iPad (tablet) also own at least one iPhone (smartphone). The iPhone could serve as a separate controller *and* an extra display, opening up a lot of possibilities for both gameplay and storytelling. It also allows one player to keep secrets from or surprise the other player, a very interesting mechanic for social play.

The way the devices are held "has implications for how easy the device is to share" and can "influence the closeness of the interaction"[3], so I found it interesting to see what sort of impact a secondary device could have. Would it only lead to more

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[1]   Depending on how you look at it. It's said to be the first computer game developed purely as an entertainment product.
[2]   PS4 Pro
[3]   Yuill & Martin, 2016, p. 10

individual screen-staring, or could it be used to coax the participants into close interactions?

I started sketching out some scenes and scenarios for two players, with screen layouts for tablet and mobile. I tried to represent as many play types as I could, and explored themes like negotiation, cooperation, competition and dialogue. Some sketches focused on the secondary device as a remote control, others tried using the mobile device as a synchronous "viewport" for storytelling, showing the current scene from a different perspective.



**Fig. 4.2** | Multiplayer scenario sketches. Top half represents primary/tablet view, bottom right quarter represents secondary/phone view.

Some examples include:

- A second iteration of the origin idea, where the one player was stuck in a completely alien environment and tasked with finding the "crombobulator". When the player clicked on various items, the other player took on the role of expert, getting access to detailed explanations of what was clicked. The story would progress once the "crombobulator" was discovered.
- A scenario in which one player has to defuse a bomb and the other has access to a cryptic and randomized bomb defusing manual *(fig. 4.2, left)*, forcing the two to cooperate (or sabotage each other). A timer would add urgency.

- Negotiation between the two players *(fig. 4.2, middle)*. One player takes the role of a guardian blocking the path leading to the next page, the other plays the protagonist who has to convince the guardian to let her pass. The protagonist player offer items to the guardian player, who decides if the offer is met with anger, spite or acceptance.
- Ways to tell the story from different perspectives simultaneously *(fig. 4.2, right)*. Though interesting-looking, it could easily make the story hard to follow. It was also hard to make it interactive, instead making both players passive spectators.

These led to more involved storyboards of action sequences, with multiple outcomes depending on player input.



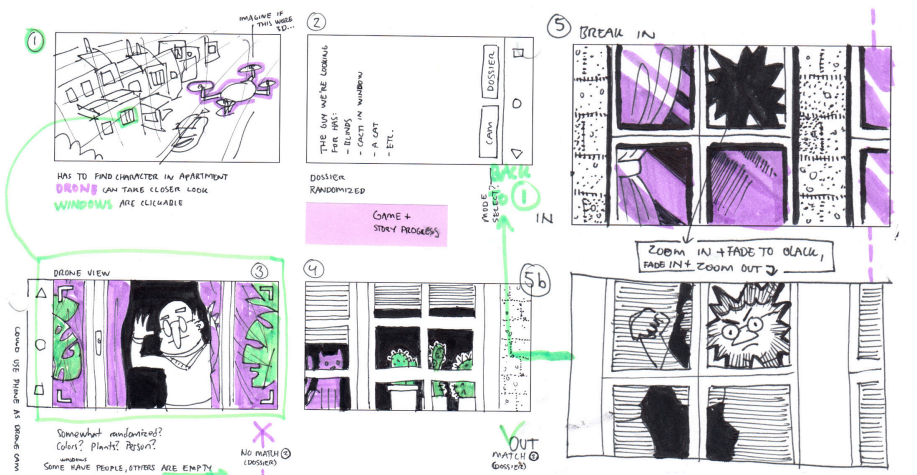**Fig. 4.3** | Interactive sequence storyboard

For instance, one storyboard *(fig. 4.3)* depicts a sequence where one of the players are given a description of an apartment, and the other pilots a drone to peek into people's windows. If they think they've found the right apartment, they can crash the drone through the window to enter. If it's the right apartment, the story continues. If not, someone gets very angry.

## Proof-of-concept apps

I made some very early tech prototypes to see whether or not it was plausible to get the two devices to talk to each other. The first working prototype was "platform-agnostic"(i.e. my iPad communicated with an Android phone), written in JavaScript and packaged for the devices with Apache Cordova[4]. The apps were synchronized via a local server, sending instructions back and forth using node.js and websockets.

This soon out turned to be a slow workflow with bad app performance, so after some tests I swapped my Android phone with an iPhone, focused on iOS development and learned how to program apps with Swift and Xcode. I then made some unsuccessful attempts at getting the devices to communicate without my node.js server, based on proximity and via Bluetooth.

In the end, I had tested a dozen different approaches and found the most effective way of prototyping with "real code", and proven the multiplayer idea could work.

# 4.2 | Interactive storytelling

Each scenario sketch was a snapshot that could be a single page in a storybook, and I started thinking of ways to string them together. Many scenarios involved the players making decisions, which would only make sense if those decisions were reflected in the story. That, in turn, meant the story couldn't be the same every time.

I looked at story archetypes ("The Hero's Journey", "Seven Basic Plots") and tried to apply them to look at non-linear and branching storytelling. Though no surprise, what I discovered was the sheer amount of planning and writing needed to drive these kinds of plots successfully. Respecting a standard story structure is easy when the story is linear, but gets difficult *fast* when the introduction sets you up for different conflicts, where the protagonist meets different characters for each one, and

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[4]     https://cordova.apache.org

you suddenly try to time a simultaneous climax for a dozen separate storylines branching out to even more endings.

You don't need many branches before a story gets completely out of control. Add illustrations on top of this, and you've got yourself a nightmare. After various attempts, I ended up close to adventure games again – quite linear stories that take interesting detours. Instead of big branches, smaller variations based on player choices seem more viable.



**Fig. 4.4** | Various attempts at visualizing non-linear stories

There's also the question of how close to stick to a book and its pages. In a book, you can always turn *back* a page, but once you introduce player choices, the choices should have some weight and mean something. If you can undo all choices by turning back a page, you render them meaningless. It doesn't matter for the plot, but it has a large impact on how it feels to read and play.

## 4.3 | Locations and characters

Again inspired by the tradition of adventure games, I wanted the story to include a lot of traveling between locations. If the story is told in a non-linear fashion and you still want to retain some control of it, you need to limit where the players can go. The easiest way to do that is placing the story in small, naturally "walled-off" areas (see also: Agatha Christie).

**Fig. 4.5** | Location overview studies. **Left:** Secluded island layouts | **Right:** Cityscape idea – spacial story diagram and block mockup

I also explored how the players could leave an impact on the locations they had visited, and how to design a location where a branching story was represented by literal crossroads and branching paths. This led to a small, and very steep, city location, where the players started at the bottom and progressed upwards. Each location they stopped at would have some sort of interaction with the environment or another character, and each of these interactions would leave a visible mark in the environment. For instance, the players could end up starting a fire in a bakery, or completely flood the lower levels of the city. When the story concluded, the camera would zoom out to reveal the visual traces of all the players' decisions. It could also serve as a nice bookmark if you returned to the book halfway through the story, as the trail would mark how far you'd progressed.

The scenario sketches also hinted at the players taking on various roles, so I looked into character archetypes *(fig. 4.6)* and classic pairings ("mentor and apprentice", "good cop, bad cop" etc.) to come up with ideas for role-play and dramatic interactions between the players.

**Fig. 4.6** | Two of the twelve Jungian character archetypes.

It also led to a host of ideas about character creation and customization, with the possibility of the players feeling closer relationships with the characters they experience the story through. Again, it's a balance of writing a story beforehand, and how big blanks the readers should fill in on their own.
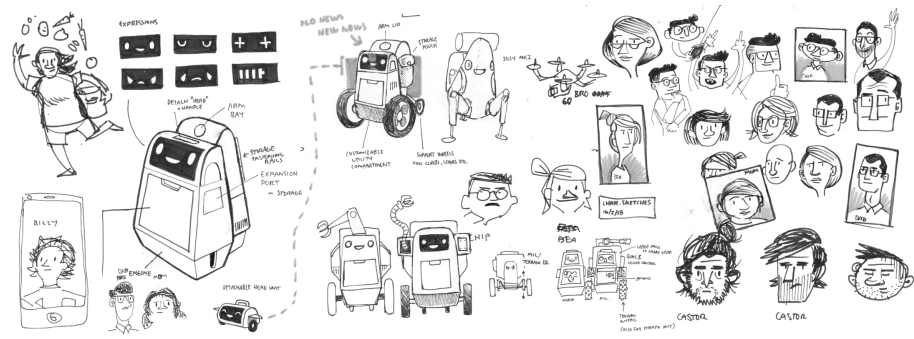


**Fig. 4.7** | Character sketches

I tried explaining the use of the secondary device by having characters interact with the player's phone, for instance via simulated calls or text messages. I even played with housing a character in the phone through supernatural means *(fig. 4.8)*.

**Fig. 4.8** | Story sequence where a character gets trapped in your phone.

Character personalities were simulated through their phone interfaces. "Geeky" characters might have some very odd or advanced apps on their phones, while a social, friendly character might have a lot of apps for sharing pictures or sending messages. If the secondary device played the part of the characters' phones, their apps could even be used for storytelling, through reading their mails and messages, or peeking at their selfies.

Pre-written characters can be quite complex, leading me down a rabbit-hole of backstories and relationships. In general, storytelling had become a daunting and time-intensive task.

# 4.4 | Story development

This is where the explorative nature of the project almost took it off the rails and into a vicious circle. The various attempts at stories and setups would affect the form of the product and its interactive elements. A certain story sequence would be a good fit for a certain minigame. When developing these elements, the story would need adjustments to accommodate the interactions. Maybe a location would change, but then the story might not make as much sense, so it would be rewritten again, which might affect the minigame, etc.

For instance, let's say a group of characters are on a hiking trip and camping in tents. One character loses something important, a MacGuffin, that needs to be recovered for the plot to progress. Finding the MacGuffin is then played out via a minigame, that

consists of clicking hotspots in an interactive environment. One of the tents would be a natural place to look, but tents aren't particularly interesting environments, so maybe they should be camping (or glamping) in an RV instead. That opens up a lot of possibilities for story locations, too.
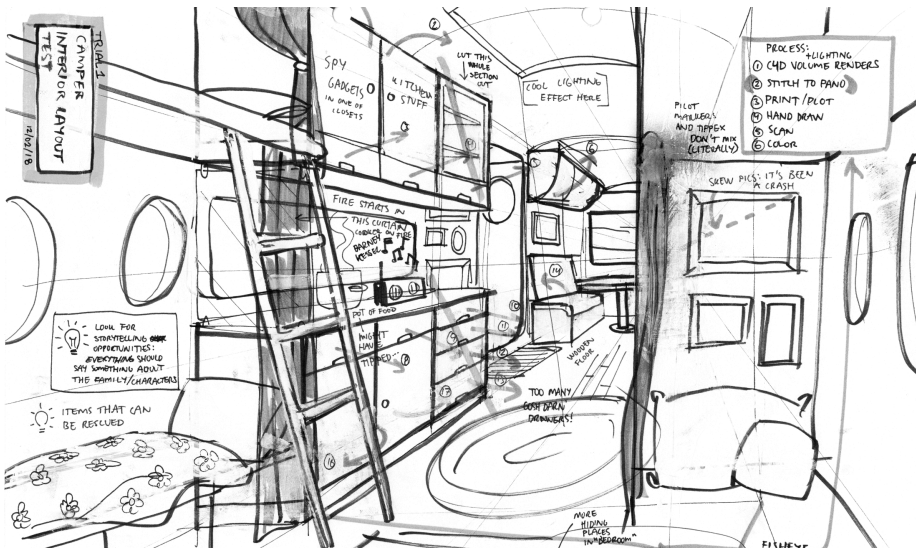


**Fig. 4.9** | RV interior, idea sketch. Example of designing a minigame based on location, from interactive hotspots to background music.

Now the minigame starts to get interesting, but the characters are no longer hiking – they are on a roadtrip. They are all traveling in the same RV – what if one of the characters *stole* the MacGuffin, and has *hidden* it somewhere? That creates an interesting conflict, the minigame can be expanded to include both players – one to hide the MacGuffin before the other must find it. But who are these characters..?

And so the process went, ad nauseam. Normally, this would just be a normal creative process, but a diploma project has a pretty short timeline. It's a ton of fun to work this way, but I got caught up in storytelling and lost sight of two very important points:

1. The goal of this project isn't writing a compelling story, it's the parent-child interactions.
2. I would never have time to prototype an entire story anyway.

Though not a shining example of project management, the process was by no means a *waste* of time – working with the story this way *did* generate a lot of ideas and discoveries that might have been hard to come by in a less slapdash manner. It also underlined the idea of interactive sequences both driving the story and being driven by it.

In retrospect, when looking at the product as a storytelling framework, I think it was essential to have explored "real" storylines to get a feel for what sort of scenarios the framework might have to support.

## 4.5 | Patterns emerge

All the sketches, ideas and storyboards could either be described as purely story-related, or categorized by play type using Hughes' taxonomy. Many of the play-related ideas fit under role-play, while others didn't. Thus all my ideas could be presented as:

- Story ideas, for reading
- Role-play ideas, for acting
- Game ideas, for playing

The principle that games should not interfere with the story made it necessary to separate the three somehow, especially if any product were to represent and contain all three categories. This meant everything from the storytelling category should be kept on its own, interspersed with interactions relating to the other two. The game ideas were only loosely connected to storytelling, and had the most potential to be distracting, so maybe they should be kept completely separate too.

This led to idea of a storybook app with three "modes": Read mode, Talk mode and Play mode. Each page could be one of the three modes, depending on the what kind of interaction suited the plot. To accommodate any kind of story, I went general: I started thinking less about one, definitive product and more about a sort of framework that could be used to build storybooks.

# 5 | Convergence

## 5.1 | The Framework

The framework app provides the "building blocks" with which to tell a story. It's like a book with blank pages: a container for the story, where the story itself comes from the applied text and images. In this imagined framework each page can be represented with on of three modes: read mode, talk mode, and play mode.

To facilitate stories with branching plots and player choices with story consequences, the framework needs to react to both real-time user input, and keep track of previous actions. Did Snow White eat the poison apple or not? What item was used to murder Professor Plum, and in which room? From a technical standpoint, this can be solved by storing "flags" – small pairs of information that can be used to store and reference choices made by the readers.

The framework also needs protocols for device connection and communication. This handles how the devices synchronize their data, for instance what page the readers are currently on, and how choices on one device are communicated to the other.

## 5.2 | Modes

### Read mode

This mode focuses on reading and story progression. One player takes on the reading role, and reads the story on the primary screen (iPad). Illustrations and animations are shared between the devices, but the secondary screen (iPhone) may also contain interactive elements that lets the listener influence what's being read.

Fig. 5.1 | Read mode initial sketches. The iPad has a split view for text and illustration.

## Talk mode

Children are more engaged when reading than listening, so I wanted to find a way to ensure both participants got to read something. Talk mode is about dialogue and dramatic play. It uses one device for each participant, who are given character roles and dialogue lines to read. While one player reads, the listening player can change their character's reactions to what's being said. These reactions are reflected on both screens, and determine the next lines and the final outcome of the conversation. This outcome then has consequences for the rest of story.
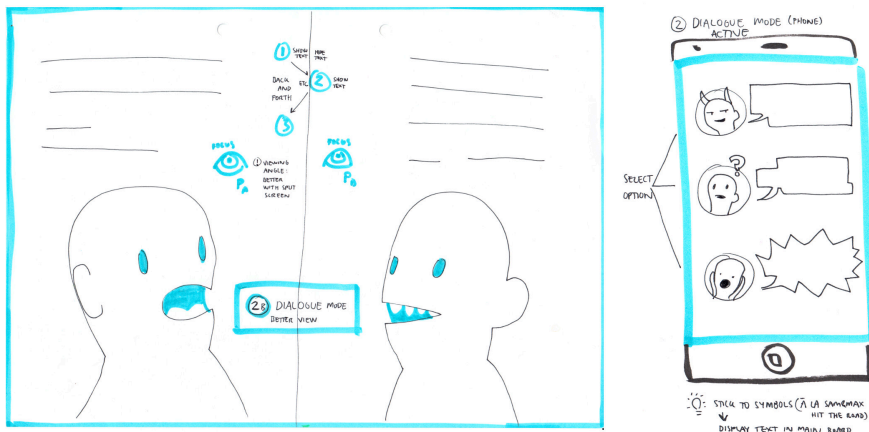
Fig. 5.2 | Talk mode initial sketches. Characters talking to each other based on input from the secondary device (right).

In a conversation between two characters, they might end up best friends or angry at each other. Talk mode also opens up possibilities for bartering, negotiation and diplomacy. A character could gain a valuable items, or miss them completely, depending on the chosen dialogue options. One character could be tasked with persuasion and try (and fail) to convince the other into something. The roles could even be without regular language, where one player or character has to communicate via sign language, robot movement or alien noises.

## Play mode

The point here is to keep distracting games away from the story, a little time-out "between" pages. The games should be closely connected to the story, for instance letting the players explore locations, develop characters, or just determine what happens next.
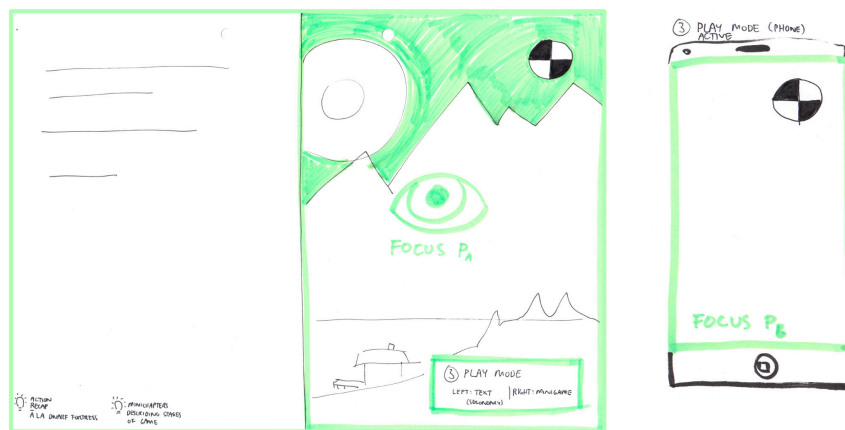


Fig. 5.3 | Play mode sketch, with both devices as controls for the same minigame.

# 5.3 | Framework guidelines

**Story-driven, and driving the story**
Every event, action and reaction should always connect both players to the story. Interactive "hotspots" and choices should be directly related to the story at present or near future.

**Requires active participation by both players**
Try to encourage social interactions. Make sure both participants are always involved in the same event or activity (whether with or against each other). Even as passive participant, a listener should have something interesting to watch or choices to make.

**Non-distracting interactions**
Interactions must not distract from the story being told. Engaging illustrations, animations and games should be used carefully, and not when important story details are being read.

**An action on one device demands an immediate reaction on the other**
It's important that the participants feel connected, especially when looking at separate screens. Input on one device should always be indicated or mirrored on the other. For instance, when making a choice on the iPhone, that choice should be reflected on the iPad. If the choices are secret, the iPad should indicate that a choice is being made.

# 6 | Final prototype and user testing

The prototype is a demonstration of read mode and talk mode, telling (the beginning of) a story about three people living in an old house in a small town. The introduction hints to mysterious things going on, both in the town and in the house itself.

Based on player input, mainly defining the characters, the story is set up in different ways. Each of the three characters have six different variations and backstories, based on two choices: their appearance and an interest. For instance, the character Bea can be a forest ranger, a botanist or run her own cafe. Niels can be a professional e-sports competitor, a drone photographer, robotics expert or a shut in (but friendly) programmer. Esme is your typical friendly granny and a knitting expert, or she can be a retired surveillance officer from the navy.

The listener also gets to choose what floors of the house the characters occupy, which changes the descriptions and appearances of their apartments. Bea the botanist turns the loft into a greenhouse, or she brings the whole garden into the first-floor apartment. Esme the surveillance expert installs radar domes on the roof, or has a secret control center on the second floor. Etc.

After the setup, the prototype enters talk mode, where two characters have a chat. The readers take turns reading "their" character's dialogue lines, while the other selects how to respond by using emotion buttons.

This is where the prototype ends. Play mode was not included due to time constraints - game design is a big undertaking, a project in itself. In any case, it felt more pertinent to test the other modes.

# 6.1 | Read mode



**Fig. 6.1** | Screen shot of read mode. Split text/illustration view on iPad, various interactive features on iPhone.
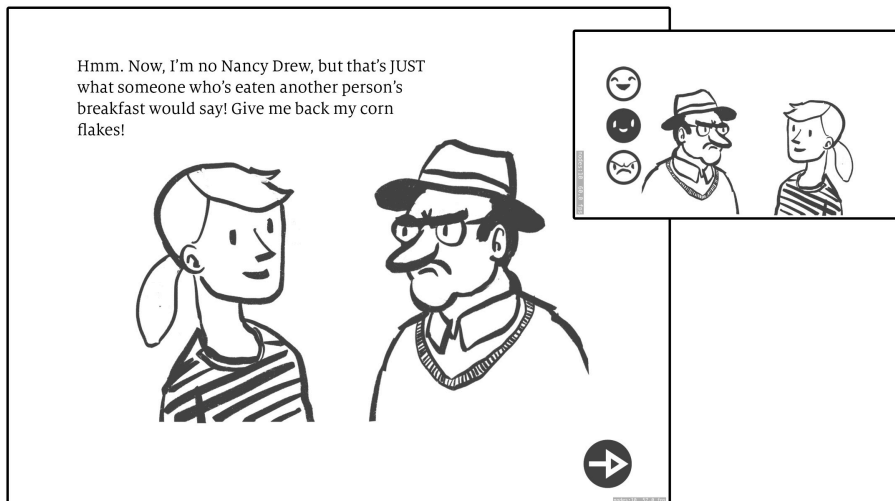
# 6.2 | Talk mode



**Fig. 6.2** | Screen shot of talk mode.

# 6.3 | User testing

Initially I pictured setting up a camera to record facial expressions and body language, accompanied by a voice recorder and screen recordings from the iPad and iPhone. This was not to be. Since the testing would involve children and their parents doing a quite intimate activity, a classic "lab user test" was out of the question.

A strange location would shatter the familiarity of the shared reading setting, and as an observer (stranger or not) my presence could distract the children. They could be overly shy or curious of me as a person, or their attention could drift from reading to watch me taking notes instead. Hidden observation through a camera would be less than optimal, as I feared neither children nor parents would be able to act natural with a lens pointed at them. A hidden camera would be hard to conceal in someone's home[1]. Thus, the tests would have to be carried out in the users' home environments, without me or a camera present.

I would start by introducing myself and the project and tell the participants I'd like to record our conversation with my voice recorder. Then I asked if I could take some pictures and video, and whether or not I could use their names and test data in my report and presentation. Then I'd start the prototype and connect the devices, and ask them to read it together by themselves while I went somewhere else [2]. I used voice and screen recording to document the shared reading, then ended with an informal interview with the participants, where we further examined and discussed the prototype together.

I only got to do two of these tests. The first dyad consisted of an 10-year old boy and his father, the second of 8-year-old Lotte and her mother Anne-Stine, a teacher and educator at Mjøndalen skole. [3] While fewer tests than I would have liked, and far too few to make any generalizations from, they still provided some valuable insights.

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[1]    Not to mention the creep factor. No spy cameras in teddy bears, please!

[2]    For instance, the kitchen.

[3]    The former did not give me permission to use their names or pictures, all images are from the second test.

Fig. 6.3 | Lotte & Anne-Stine in a "curled-up" dyadic posture (unprompted)

In practice this informal testing worked quite well. By the time we got to the reading, the dyads had more or less forgotten about the voice recorder, giving me quite natural-sounding interactions and discussions. The downside was that the screencasts weren't telling me a lot, and I would have loved to see more of their faces and body language, as well as the dyadic posture.

If the book is engaging enough, it might overcome the strangeness of a test lab setting, allowing for better documentation and observation, but it seems a bit risky, since you can't predict the level of engagement beforehand.

The post-reading interview was more useful than I had anticipated. The easiest way for the participants to answer my questions about the prototype, was to demonstrate by playing with the prototype some more. In both sessions, the children were excited for another go[4], since they wanted to see what would happen if they picked other options. Neither of the children were particularly shy, so this let me observe their

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[4]     They both ran through read mode more than 4 times

behavior during a reading, and how the dyad interacted with and through the prototype[5].

I had expected more talk about the story and characters: parents asking about why children made certain decisions or children chipping in their own little ad-libs. The recordings revealed both laughter and some "outbursts" ("OH!"), but the children mostly seemed to listen carefully and deliberate their choices in silence.

In the father-and-son dyad, the father asked the son why he'd placed one of characters on the house's top floor, to which the son replied that the character had just been described as a loner, and the attic seemed like it would fit him the most. He made that decision while listening to his father reading; at least this time, smartphone interaction was not distracting the child from what was being read.



Fig. 6.4 | Lotte choosing the look of a character while listening to her mother read a brief description.

There were some parental scaffolding, with the children asking their parents about some difficult words I'd used. They also seemed insecure making choices, as if they

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[5]    ...albeit after becoming familiar with it.

were tested and could give a wrong answer. This required some parental encouragement.

The app led to some confusion on the first play-throughs. The way the text appears in read mode makes it hard to see what paragraph you've already been through, and where to continue reading. The children seemed especially confused, but the parents also read several sentences into paragraphs before realizing they'd read them before.

There were also some silences while the users waited for something to happen, interrupted by one of them discovering a progress-button. Progress and pacing proved difficult to control, I observed both children pressing the screen as if to skip their parents' reading, but they also expressed discontent when their parents turned the page before they were done studying the illustrations.



Fig. 6.5 | Testing read mode

On consequent play-throughs, the children seemed the most engaged at the times there were buttons to press, with exclamations like "No, *I* want to do it!" This meant the phone was the most popular with the kids, but in the observations during the interview, I noticed that their focus shifted immediately from the iPhone to the iPad once a choice had been made *(fig 6.6)*. Interviews revealed that they liked that something happened on the iPad by remote control, but also that screen size matters.

The iPhone was fine for interactive features, but the illustrations were more interesting to look at on the larger iPad screen, though identical on both devices.



Fig. 6.6 | Lotte focusing on the iPad instead of "her" iPhone.

Lotte also seemed especially interested in seeing what choices her mother would make, whenever they changed roles. At one point, this made her mother hide the screen from her, as if the choice she made was a secret.

Fig. 6.7 | Lotte focusing on the iPhone instead of "her" iPad.

# 6.4 | Take-aways

The text intended for reading should not be preceded by earlier text paragraphs. I had thought they made it easier to recall what had happened before, but with focus switching from device to device, they only made it hard to continue reading at the right place.

Pacing and turn orders are difficult, there needs to be clear indications of who has the control, or from whom an action is required. One solution could be to require input from both players simultaneously to progress to the next page, like a button that both players could hold at the same time.

Anne-Stine, the teacher, was excited by the interactive options for shared reading, saying she could definitely picture using something like my prototype with her students in the 1st–4th grades. Creative storytelling ("making stories") is part of their curriculum, and they often do exercises like mad libs or "one sentence each" with the

entire class. They also read books together, taking turns reading out loud. Taking turns also directing the story could make it all the more engaging. The teacher does the scaffolding, asking story related questions to measure reading comprehension.

Anne-Stine questioned herself why she didn't do more of that kind of scaffolding while reading with Lotte, she said she just didn't think of it as much when at home. She would like to do it more, but would like to be reminded of if somehow. There's definitely room to add suggestions for questions and discussions in the text.

Picking out keywords from texts is another important reading skill, something the students practice often. Anne-Stine pointed out that the character selection was a good way to teach it, since the characters' interests are represented through key objects that shows up in the following subsequent text.

Choices need to be presented in a way that doesn't make it feel like there are right and wrong answers. The easiest way to do this, is probably by better text prompts beforehand.

Simple interactions can have big payoffs, just hearing her mother start reading about the character Lotte had selected, made her surprisingly excited. Both children seemed inspired by the possibilities opened to them by making choices, and both had a lot of ideas for where the stories could go, from cheetahs in the basement to one of the characters being a secret space alien.

# 7 | Results / final conclusions

My user testing wasn't thorough enough be called proof of anything, but I feel confident in describing the results as "promising", at least. Even the simplest branching story increases replay value, with the children exited to see what would happen if they made different choices. Doing "tasks" while listening to the story did not seem to inhibit story recall.

To my knowledge, there currently aren't any commercial storybook apps made especially for shared reading on the market, which means there's an opportunity to stand out.

There is room to take "book-like" much farther from books than predicted. Games like "Burly Men at Sea" are proof that there's a market for games masquerading as children's books, even inspiring audiences to share the games with their children. Staying too close to "book-like" sets the user up for certain expectations about how the storybook is supposed to work, that aren't necessarily ideal for interactive storytelling. For instance the idea that you can turn back pages in a book.

It's hard to get the secondary device to be more than a gimmick, but it shows potential for some features, especially related to competition and secrecy. Screen size also matters.

To finish with the main question, *"is there room for iPads in shared reading?"*, I'd say the answer is a resounding "yes". The positives of interactive media offer great opportunities for engaging interactive storytelling, and It doesn't take much to overcome its negatives.

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