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zReader: a Mobile Game Suite for Improving Children's Reading Skills and Behavior

Fabrício Vale de Azevedo Guerra

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Dalton D. S. Guerrero
Jorge C. A. de Figueiredo
(Advisors)

Campina Grande, Paraíba, Brasil

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"zREADER: A MOBILE GAME SUITE FOR IMPROVING CHILDREN'S READING SKILLS AND BEHAVIOR"

FABRÍCIO VALE DE AZEVEDO GUERRA

TESE APROVADA EM 12/11/2018

DALTON DARIO SEREY GUERRERO, Dr., UFCG
Orientador(a)

JORGE CESAR ABRANTES DE FIGUEIREDO, Dr., UFCG
Orientador(a)

LÍVIA MARIA RODRIGUES SAMPAIO CAMPOS , Dra., UFCG
Examinador(a)

JOSEANA MACÊDO FECHINE RÉGIS DE ARAÚJO, Dra., UFCG
Examinador(a)

CHRISTINA VON FLACH GARCIA CHAVEZ, Dr.ª, UFBA
Examinador(a)

ROBERTO ALMEIDA BITTENCOURT, Dr., UEFS
Examinador(a)

CAMPINA GRANDE - PB

Abstract

This work describes an empirical, educational and technological research conducted within the context of Brazilian formal literacy education problems. The main purpose of the research was to address the question of whether research-specific software for mobile devices could improve disadvantaged children reading related variables, namely reading comprehension and reading frequency, and still provide a good user experience. In this regard, zReader, a mobile game suite for reading and storytelling, was developed and validated by means of an experiment with children attending the so called *alphabetizing cycle* – 1st , 2nd and 3rd elementary grades – in Brazilian public schools. Results include positive inferential findings for children's reading skills improvement and book reading frequency, as well as for children's user experience. In 2nd and 3rd grades, children using zReader performed better in reading skills tests, with a moderate effect size. Greater overall book reading frequency, in 3rd grade, was also observed, with a huge effect size. Still in 3rd grade, considering only zReader users, children read more zReader books than paper books. For 1st graders, a greater paper book reading frequency was associated with children using zReader (with a moderate effect size) and, across all grades, zReader provided a good user experience for children – specially with regards to enjoyment, ease of use and frequency of use.

Keywords: Instructional design; Mobile applications; Literacy; Reading skills improvement.

Resumo

Este trabalho descreve uma pesquisa empírica de cunho educacional e tecnológico conduzida no contexto dos problemas de alfabetização no Brasil. Seu principal objetivo foi o de verificar se um software para dispositivos móveis, desenvolvido como parte do trabalho, poderia melhorar habilidades e hábitos de leitura de crianças em situação de fragilidade social, além de oferecer-lhes uma boa experiência de utilização de software. Nesse sentido, zReader, um aplicativo de biblioteca de jogos educacionais para leitura e contação de histórias, foi desenvolvido e validado com crianças matriculadas em anos do ciclo de alfabetização – Primeiro, Segundo e Terceiro anos do Ensino Fundamental I – em escolas da rede pública brasileira. A pesquisa rendeu resultados positivos para habilidades de leitura e frequência de leitura, bem como para experiência de utilização de software. Crianças do Segundo e do Terceiro ano que usaram o zReader tiveram desempenhos melhores em testes de habilidades de leitura, com um tamanho de efeito moderado em relação às crianças que não usaram a ferramenta. A frequência de leitura de livros em geral, para alunos do Terceiro ano, também foi maior, e com tamanho de efeito enorme. Ainda no Terceiro ano, considerando apenas crianças que usaram zReader, uma maior quantidade de leitura de livros digitais foi observada. Para o Primeiro ano, observou-se uma maior frequência de leitura em livros de papel associada às crianças que usaram a ferramenta - mais uma vez, com efeito moderado. Finalmente, zReader ofereceu uma boa experiência de utilização, tendo obtido boas avaliações com respeito a satisfação, facilidade e frequência de uso.

Palavras-chave: Projeto Instrucional; Aplicativos Móveis; Alfabetização; Melhoramento das Habilidades de Leitura.

Dedication

To my son, Ian.

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Chapter 1

Introduction or How to Justify This Work

For many decades Brazilian literacy education problems have been a major concern among educational professionals and researchers, with illiteracy rates getting more and more concentrated and reflecting social-economical differences among Brazilian regions [8] – with notable literacy deficits in regions North and Northeast [18]. It was a common finding that low literacy rates had a considerable relation with low social condition [41], a claim that was not really exclusive to Brazil, even in the 21st century, as studies about United States [27], Germany [54] and Poland [48] confirm.

These deficits were still an issue by the turn of the last century, with more than 15 millions of illiterates above the age of 15 [18] – and with more than 34 millions of *functional illiterates*, people who could read only basic sentences but still not enough to deal with day-to-day tasks at home or at work.

These numbers may be better understood by taking closer look at specific statistics about the early years of literacy education. Let us consider, for instance, the case of Caicó, a typical Brazilian northeastern city. Data from 2014 indicated that about $2/3$ its 3^{rd} grade children – that just completed the so called *alphabetizing cycle*[1] – could not locate an explicit information in a text segment and could not infer cause/effect relation in a joke or fable [19]. Data from 2015, in addition, showed that after 9 years of formal public education, not a

[1] Brazilian alphabetizing cycle consists of the first 3 elementary grades, where children begin to have formal reading education.

single student reached the highest reading level for the test [20]. That is quite a discouraging picture for parents, researchers and educators.

And, undoubtedly, for children.

And while our children struggled with public literacy education, mobile computer devices became populars and low-cost. Several experiments were conducted around the world to test how technology could be properly used in educational environments, including, of course, literacy education/reading comprehension (both terms will be used interchangeably along the text). And also, as brain sciences evolved, specially cognitive psychology with brain architecture theories, software solutions ranged from implementations of apparently simpler ideas (like a bar code as a *hotspot* on a printed page [67], for instance) to carefully designed user interfaces [29] and functional principles that conform to existing empirically tested *instructional designs* [23; 64].

The results of technology applications to improve literacy levels or even fostering learning-related abilities in a broader sense, however, were quite mixed and controversial, provided that sometimes some fancy digital media features fail to beat good old plain paper reading [14; 22; 26], an entertainment action game outperforms a brain training game [59] or an elaborated 3D learning media falls behind a simpler and less interactive 2D material [61].

But controversial results may not even be the worst case to remark. For Brazilian Portuguese literacy specific solutions, for instance, one may not find mixed results due to the lack of technological solutions. Not too many of them were available as of the literature review performed for this research. Gaspar et al. [9] conducted a recent systematic mapping on the use of technology for learning Portuguese language and reported "limited literature data" in their conclusions. Their criteria found only 9 publications, the first one in 2009, 5 of them published in the same forum and only 4 of them proposing mobile applications (2 of these still unavailable). The authors argue, however, that the topic is receiving more and more attention of the researchers for the last years, when the number of publications in the area raised. Takacs et al. [65] conducted a recent broad systematic review on the effects of multimedia and interactive features specifically designed to address literacy. The review did not select absolutely any solution regarding Portuguese language. Moreover, the authors conclude their analysis by stating that features like game playing were, for many times, harmful

for reading comprehension – non-interactive multimedia features having been used in more effective ways. Another important remark by the authors is that multimedia features favors low socio-economic family children ("disadvantaged children") for reading skills, working on their linguistic comprehension deficiencies.

To make a long story short, we have a big secular social issue regarding literacy deficits in Brazil that are very easily described in numbers and that can be traced back into early years of elementary schools, there are limited technological researches when it comes to Brazilian Portuguese language, many foreign solutions do exist but are controversial, sometimes harmful to their own educational purposes, and there are promising researches outside computer science field, like brain sciences, that may be used within educational contexts but need crossover studies that, of course, require an extra effort from the researchers. And, finally, to make the problem even worse: last PISA report for our country [42] states that "mean reading performance in Brazil has remained unchanged since 2000" – that is, our low reading scores (far lower than OECD average and with only 1.4 percent of top performers) have remained unchanged ever since the report was first published, almost two decades ago. Thus, it is quite possible that either the proposed solutions – scientific or not, technological or not – failed to be incorporated into schools day-to-day activities, either they failed to cross the line between specific sample and actual population.

Under all these circumstances, this work focused on using highlights from researches concerning these educational software application and instructional design remarks in the production of a mobile application to address issues related to the former discussion about poor literacy rates at public school low-income children in Brazil. The research was targeted at 1^{st} , 2^{nd} and 3^{rd} grade elementary school children. An educational mobile game technology – zReader – was proposed, designed, implemented and empirically tested in the context of experiments in public low-income neighborhood schools. Reading skills, reading frequency and user experience were observed in the experiment. The following research questions were addressed:

RQ1 - Does using zReader make children read more books, compared to children not using z-Reader?

RQ2 - Does using zReader improve children's reading skills better, compared to children not using z-Reader?

RQ3 - Does using zReader provide a good user experience for children using it?

Inferential results for reading skills improvement in 2nd and 3rd grades favored children using zReader, with a moderate effect size. Greater overall book reading frequency, in 3rd grade, was also observed, this time with a huge effect size. Still in 3rd grade, no paper book reading frequency differences were found between children using and not using the mobile application and, inside the former group, children read more zReader books than paper books, with a moderate effect size. For 1st graders, a greater paper book reading frequency was associated with children using zReader. In addition, zReader provided, across all grades, a good user experience for children – specially with regards to enjoyment, ease of use and frequency of use.

Chapter 2

The zReader and its Theoretical Foundation

zReader is an Android application consisting of several implementations of literacy games. The main user interface stands like a digital library and is depicted in Figure 2.1. Main interactions are downloading *zBooks*, which are a story encapsulated with its corresponding games, namely **SKey**, **TVid** and **CPuz** games. Once a game – **Jogo** – is selected, user can touch the play icon and load it.

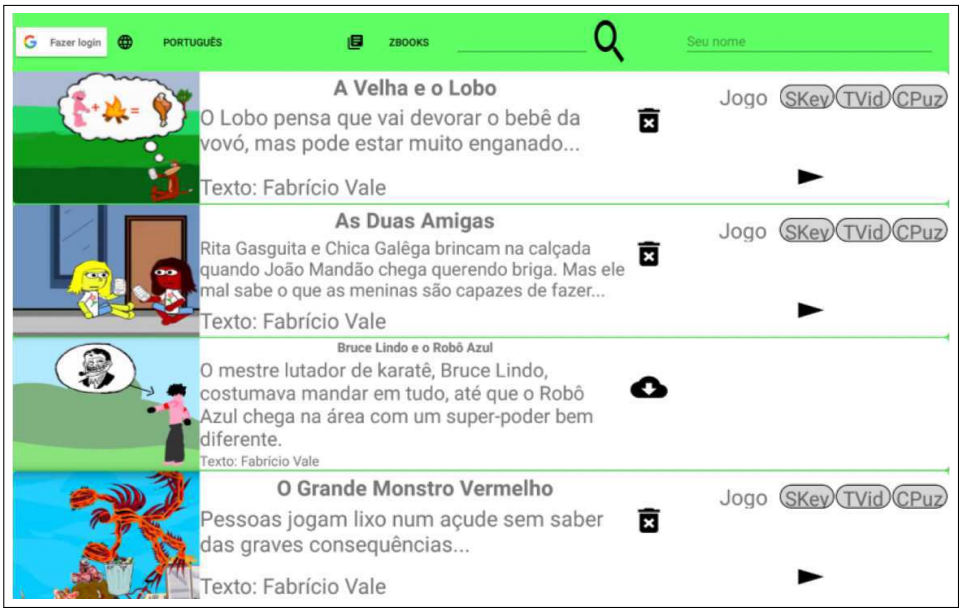


Figure 2.1: zReader main user interface

The purpose of the main zReader structure is to make possible that new zBooks are added without the need for programming skills, for zBooks are, from a technical point of view, a bunch of video and structured text files with which zReader core system can construct the games for children to play with. Any zBook added to the zReader cloud is automatically seen in connected devices. Interested reader must refer to Appendix A to check how these text and video files are integrated to constitute a zBook, for the object of this Chapter is how the specific games were designed and which are the scientific references that influenced this process.

So, let us get to the point.

The games may be implemented according to three different designs, proposed to impact on children's literacy skills and reading behavior. The designs involve user interface structure and interactions guidelines that coordinate the activities of reading a narrative text, building a corresponding cartoon animation and dubbing the cartoon.

Even though *implementations* of the games were ultimately used by children, it is the designs themselves that the research was intended to validate. In the context of the study, the designs were the *experimental treatment*, and we are referring to them, as a whole, whenever we use that term. If this was a chemical research to find a new drug for a given disease, the chemical composition and dosage specifications for the drug would be the designs and the pills taken by subjects in the experiment would be the implementations.

Thus, we proceed with a literature review *guided* by design features, concentrating mainly on empirical researches or theories with empirical support that influenced them. We begin with literature influences common to all the designs, before moving to their own definitions, where specific influences are properly referenced.

2.1 Common ground

The backdrop educational framework considered for the treatment is Papert's Constructionism [44] which, on its turn, was developed on Piaget's Constructivism [40]. In brief, as Constructivism more generally stresses on subject *interaction* with the object of study as a mean to achieve learning, Constructionism directs this interaction to the *creation* of artifacts of any kind, in order to promote learning "in a context where the learner is con-

sciously engaged in constructing a public entity" [44]. This later characteristic has, in fact, led to the implementation of a number of computer tools designed to support Constructionism principles for improving learning in specific fields, like computer programming [50; 60]. Even though the treatment evaluated in this work was not designed rigorously tied to Construcionism and Constructivism theories as a whole, it does rely on the principles of subject/object interactivity and artifact construction – this time, for improving children literacy achievements.

Thus, the games were designed in a way that the children were able to *construct* cartoon animations for particular fictional narratives and put their voices on it by organized *interactions* with user interface components, developing their current literacy skills along the way.

This process of cartoon construction, of course, included a gamification [13] perspective, since it uses "game elements for serious purposes"[4]. Firstly, each game design may be regarded as a *level*. Children who find playing games of a given design too *easy* may begin to play games of a different design that demands more reading skills. Secondly, the cartoon animations are segmented so the storyline of the underlying fictional narrative gives some sense of *flow* to the playing.

In addition, the interactions always take place with a literacy-related purpose *disguised* as game goal or task. They include, for instance, triggering animation segments or word/syllable pronunciation, reading or creating dialogs for cartoon-like balloons, setting up words, syllable by syllable, choosing proper visual representations for text segment or assembling pieces of animation together in the right sequence. This ever-present educational purpose also frames this work in a Serious Game context [49].

Voice recording of character dialogs (and thoughts) is also a feature present across all the games. The dialogues and thoughts may be visually presented in two different forms – text and image stimuli – inside comic-book-like balloons.

During the dub process, when text-balloons appear on screen, children are meant to read aloud the subscribed words exactly as they are presented. On the other hand, when image balloons appear, they are meant to say aloud whatever they want, provided that the speech has something to do with the image inside the balloon and with the cartoon story flow. This dub process may be repeated until children are satisfied with the final cartoon version. Text balloons work directly on *decoding*, which is widely accepted as a core component of reading

since Gough an Tunmer's model entitled Simple View of Reading (SVR) [11; 16] – the model suits specially well for school-age children [6] and defines reading comprehension as a multiplicative relation between decoding and linguistic comprehension. Furthermore, the potential repetitions of dubbing dialogs may improve children reading fluency, and fluency has also been identified as an important factor for reading comprehension [47; 62] (from a SVR perspective, fluency is related to the decoding component). Image balloons deals more with creativity but they were designed to enable a *personal touch* to the final cartoons and motivate the children to get into the characters of the story by improvising some of their dialogs and thoughts.

2.2 Theoretical foundation for specific design decisions

All educational and gamification references discussed so far acted at a rather abstract level in terms of treatment design decisions. Sure interactivity, artifact construction and storytelling involvement supports important points like engagement and motivation for performing tasks, as the above-referenced works testify. Nevertheless, it is important that the influences in children's behavior lead to actions or task performing that somehow favor knowledge acquisition, otherwise these features will have a questionable relation towards learning, once "student behavior may lead to deep learning only when the activity is designed to prime the learner to be cognitively active" [38].

For that reason the treatment *low level* specifications were based on cognitive theories that focus on brain logic architecture and how the design of instructional material may foster learning by respecting architecture characteristics and limitations. These theories are Sweller's Cognitive Load Theory (CLT) [63], Mayer's Cognitive Theory of Multimedia Learning (CTML) [33] and Schnotz's Integrated Model of Text and Picture Comprehension (ITPC) [53]. We must spend some paragraphs with these cognitive theories before one can fully understand their importance to the study of the main dependent variable the treatment is intended to work on - reading comprehension.

Firstly, the theories may be used together. CTML, a learning centered theory, is based on CLT, which is more general theory of human cognition [34]. ITPC, on its turn, builds upon CTML structural components to explain not only multimedia learning but single-medium

learning [17].

The three theories, thus, have several commonalities, even though they eventually change in terminology or add some components at specific points. All of them consider an arbitrarily big *long-term memory*, where knowledge is stored as potentially interrelated *schema* – which are abstract mental models of virtually anything (information, concepts, procedures etc.). Schema present in long-term memory are often referred as *prior knowledge*.

New schema may be created in long-term memory and existing schema may be updated, but that can be accomplished only if the schema are previously cognitively processed in *working memory*, which is limited in capacity as well as in the amount of time it keeps information activated.

Besides communicating with long-term memory for schema retrieval, creation and updating, working memory may receive external information through perceptual channels, most notably an auditive and a visual channel. These channels may also send information to working memory at the same time. This is known as *dual channel assumption* and relies on Paivio's work [43].

A typical multimedia learning scenario is illustrated in Figure 2.2 and involves receiving information from both channels (**pictorial input** and **textual input**) into **working memory**, retrieving related schema from **long-term memory** into working memory, processing existing schema along with externally received information and, finally, updating existing schema and/or creating new schema. In this context, the cognitive process that fostered schema creation/update is called a *generative process*. These concepts are all present in the three learning theories considered for this work – CLT, CTML and ITPC. CLT itself consists mainly in describing working memory loads (**intrinsic load**, **germane load**, **extraneous load** and **free load**), the working memory limited capacity property and the presumption that these loads are additive. CTML and ITPC go deeper into working memory description, defining registers for images, sounds, image and verbal based models, along with some core processes (word/image selection/organization and model integration, basically) and the order in which these processes take place (Horz and Schnotz [17] made a good work in describing and comparing the three theories).

Back to Figure 2.2, the **intrinsic load** is related to the inner complexity of the topic being learned and individual's prior knowledge, but other loads may be affected by instructional

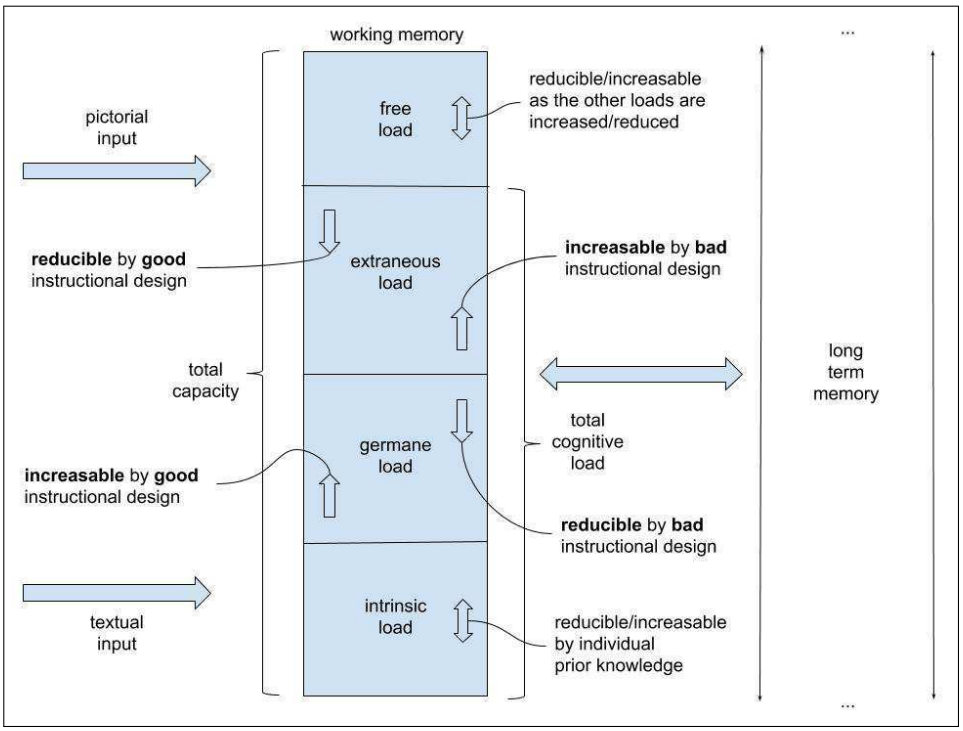


Figure 2.2: Multimedia learning scenario with brain/learning theories concepts

design. Particularly, the **germane load** is caused by instructional elements that foster the above mentioned generative processes, like a video explanation of a complex graphic, and the **extraneous load** is caused by instructional elements that do not foster generative processes, like incidental adds or interactions poorly related to the learning object. Since the loads are additive and working memory capacity is limited, special attention is necessary when learning a topic with high **intrinsic load**, because incidental **extraneous load** from learning material, when summed up with the other loads, may exceed working memory **total capacity** limits, affecting learning in a negative way – that is not necessarily the case with low intrinsic load topics, for there will be more **free load** available. And that is the point where we shall go back to reading comprehension.

We assume that reading comprehension, even only considering narrative stories, is a high demanding cognitive task for the beginner reader (a reasonable assumption [3]). It has, therefore, a high intrinsic load and it needs, in consequence, a carefully designed material that avoids extraneous loads and fosters germane ones. The next subsections describe the treatment definition under the light of these considerations.

2.2.1 Syllabic Keyboard

The first game design of zReader is named *Syllabic Keyboard* (SKey, for short) and it is primarily proposed for children with poor reading skills and fluency – typical cases include common 1st grade students and 2nd /3rd grade students without the expected skills for their grades. In general, SKey games consist of setting up words, syllable by syllable, with the help of a *talking keyboard* that has syllables, instead of letters, as keys. Each to-be-mounted word has a video animation representation and the sequence of all videos forms the to-be-dubbed cartoon. After one finishes setting up the last word of the sequence, SKey games move to a *Record Room* session (for dubbing cartoon characters), which is described later in this chapter for it is a common final stage to all zReader games.

An example of user interface for a particular SKey implementation is depicted in Fig. 2.3. It contains a video area at the center, a initially empty text field for word visualization, just below the video area, and several *key* buttons, all labeled with syllables – the syllabic keyboard itself. A *backspace button*, just beside the word visualization text field complements the user interface elements for SKey games.

The first action made by eventual player is single touching the video area. The touch causes a word pronunciation in the mobile device audio system – in this particular case, **ESCORPIÃO**, Portuguese word for scorpion, would be pronounced. While the word is being pronounced, a corresponding video animation is played in the video component. The user can freely play the video and listen to the word at any time and for as many times as he/she wants. The word pronounced is called target-word. After listening to its pronunciation, one must complete the task of *writing* the target-word by dragging, in the right order, its syllables from the keyboard into the word visualization text field. At each drop, the dropped syllable is added to the end of the current word in the text field. Syllable sequence presented is random and a single touch on a syllable causes its pronunciation *in the same way it is pronounced in the target-word* as well as a single touch on the word text field causes the pronunciation of the current written word. A single touch on the backspace button causes the last syllable dropped in the text field to be erased. The task is correctly completed if touches in video area and in the text field cause the same pronunciation and, after that, a *page-turn* gesture (right-to-left line) over the video area moves the game to another target-word. When the last word is entered, the gesture moves the game to a Record Room session for voicing over all

the video pieces showed during SKey session. We describe this process later on this chapter, for all the defined games finish with a Record Room session.

Figure 2.3: SKey user interface example

Back to SKey interface components, each animation piece played in the video area is meant to drag child's attention [15] as well as to provide pictorial description for the target-word. The playing of visual content parallel to word pronunciation is supported by dual channel assumption, as discussed earlier. Of course this whole process causes extra cognitive load, but the idea behind it is that the load will be a germane load, specially for vocabulary acquisition.

In a CTML perspective, this interaction is meant to help children with some of the theory's *core processes*. Notably, the *selection of relevant words* is straight forward, since only one word is pronounced, and this one-word-only pronunciation is intended to support the process of selecting relevant images – animation effects like zooming or focusing may also guide this later process. In addition, the process of integration of verbal/pictorial content with prior knowledge is supported. It's expected that video animation will always trigger prior knowledge schema retrieval, because characters will always be *visually* doing something children are very likely to have been seeing within the context of their own experiences in real life or with other video contents: characters will walk, run, fly, fall, fight, kick, talk,

curse, make gestures etc. So, even in the case where the child does not know what the pronounced word mean, he/she will have some prior knowledge to integrate with verbal/pictorial content. In brief, this interaction alone, still not considering the *keyboard* part, is meant to either improve or reinforce child's vocabulary. It is important that the animation playing and word pronunciation occur simultaneously once both external verbal and pictorial content must be activated in working memory for integration to be performed [17].

Another important specification of SKey animations is their duration. To date, there is still not a formal time limit but the idea is that it does not exceed a few seconds (up to 10 seconds long pieces were tested empirically), so the child will not be confused about what pictorial information to integrate with the one verbal information on the verbal working memory. When planning SKey implementations, one must take into account that it is a type of game in which children with poor reading skills will remain for several sessions and that the poor reading skills may even be caused by poor linguistic comprehension, as defined in SVR model. Thus, a long lasting piece of video animation is very likely to show many pictorial information that is not directly linked to the pronounced word. In a CLT perspective, it will cause an extraneous cognitive load and in a CTML perspective, it will overload the cognitive core processes of selecting and organizing relevant pictorial information. Actually, both theories are quite convergent in this particular point as they are in so many others: by unnecessarily increasing the complexity of the mentioned processes the learning material creates an extraneous cognitive load and consumes more resources from limited working memory. And this shall, as previous researches attested [24; 61], negatively affect learning.

It's also important to note that implementations of this design are not meant to show the word being pronounced in the animation video – that could possibly lead to harmful redundancy effects [69], apart from *spoiling* the task of discovering how to construct the word by playing with the keys in the keyboard.

For language semantics matters, the word pronounced may be of any kind (verb, adjective or noun, in most cases), but it has to have something to do with the video animation played. The fact that all the video animations must be part of the same story allows game implementations to enrich children's vocabulary with words that are not directly reflected in the corresponding animation action but can be inferred from the context. In a scene were a character is saving another character, for instance, one eventual implementation may use

the word *retribution* instead of the more direct *helping* or *saving*, as long as previous scenes give context for the word comprehension when the current scene is played (in this case, one character could have been previously helped by the other one, who is currently acting in retribution).

Another important point is that SKey implementations should not use text balloons for dialogues and thoughts, but only image balloons. Typical users of SKey games are 1st grade children or 2nd grade children who didn't get expected readings skills, so they should not have reading fluency to dub dialogue text phrases and that can be harmful to engagement and motivation. This also works the other way round in terms of negative consequences: letting skilled children playing SKey implementations for many sessions without letting them pass to a more demanding kind of game will probably lead to expertise reversal effects – because effective learning instruction depends on subject expertise [21]. So, SKey is not the right start point to common 2nd and 3rd grade children.

All in all, SKey was designed to support reading components of SVR in very particular ways and respecting postulates of the subjacent cognitive theories. The first part of SKey – the video playing along with word pronunciation – deals clearly with linguistic comprehension, even though it does it with limited means, for only single words, and not complete sentences, are pronounced. The second part – the word set up – deals with single word decoding (a topic related to reading comprehension skills [45]) with a special focus on how this process works for the beginner reader – that is, with a special focus on phonological rules for translating grapheme to sound [10]. These rules, however, are taken at a syllable granularity rather than at a letter granularity. This feature reduces the cognitive load of the task, once using letters would explode the number of possible sequence options. For a 3-syllables-6-letters word – quite a common case for Portuguese language – children would have to deal with a total of 720 permutation possibilities and, worse, letters alone would have poor relation to the sounds listened from the word pronunciation, forcing them to *guess* a possible solution. The syllables in SKey are to be pronounced as they are in the word context exactly to avoid guessing and to foster sound/grapheme comparisons and associations.

2.2.2 Text/Video Translation

The second game design of zReader is named "Text/Video Translation" (TVid, for short) and it is primarily proposed for children with intermediate reading skills and fluency – typical cases include 1st grade top students, common 2nd grade students and 3rd grade students without the expected skills for their grade. In general, a TVid game consists of reading pages of a narrative fictional story and choosing proper cartoon animation for visually representing the text page read. When the animation for the last page is chosen, the game moves to a Record Room session, just like SKey games, expept for the fact that the animation segments to be recorded reflects children's choices in TVid and may be different from the written narrative story. Wrong choices lead to senseless final cartoons ("bad cartoons", as children name them), so the children have to pay attention to the text when choosing visual representations. The recording, or the final cartoon, in this case, may act as a reward to the playing children. If they play TVid right, their cartoon will be a "good" cartoon.

An example user interface for a particular TVid implementation is depicted in Figure 2.4. The interactions take place as follows: below the text component, two unlabeled buttons can trigger different animations (Figure 2.4a and Figure 2.4b) in the video component at the right side of the screen. The goal is to watch both animations, choosing the one that better suits what is written in the text component (the page). When the check button is touched, the next text page, with corresponding video animations, are automatically loaded. Page turn gestures may be used to navigate forth and backwards in the text.

The main idea behind the two animation options for a given text segment is to *adapt* CTML's reflection principle [36]. Basically, reflection principle aims at promoting generative processing by asking questions to students while they are making sense of information. The principle has been positively probed by Moreno and Mayer in the context of plant design [37] and by Seifert in the context of biology related prose reading comprehension [58]. For implementing the reflection principle, Moreno and Mayer asked questions about students problem-solving answers by means of a agent-based multimedia game. Seifert, on his turn, used the *elaborative questions* in book pages where the studied content was printed (it was not a multimedia experiment, even though the principle was the same).

There is, of course, a clear difference between our approach and the other authors': TVid do not explicitly ask questions like "why did you choose this option?" in order to promote the

(a) Wrong option for the text

(b) Right option for the text

Figure 2.4: TVid user interface example

principle. Instead, it *induces* reflection, because the question is always there and is always the same, even though it is also always implicit: why is one option more representative than the other one with respect to the text read? The answer depends not only on matching verbal and pictorial input but also on reflection about the differences between the two pictorial options, the right one and the wrong one.

The wrong option, by the way, plays, for several reasons, an important role on TVid, provided that it is used with a clear goal in mind, as we explain next.

ITPC model describes some specific components and processes to working memory as compared to CTML (and CLT). According to ITCP, for a printed text to be understood, the text surface representation in working memory is first cognitively translated to a propositional model, which is allocated in another part of working memory (the so-called *propositional working memory*). The propositional model, finally, "triggers the construction or elaborations of a mental model [for the text]" [17]. Pictorial information processing is slightly different: once selected pictorial information lies in working memory, the mental model is created beforehand and, from this model, a propositional model can be created. For TVid interactions regards, as ITPC also states that mental and descriptive models are actively interacting and changing, it is expected that the playing child will improve propositional and mental models for text by comparing them to the mental models created for animation visualization.

With this characteristic in mind, the wrong option may, indeed, help incorporating to the final mental and propositional models something important for the text comprehension that child cognitive selection processes may have been missing.

We will elaborate this claim.

Suppose that a character is hungry and this is a central point to the text segment and to further storyline plot comprehension. If two completely different animations, with different sets and characters are presented, the choice will be straightforward but the final model constructed by the playing child may not include the *hungry information*. On the other hand, consider two animations with the same sets and character, one in which a thought balloon over character's head shows the image of a piece of meat and other in which the same balloon shows the image of money. The reflection is induced over the hungry point of the pictorial information and, for that reason, is more likely to be present at the final model – these *little*

differences may be used with other purposes as well, like reinforcing language topics like object pronouns, adjectives etc.

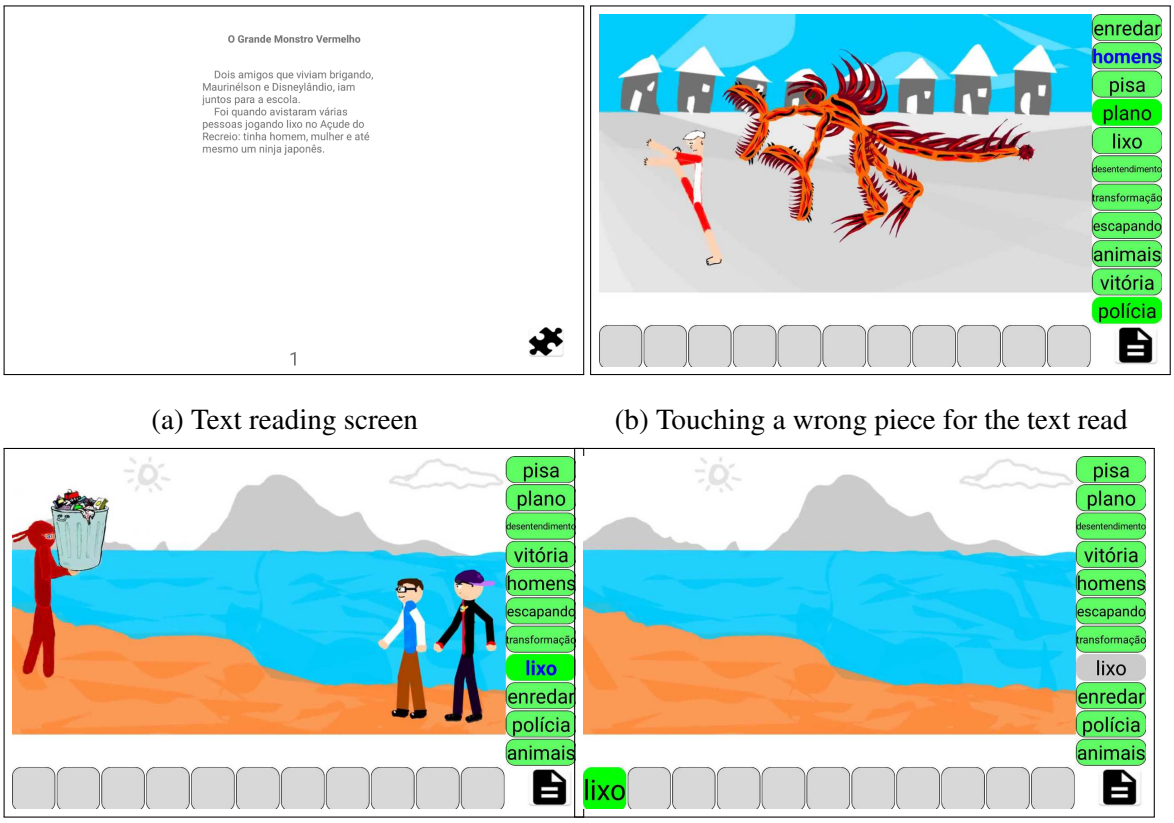
2.2.3 Concept Puzzle

The third game design of z-Reader is named Concept Puzzle (CPuz, for short) and it is primarily proposed for children with good reading skills and fluency – typical cases are common and top 3rd grade students, as well as top 2nd grade students. In general, CPuz games consist of reading a narrative text and then arranging labeled puzzle pieces in sequence – each piece representing one of the text pages just read. The pieces are labeled with words that are central to the corresponding text page comprehension. We adopted the term *Concept Puzzle* instead of *Word Puzzle* to stress on the important semantic relation between text segment content and puzzle piece label.

Figure 2.5 depicts user interfaces for a particular CPuz implementation. Firstly, we have a *text screen* (Figure 2.5a), with title, text (one page), page number and an *puzzle icon* that, when touched, moves the game to the *puzzle screen*, which is depicted in the remaining images. In the puzzle screen, there is a right *concept panel* containing labeled buttons, a bottom *montage panel* with initially unlabeled gray slots and a video component for cartoon animation playing. In addition, there is a text icon in the bottom-right side of the screen that changes the user interface back to the text screen.

The goal of CPuz games is to arrange all the concepts together by dragging them into the montage panel in a sequence that reflects the storyline of the underlying narrative text. To help with this task, the game plays a corresponding animation when a concept is touched. Figure 2.5b shows a moment after the piece **homens** (Portuguese for men) is touched, which, in this case, is a wrong piece, for the text just read describes people throwing garbage in a lake. The child may try all the pieces until he/she finds the right one, but the idea is that the concepts will guide their touches (and develop their abstraction/comprehension skills). Figure 2.5c shows a moment after the right piece, **lixo** (Portuguese for garbage), is touched, and Figure 2.5d shows the piece **lixo** dropped in the first slot – the right place for the piece corresponding to page 1. After the whole set of pages is read and the whole set of animation pieces is assembled together, the game moves to a Record Room session.

CPuz design clearly imposes more cognitive load on children's working memory by the



(a) Text reading screen

(b) Touching a wrong piece for the text read

(c) Touching the right piece for the text read

(d) Right piece dropped in the right place

Figure 2.5: CPuz user interface example

nature of its interactions and the number of options involved. It is important to note, again, that CPuz is designed for children with good reading comprehension skills and that these children might be bored to play TVid games which, once more, would lead to expertise reversal effects.

The intrinsic load imposed for reading, in this case, is not the same load imposed to poorly skilled readers, because intrinsic load depends on subjects prior knowledge [39] and the reading schemata in these children are supposed to be, to some extent, automatized by prior regular class reading instruction and reading practice as well as by previous SKey and/or TVid game playing.

The children are, in other words, supposed to be able to construct a reasonable mental model for the printed narrative text. The idea behind the *sequencing training* and *concept mapping* is to improve this model, complementing their original understanding of the entire text by visualizing/ordering animations. In addition, the game playing is meant to, eventually, induce children to spontaneously perform repeated reading activities when they do not find the right piece for a given page. They also read the text dialogues at least twice – in the text page and in the text balloon when playing the animation. This is an important feature, for repeated reading has been observed as relevant for reading skills. Therrien [66] reviewed several quantitative researches published from 1977 to 2001 and found significant results for repeated reading techniques in terms of "non-transfer", specific reading comprehension (that is, comprehension of the story being read) as well as in terms of "transfer", general reading comprehension - which is precisely what the treatment is intended to improve.

Finally, some CPuz features are not directly related to SVR but may, considering results of some researches, foster reading comprehension by training some meta-cognitive skills, like sequencing and story mapping – features that were, also, part of a tool successfully used to improve early literacy [31]. It is also possible that the game playing of ordering and reordering concepts together based on a mental model of a text may foster executive functions like cognitive flexibility – defined as "the mental ability to switch between thinking about two different concepts, and to think about multiple concepts simultaneously" [55]. Cognitive flexibility is also a non-SVR related factor that has being related to reading comprehension [1].

Figure 2.6 summarizes the main theoretical basis of **SKey**, **TVid** and **CPuz** designs dis-

cussed so far. The left side of the figure relates **general influences**, like **constructionism** with corresponding features that are common to all designs, like **conscious production of cartoons**. The right side of the figure, on its turn, relates **particular design features**, like **SKey** use of **syllables instead of letters**, with corresponding theoretical **specific influences**, like **CLT/CTML**.

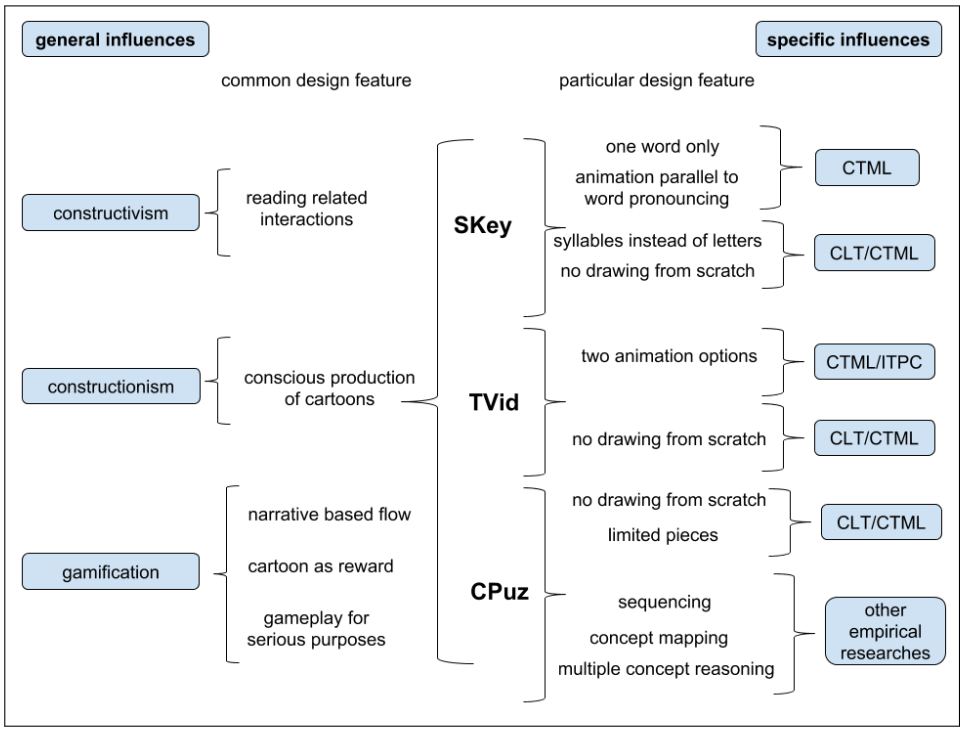


Figure 2.6: General and specific design foundations

2.2.4 Record Room

As already mentioned, there is a Record Room screen (RR, for short) common to all games of zReader. It is not a game in itself, but the final part of all games. In the first version of the suite application, following CLT principles of not overloading learner's working memory, we designed RR as simple as we could conceive: a video in full-screen mode (no button at all) that played in sequence the whole selected animation segments while recording audio from device microphone. When submitted to experimentation, however, the design decisions proved not to be suitable for a good user experience. Children involved in pilot experiments were often too serious about their recordings so they rarely accepted the first version as good

enough for them, either by self-criticism, either by occasional background noise. Thus, they often had to repeat the recording process for the whole story, which was object of many complaints from them. For the current version it was, then, designed a new user interface for the RR, which concerned a new approach of recording, one by one, each animation segment selected in previous game playing.

Figure 2.7 depicts a particular scenario for a RR session played as part of a CPuz game. There is a labeled button, **pisa**, which represents the current animation segment to be recorded (a piece label in a previous CPuz game was also labeled **pisa**). By touching this button the corresponding animation is played – with audio, in case it is already recorded. The microphone button, as one may expect, reproduces the video animation, without any sound, while recording audio from device microphone. This way, it is possible to record and re-record audio for the particular animation segments until the child is satisfied with the result.

Figure 2.7: RR user interface example

Thus, with this current RR design, children did not need to record the whole story at once and, in case of any recording mistake or unwanted audio capture (like school siren or other people's voices), they only needed to re-record a small piece of animation without affecting any previous recording.

Chapter 3

Materials and Method or How Treatment Was Validated

zReader is the result of years of research and was subject to several experiments along the way. Scientific experimentation, along with user feedback and extended literature review, changed a initially proposed PC game application with only one kind of game (somewhat designed like what is now CPuz) and no dubbing features to the mobile application described in Chapter 2.

Of course, for a question of scope, we cannot tell the whole story from the very first iteration, so this Chapter is dedicated to describing the last experiment, as of the writing of this text, that was designed and run in order to validate zReader games and answer the research questions enumerated in Chapter 1. This last experiment, however, repeated some results from a earlier experience concerning the same game designs and similar research questions, but with a smaller and more restricted sample (N=18, 2nd grade children only). For repeating results is an important part of scientific research, that earlier pilot experiment is documented in Appendix B.

3.1 The last experiment to date

A sample of N=102 volunteer children was available for the experiment (25 from 1st grade, 31 from 2nd grade and 46 from 3rd grade), all of them with proper parental consent. The project was registered under the code **CAAE 56153716.3.0000.5182** in official Govern-

ment site for experiments involving human subjects[1] and was approved by Ethics Committee of Universidade Federal de Campina Grande. Further details about ethical approval to the project are shown in Appendix C.

The children studied at the same public school in a low socio-economic neighborhood at the city of Caicó(RN), Brazil. Also, all children were at a regular situation with regards to age/grade relation and had no diagnosed cognitive problems. A control group of children attending regular computer lab classes (conducted by school teachers) was compared to an experimental group of children attending *optional* zReader sessions. The children were randomly assigned to control or to experimental group.

Two main dependent variables were observed: **book reading count** and **reading skills improvement**. In addition, some variables related to **user experience** were also considered. Specifically, the number of refusals to play zReader games in the treatment sessions was observed and a simple Likert survey was answered by experimental group children in order to verify their own perceptions about their experience with the software.

The survey questions concerned enjoyment, frequency and ease of use of zReader, along with a comparison with paper reading – and children from all grades answered the questionnaire. Since we were working with 6-8 years old children, training sentences were performed before each questionnaire item, with similar sentence structures to the item itself but involving different subjects/objects instead of zReader – item "I like reading in zReader better than reading in paper books", for instance, was trained with sentences like "I like swimming in the swimming pool better than swimming in the lake" or "I like eating banana better than eating apples". Similar sentences were invented until children covered all the scale options.

The assessment of the **book reading count** variable was performed by means of a school reading program for children in 1st and 3rd grades – in the program, all the books they read were counted (unfortunately, no book counting was available for 2nd graders). By program rules, children who read more books were granted prizes and medals each two and a half months, so we were quite confident that they did present to school staff any book they came to read. For 1st grade children, most of them with no proper reading skills, the books were read with the help of their parents – very possibly read *by* their parents, so 1st grade children will be further analyzed separately from 3rd grade children with respect to this variable.

[1] http://plataformabrasil.saude.gov.br

Reading comprehension was assessed by means of quantitative standard reading test TCLPP [56], before and after the zReader sessions. The difference between post and pre-test scores stands for **reading skills improvement**. The test is validated for both 2nd and 3rd graders, for they are expected to have reading skills. Children from 1st grade, then, were not assessed with respect the this variable. They were pre-tested for *phonological awareness*, with TCFO [57], a test that was found to be "the best predictor of reading skills [that 1st graders should have] at the end of 2nd grade" [5]. Our intention was not to compare the pre-test results with a post-test (TCFO is an oral test, with no reading involved), but to check if phonological awareness differences in groups could explain potential book reading variation rather than the experimental treatment itself. All these tests were chosen and applied by a Pedagogical support team of educational researchers and students from local Campus of Universidade Federal do Rio Grande do Norte.

We summarize all the information concerned in this discussion with the experimental setup in Table 3.1, showing dependent variables, their values/assessments and sample size descriptors.

Table 3.1: A summary of the experimental setup

Dependent	**Sample size**		**Value**	
variable	Cont	Exp	Initial	Final
book reading (1st grade)	13	12	0	number of books read
book reading (3rd grade)	24	22	0	number of books read
phonological awareness (1st grade)	13	12	TCFO (pre-test)	–
reading comprehension (2nd and 3rd grades)	39	38	TCLPP (pre-test)	TCLPP (post-test)
refusals (all grades)	-	50	-	number of refusals to play
opinions on user experience (all grades)	-	50	-	survey answers

3.1.1 Treatment dynamics

Two training sessions and eight regular sessions, one session a week, for each grade, were scheduled with experimental group children. Training sessions were collective and consisted of one member from the research team explaining the children how to interact with zReader. Regular sessions consisted of children themselves interacting with zReader in all of its features with on-demand help by research team. In all sessions, children were asked if they wanted to participate and eventual refusals were registered without asking for any further reason. The games were played in pairs and, in training sessions, children were explained the "rules" for playing them as well as the rules for playing them in pairs, as we now describe the later.

In SKey, both children listened to the target word and one of them was responsible for dragging the syllables. The other child could help but without interacting with the game. At each target word, the process was the same, just alternating the roles of the children: the one who had interacted with the game would help, the one who had helped would interact.

In TVid, both children read the text part and one of them was responsible for playing the animations and suggesting the right one. If the other child agreed on the choice, they would confirm it and go to the next page. If he/she did not agree on the choice, they both had to discuss their reasons and decide together on which choice was best related to the text. The roles were inverted for each "page turn". In CPuz, the dynamics were quite the same – the children just had more options of animations for choosing.

As for recording the cartoon, the children were free to choose the characters they would play and any other possible action about recording when there was no balloon dialogue visible (in which case they had to read the balloon). Some of them, for instance, added narration or made sound effects for some actions or invented thoughts to a character or even sang melodies like making a soundtrack. It was completely up to them, they could even say nothing of ask for suggestions.

There were more rigid guidelines for the children to follow, however, for recording when the comic-like balloons showed up:

1. if a text balloon appeared, they should try to read the text exactly as it was written inside the balloon, making oral emphasis on accents and punctuation marks. They also

should try to improvise new sentences after completing the text reading (fast readers often finish reading some seconds before the balloons disappeared from screen). The recording should be repeated in case the text was not completely read;

2. if an image balloon appeared, they should try to improvise some sentences related to the image and also try to say the sentences with an oral emphasis related to the image;

It was allowed, for children who missed sessions, to make extra sessions to replace the missing ones just as control group children could do with regular computer lab classes. They were also allowed to read/record another story if they wanted, provided that they had finished the current story. They were, in sum, free play zReader games as they please with the limitation of not repeating a story already read/played. The idea behind it was to simulate, as fairly as possible, a computer lab class with the mobile app being its subject rather than Internet sites and other common computer software they play with.

A final and important remark on treatment dynamics is that experimental group children from 1st grade began the treatment with SKey games, moving forward to TVid and CPuz if they felt like it, that is, if they found SKey games too easy. On their turn, 2nd and 3rd graders began the treatment with TVid games and passed to CPuz games, again when they found the current games too easy for them. They could also go to SKey playing in case of facing problems with TVid. Again, it was their decision to move to a *harder* game (a harder "level", as they name it) or the other way round.

3.1.2 Treatment notes

A total of 16 game implementations were used along the way, all of them implemented as Android 5.0.2 projects and installed on 5 Samsung Galaxy Tab 4 tablets with quad-core 1.2GHz processor and 10.1 inches 1280 x 800 pixels screen size.

All the texts used in the implementations, in terms of sentence complexity, were chosen with regards to what the children were *probably* able to read. The implementations were not to introduce Portuguese language topics or replace teacher classes, but to develop abilities on the top of what children knew. Obviously, it was not knew beforehand what were exactly the words and syntactic clause structures that they could understand, but children's text books were analyzed and their teacher was consulted with that in mind, so the narrative texts could

be accordingly adapted. Eventual replications or adaptations of the experiment must take that into consideration.

Chapter 4

Results or How Data Analysis Answers Research Questions

The analysis of both **book reading count** and **reading skills improvement** variables were based on the following approach. Initially, the dispersion of the variables was visually observed in notched box plots. Then, depending on the visual clues, we proceeded to distribution checking and inferential comparisons between groups. Shapiro-Wilk test was used to check for normality in distributions. Parametric Welch two sample t-tests were used to investigate inferential differences between normally distributed data sets and non-parametric Wilcox test was used whenever any of the considered data sets was not normally distributed. When differences were found, the effect sizes were calculated either by Cohen's d (for normal cases) or Cliff's delta (non-normal cases).

For the analysis of the Likert questionnaire about children's opinion on zReader **user experience**, we used confidence intervals, for each questionnaire sentence, to check if they included the *indifferent* option. If they did not and, of course, if they were above indifferent option, we considered that children approved sentence proposition. Coherence between children's subjective answers and objective measure of **refusals** to play the games were also considered and Crombach's alpha was calculated in order to check internal consistency of the questionnaire sentences and answers.

4.1 Book reading count

The analysis of the book reading count variable considered only 1st and 3rd grade students. It is important to recall that in-app zReader book reading was optional for all children in experimental group (and not allowed from control group), just as reading paper books in school program was to all of them.

The hypothesis is that the zReader positively impacts the number of books the students read in either grade.

4.1.1 1st grade

The notched box plots in Figure 4.1 show distributions of paper book count considering control and experimental groups.

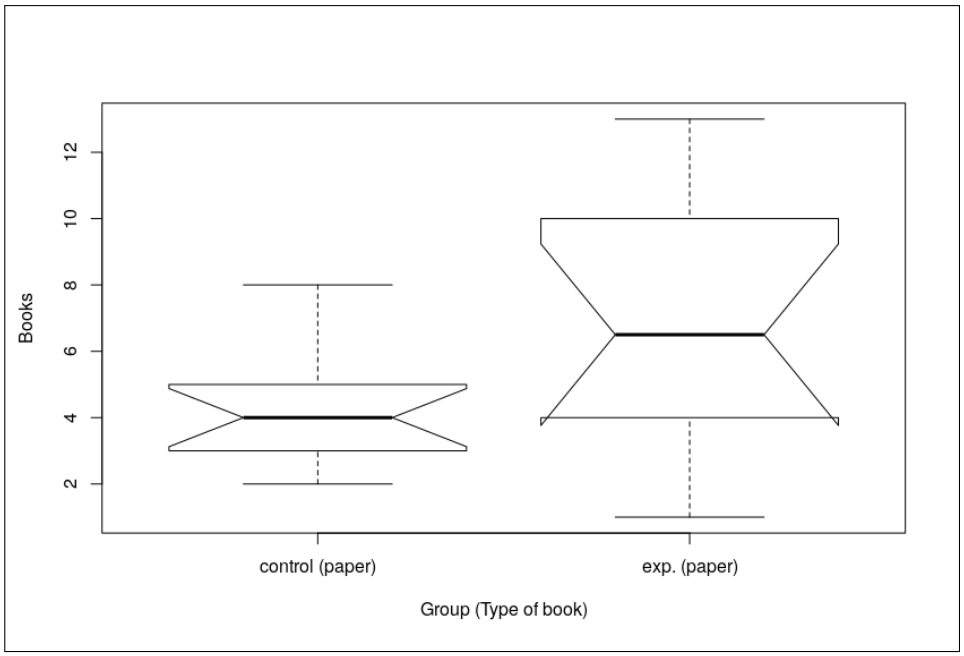


Figure 4.1: Distribution of the book reading count variable for 1st graders

There is an intersection between the confidence intervals (denoted by the notches) of both plots, but the median for **exp. (paper)** is slightly above the confidence interval top limit for **control (paper)**. This is an informal evidence that children in experimental group read more paper books than children in control group.

It is possible that this difference is explained by differences in **phonological awareness** between groups before the children had access to the treatment. The notched box plots in Figure 4.2 show distributions of the pre-test for this variable in both groups. There seems to be no statistical differences between **control (phon. awareness)** and **experimental (phon. awareness)**, so this is another evidence that eventual greater paper book reading in experimental group is associated primarily with experimental treatment.

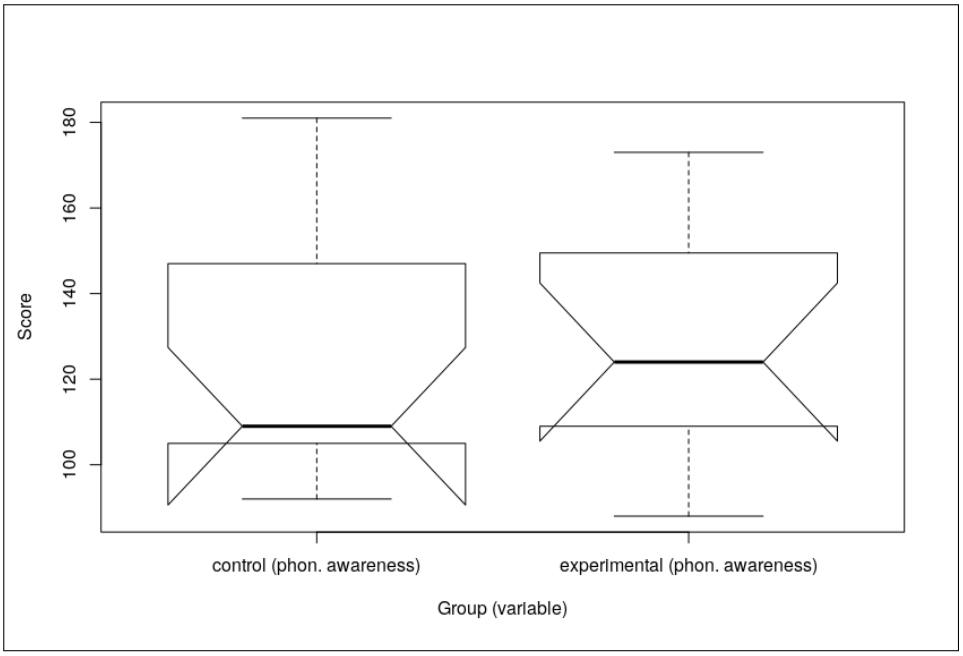


Figure 4.2: Distribution of pre-test on phonological awareness variable for 1st graders

Table 4.1 summarizes null hypothesis, statistical tests and effect size in order to confirm the results just discussed and visually depicted in Figure 4.1 and Figure 4.2. Since the distribution of **control (phon. awareness)**, visually, back in Figure 4.2, does not really look normal, both parametric and non-parametric tests were performed, but they both were not significant. The tests confirm previous analysis that associates zReader with the behavior of reading more paper books. The magnitude of this impact is measured as Cohen's d and indicates a medium effect size value of 0.77.

However, for we have such a small sample size for this specific analysis (N=25), this association must be regarded with caution and further experimentation/replication shall be performed in order to verify if this result may be repeated. There are a number of independent variables that may affect the book reading count and randomization alone may not properly

Null hypothesis	Normality test p-value	Hypothesis test p-value		Cohen's d
		Welch	Wilcox	
control (phon. awareness) = experimental (phon. awareness)	0.054 – 0.55	0.425	0.321	–
control (paper) = exp. (paper)	0.07 – 0.49	**<0.035**	–	0.77

Table 4.1: A summary of phonological awareness statistical tests

distribute these variables for both groups considering this particular small sample size.

Anyway, even pondering all these considerations, the test results answer **RQ1**, that is, **using zReader makes children – 1st grade children, in this case – read more books** – paper books, specifically.

We did not summed the books read in zReader with paper books for methodological reasons, even though we would probably get a better effect size. The issue is that, for many first graders, who are not supposed to have good reading skills, the paper books are often read by their parents and the in-app zReader books are read by themselves.

4.1.2 3rd grade

The box plots in Figure 4.3 show distributions of **book count** considering control and experimental groups for paper, in-app and overall book counts.

It is quite clear, by visually comparing the box plots for **exp. (overall)** and **control (paper)**, that experimental group children read more books than control group children. The same occurs by comparing the number of books read in zReader with the paper books read by control group children – **exp. (in-app)** *versus* **control (paper)**. As for paper book reading alone, the behavior seems uniform along control and experimental groups – **exp. (paper)** *versus* **control (paper)**. Finally, it is also possible to note that children in experimental group also read more in-app books as compared to themselves - **exp. (in-app)** *versus* **exp. (paper)**. These observations evidence that, with zReader, children read a lot more overall books without affecting paper reading behavior.

Table 4.2 summarizes null hypotheses, statistical tests and effect sizes in order to confirm the results visually observed in Figure 4.3. The tests confirm previous analysis indicating that

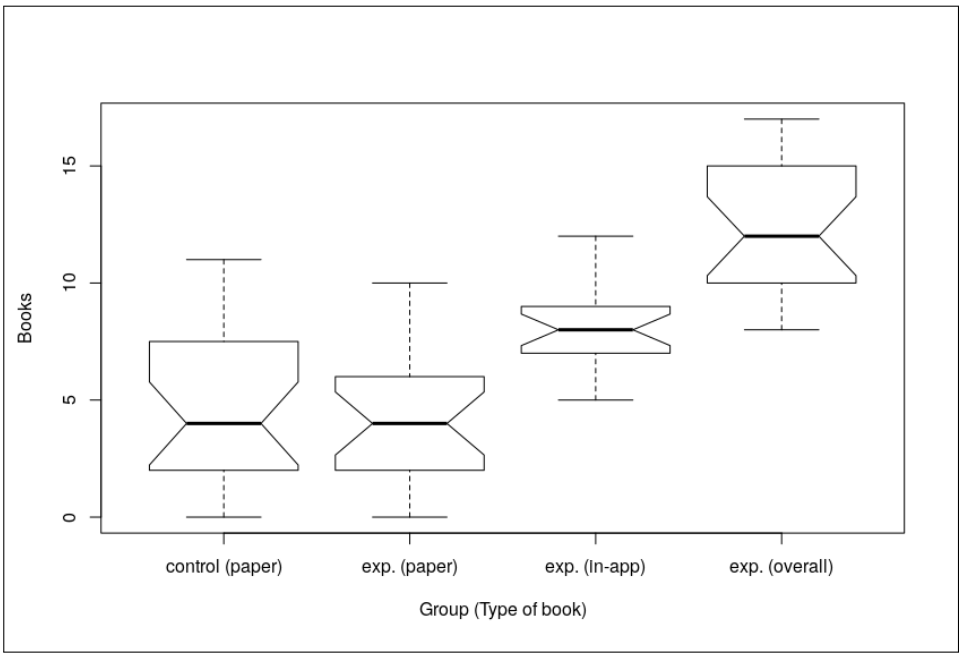


Figure 4.3: Distribution of the book reading count variable for 3rd graders

zReader positively impacts on the number of overall books that children read (**exp. (overall) = control (paper)**). The magnitude of this impact is measured as Cliff's delta and indicates a high effect size value of $d = 0.88$. The test also indicated a 92.61% chance that a child randomly chosen from experimental group read more books than a randomly chosen case from control group.

These results also answer **RQ1**, that is, **using zReader makes children – 3rd grade children, in this case – read more books**.

Null hypothesis	Normality test p-value	Hypothesis test p-value		Cliff's delta
		Welch	Wilcox	
exp. (overall) = control (paper)	**0.001** – 0.14	–	**<0.0001**	0.88
exp. (in-app) = control (paper)	**0.01** – 0.14	–	**0.0002**	0.6
exp. (in-app) = exp. (paper)	**0.01** – 0.06	–	**0.0001**	0.7
exp. (paper) = control (paper)	0.06 – 0.14	0.59	–	–

Table 4.2: A summary of book reading statistical tests

There is, in addition, a **RQ1** related observation that can be made based on the collected

data. Spearman correlation coefficient between experimental group variables paper reading and in-app reading was 0.083, so no association between the behavior of reading paper books and reading in-app books was observed. Rephrasing this result, one can state that zReader acted uniformly, in terms of digital reading behavior, for low frequency paper book readers and for normal and high frequency readers in 3rd grade.

4.1.3 Reading skills improvement

For reading skills improvement, our sample involves children in both 2nd and 3rd grades. A positive improvement was expected for both groups, once all children were receiving daily instructions on reading by means of conventional classes. Our hypothesis is that zReader improves children reading skills better for the experimental group. This scenario is depicted in Figure 4.4, where notched box plots for reading improvement in control and experimental groups are shown. Visually, we can see that experimental group median is above control group confidence interval. Thus, we proceeded with inferential tests.

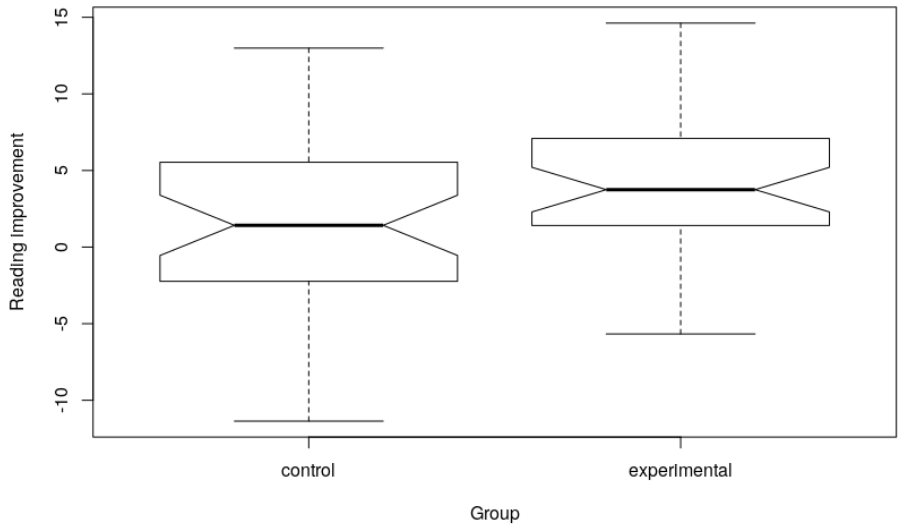


Figure 4.4: Box plots for reading skills improvement variable

Normality was assumed for the distributions of both control and experimental groups ($p > 0.7$ and $p > 0.3$ in Shapiro-Wilk test). The null hypothesis was that the groups were equal and a one-tailed Welch two sample t-test was significant ($p < 0.014$). Thus, we accept

the alternative hypothesis that mean reading improvement in experimental group is greater than in control group. Furthermore, a moderate effect size of d=0.51 (Cohen's d) was found. These results are summarized in Table 4.3 and answer **RQ2**, that is, **using zReader improves children's reading skills better as compared to children not using zReader**, specifically considering 2nd and 3rd grade children.

Null hypothesis	Normality	Hypothesis test p-value		Cohen's
	test p-value	Welch	Wilcox	d
control = experimental	0.709 – 0.393	**0.013**	–	0.51

Table 4.3: A summary of reading skills improvement statistical tests

This finding repeats a result from a pilot experience(Appendix B) with $N = 18$ and only 2nd grade children. In that earlier experiment, we found a significant effect in favor of experimental group children ($p < 0.01163$, Cliff's $d = 0.59$, confidence interval from 0.045 to 0.866) with a qualitative standard reading test used to assess pre and post reading skills. We cannot say it is a true replicated result from a replicated experiment because the conditions in which the current experiment was performed were slightly different: more specifically, for the current experiment, children played games in pairs (as opposed to single playing in the former experiment), played several different stories and had attended, at least, one zReader session more. Anyway, if not a strict replication, this is a positive result and also reinforces a point we've stated back in Chapter 2: game designs and game dynamics are the treatment, not specific game implementations.

4.2 User experience

For user experience assessment, our sample involves children from all grades and they were analyzed together. Our hypotheses is that children enjoyed playing zReader, that playing zReader was easy for them, that they like to read in zReader better than in paper books and that they would like to play zReader – weekly – for the whole year – they played it weekly, but for 2 and a half months approximately, and this assessment is important for any future incorporation of zReader as formal computer lab school practice.

The Likert scale considered the common 5 options, coded from 1 to 5 for the analysis – code 3 being the neutral option. The survey items were the following:

1. I enjoyed playing zReader
2. I like reading in zReader better than in paper books
3. Playing zReader was easy
4. I would like to play zReader for the whole year

Figure 4.5 depicts the **Mean** and **Confidence interval** for all items. It is quite clear that all intervals are well above the neutral option (code **3** in vertical axis). They are actually above the "agree" option (code **4** in vertical axis).

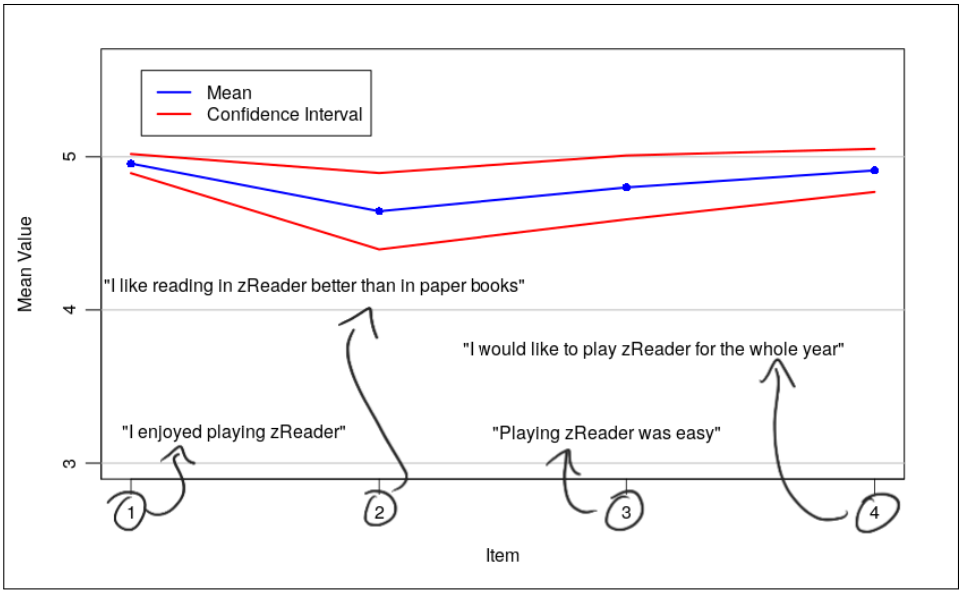


Figure 4.5: Survey items means and confidence intervals

One can also visualize this result, in a different form, as proportions inside the sample, in Figure 4.6. The left side of the figure concerns disapproval and none of the 4 questions (depicted as **Q1** to **Q4**) crossed the line of 4 percent of negative answers. In the middle – **0** value in horizontal axis – a small percentage of neutral answers is found. The greater neutral percentage concerned **9%** of children who where indifferent to reading in zReader or in paper (**Q2**). Anyway, the right side of the plot shows **87%** of approval for the same item,

and all the others are above that percentage – enjoying zReader (**Q1**) actually having **100%** of positive opinions. Crombach's alpha for the survey was 0.7, so internal consistency of the questionnaire is acceptable.

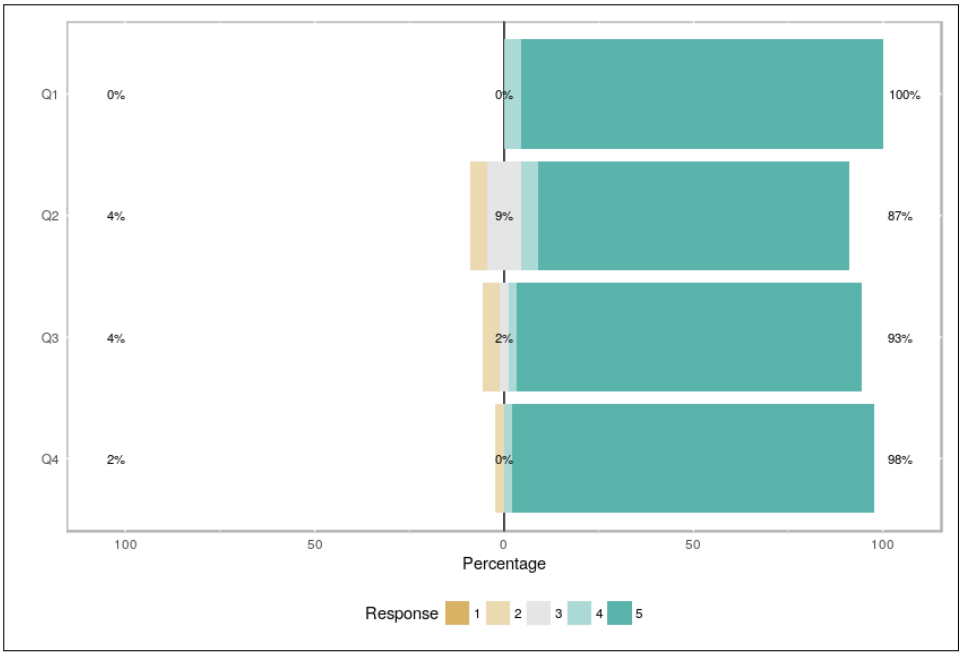


Figure 4.6: Survey item proportions

Besides Crombach's alpha, children's answers were coherent with the small number of refusals to play zReader games. In total, one child refused to play it once and another child refused to play it twice – and they came back in later sessions to play the games and replace the session they've missed. Considering the scheduled 8 sessions (training sessions not included) with only 1 game play per session (a conservative consideration, since many played more than one game in several sessions) and 50 children in experimental group across grades, we have a total of 400 possibilities to refuse to play with only 3 actual refusals – 0.75% – which is a number absolutely residual and reinforces children's answers in the survey, specially with concerns to enjoyment and frequency.

This way, we consider answered **RQ3**, that is, **zReader provided a good user experience for children**.

Chapter 5

Discussion or How These Results Are Any Good

As obvious as it is, our discussion is initially centered around the dependent variables, the results we observed over them and how they related to other researches. However, there are also some important discussions that do not directly involve research question related issues but are important for contextual reasons, so we also include some theoretical considerations about how background theories were put together, as well as a brief discussion about zReader costs and its possible integration into school practice.

5.1 Of reading related variables

The most important point to be discussed is probably whether zReader directly caused the observed better reading skills improvement in 2^{nd}/3^{rd} grade sample or whether it caused more reading practice that, on its turn, caused the better reading skills improvement. It is quite possible that a combination of game dynamics and reading practice caused the observed results, but our design cannot separate these effects – specially because every treatment game *is* a book (or a bunch of words, like SKey) and, thus, every treatment game *is* reading practice.

Anyway, it is maybe counter-intuitive, but even daily contact with conventional books and improved taste for reading are not always observed as causing literacy skills improvement in disadvantaged children [12], so we should not despise the effects of game dynamics in this experiment. A pilot study, described in Appendix D, investigated brain cognitive ac-

tivity of two top reader subjects, comparing an experienced zReader user with a reader that never used the application. Initial results show that attention levels, algorithmically calculated from brain waves, were greater for the child that read in zReader, as compared to the child that read the same text in paper, even though they had the same reading skills prior to the study. Of course this is only a pilot two cases study. Nevertheless, it is another piece of evidence that associates observed effects with zReader and seems to be an alternative of studying gameplay causal effects since one cannot separate the game parts from the inner e-book.

As for the the moderate effect size found, getting greater values with technology alone, even counting on traits like teacher training or daily exposure, which is not our case, does not seem to be a simple task.

Lisenko et al. [31], for instance, describe the use of two successful web tools with 1st and 2nd grade Canadian children in order to improve literacy related variables. The tools have many features, concern teacher training and even weekly children training and, still, positive effects were small over vocabulary and reading comprehension, as assessed by standardized tests.

Another interesting literacy related research was the one presented a couple of years ago by Santiago et al. [51], which worked on Brazilian literacy issues, like we did, but concentrated (initially) on children who had not the expected reading skills after the end of 3rd grade. Their project is quite broader than ours and involves a teacher module and planning as well as three student modules, one of them with "20 classes and 1,175 activities and educational games". Unfortunately, the research was sort of a quasi-experiment and no inferential results or effect sizes were reported, so it is not possible to compare to our results in that sense.

Looking beyond these particular cases, conclusions from a related systematic review [65] report that technology has a "small but significant addition" over *specific* skills. Note that the authors are talking about small effects over topics like particular story comprehension and vocabulary acquisition. So, improving effect size over a more complex variable like general reading skills improvement, which is the case for our interventions, may actually be regarded with enthusiasm, given all these circumstances, even if the observed effect size is moderate.

The behavior of reading more books is also important for alphabetizing children. Spe-

cially because this behavior is possibly associated with taste for reading, which is cited by 5-10 years old children as the most important factor for motivating them to read books, as published in last Pro-Livro Institute report [7, p. 193]. Thus, it is possible that zReader affected this important variable and that the high number of overall reading in 3rd graders is a reflex of that – which is a great result anyway. One may argue that is logical to have more overall book reading, since experimental group children were given access to digital devices, but it is important to remember that the zReader sessions were optional. This is also counter-intuitive, but it has being observed that access to eReading enabled devices may be associated with *less* reading in general [35]. In sum, when it comes to reading and technology, there seems to be no logical path to follow. The best way to draw conclusions is by running controlled experiments.

5.2 Of user experience

Literacy related software evaluation does not seem to be a topic that researchers are giving the importance it deserves. Among a couple of systematic mappings considered in our study [9; 65], for instance, software evaluation was not taken as observable variable in any of them, possibly due to the lack of researches that reported it in the first place. A more recent and more specific review centered at literacy technology for children [28] – a mobile application review, not a systematic mapping – also does not mention any user experience consideration.

Nevertheless, there are researches that evaluated user experience by general means. Manero et al. [32], for instance, developed somewhat successful games to increase high school students' interest in theater and measured their experience by one 7-option question about "experience evaluation" (their work was not centered at literacy, though).

On the other hand, educational software evaluation models, like MEEGA [52], MEEGA+ [46] and MEEGA+ KIDS [68], are interesting alternatives proposed for an uniform way of taking educational software evaluation under consideration, even though they were primarily designed to software engineering or computing education games and (understandably) are not so suitable for children in early elementary school still mastering essential reading skills. MEEGA+ model analyses "player experience" and "learning perception" perspectives of educational software by means of several items of a Likert questionnaire.

Which was our kind of approach – evaluating user experience by means of a questionnaire – even though we did a lot of simplifications for the assessment to become achievable.

This evaluation was surely a defiant part of this work, because our subjects were 6-8 years old children. Some of them didn't even have enough reading skills to merely decode and understand some item sentences, practically none of them could reflect upon MEEGA items like "the contents and structure helped me to become confident that I would learn with this game" or "the colors used in the game are meaningful". In addition, many of our subjects did not even fully understand Likert scale options like "strongly agree" in its literal form.

Thus, given all simple and detailed possibilities available in literature and all restrictions concerning the subjects' age, we opted for a 4-question 5-option Likert oral survey, with all sentences taken/adapted from MEEGA models (not MEEGA+ KID, though, for it was published after our experiment was completed). Precisely, the selected questions were about enjoyment, ease of use, comparison to other approaches and potential frequency of use.

We also had to train children with each style of item sentence before really getting them to answer the actual item sentence and substituted option descriptions by emoji faces in the response card. Two "unhappy faces" were "strongly disagree" and so on. We were quite confident that the subjects were comfortable with "emoji language" because every other zReader game (that they've played for at least 8 times) had image dialogues with emoji faces for them to interpret and dub.

The set of questions showed acceptable internal consistency and excellent results regarding the experience children had with the application, as explained in the previous Chapter. And, as also explained in the previous Chapter, objective measure of refusals to play zReader games was consistent with subjective responses.

This is not a methodology proposing research and it is not our intention to report this as any new method for assessing children's opinion, but given the lack of literacy related researches considering this perspective, as already discussed, we found that it is important to register and discuss how we proceeded to make the assessment for children's experience with our software.

5.3 Of theoretical background

Away from reading skills and reading behavior considerations and even away from user experience considerations, there are some important remarks about theoretical foundation that must be discussed. Recall that zReader design decisions, as stated back in Chapter 2, were based on several empirical works or theories with empirical support that included educational frameworks like Constructionism [44], as well as multimedia learning theories derived from Cognitive Load Theory [63].

Well, it turns out that Pappert's Constructionism is built upon Piaget's Constructivism [40] which, on its turn, have been, to some extent, subject of criticism by instructional design and multimedia learning practitioners. Critics focus on what is called random searches or minimal guidance[25], the type of activity one has to perform when receives only a problem specification with poor instruction of how to proceed to solve it. Recall, also, that, for the beginner reader, reading has a high intrinsic load and that, therefore, the design of the reading centered software (or any learning material, actually) should avoid any activity that demands high cognitive resources – like random searches do.

So, this way, questions may arise about how zReader design decisions put together otherwise conflicting theoretical backgrounds.

The zReader games actually stay in a middle term between these educational and cognitive learning theories. The games are sure built on Constructionism/Constructivism principles, but avoiding random searches. For that reason, differently from popular mobile storytelling applications like ToonTastic[1], the children were not allowed to manipulate characters or move them around as they please, nor were they allowed to draw scenarios and scenarios properties – considering the *problem* of creating a cartoon *for* a particular story, that would suit the concept of random search, impose a high extraneous cognitive load and, in addition, involve the children in cognitive activities not directly concerned with text comprehension.

So, in zReader games, children had to choose between a small number of previously made representations for something they read – visual or auditive representations, depending on the game – in order to construct the cartoon animation. They still had to construct, in sum, but not with general purpose tools – like in MIT's Scratch[2], for instance – and with a limited

[1] https://play.google.com/store/apps/details?id=com.google.toontastic

[2] https://scratch.mit.edu

number of them. Results observed for reading skills and book reading proved that it was a successful approach and it may be important for researchers facing similar situations. One does not really have to choose between one approach or another – the searching options may be restricted for reducing cognitive load imposed by instructional material while still keeping a Constructionist approach.

5.4 Of potential implementation costs

Lastly, we also have to consider the developed application with regards to its possible integration into formal education environments. Sure there are great published solutions, like TaBooGa [30] – a hybrid e-book connected to external tangible elements – that also work on literacy and motivation but are, in terms of costs, very far away from being implemented in Brazilian public schools. Mobility features of zReader make possible for a relatively low cost mobile lab with a few tablets to serve several different schools (well it was quite the case for this research for the past 4 years). Moreover, beyond any subjective survey answer, a very positive evidence that children had enjoyed using the software was the fact that they attended almost all zReader optional sessions they had the opportunity to attend. These considerations address two essential perspectives for integration into school curricula or practice: implantation costs and children's user experience with the application.

Because, by analogy, we can say that it's not just the question of buying paper books and putting them in school library. Also, it's not just the question of getting children to actually read the books that were put in school library. The question is putting books in school library, getting children to read the books *and* getting them to improve their skills and reading behavior along the way. So, a good user experience is essential to these last two questions just as integration costs are restrictive to the very first one. But the costs question is a first obstacle to any further one, and the mobility feature of zReader is useful that sense: a bunch of tablets may well work like a "mobile library". It's not the best alternative, of course, but it suits Brazilian elementary public schools funding issues.

Chapter 6

Conclusions, Limitations and What to Do Next

This work presented a mobile application suite from alphabetizing children, zReader, along with an experiment for validating its effects on reading skills, reading behavior and user experience. The software is a mobile e-book story telling application and, beyond putting together theoretical foundation in order to take design decisions, its implementation concerned several supporting activities like writing/adapting narrative texts, creating inner cartoon animations for each one of them and implementing a library-like infrastructure in the clouds that simplifies the process of making further material available – for these matters, the narratives are available in Appendix F and the current library-like version of zReader is available for free on Google Play Store[1].

Data analysis presented in this work showed both reinforcing and extended results as compared to a pilot experiment. Also, children attested a very good user experience with the software and showed an extremely high number of attendance to optional zReader sessions.

It is probably the third time we mention this session attendance remark and we don't really want to get boring or repetitive. But even though it is not possible to make such a claim from a scientific perspective, we find very, very unlikely that one may succeed in getting these children to read paper or conventional digital books just by offering them the possibility to do so once a week. Literacy would hardly be an issue if this simpler approach was effective and it was effective for reading with our application. This over-repeated remark

[1] https://play.google.com/store/apps/details?id=com.zeroum.leiturainterativa

is, in that sense, if not a formal, concluding result, a very encouraging observation.

Nevertheless, this research has many limitations, specially when it comes to the broader sense of Brazilian literacy problems, for it was not feasible to experiment over a random sample from such a huge population as Brazilian disadvantaged children. Even considering the population as a particular city, we faced several political and physical issues to work with such a random sample for running our experiments. So our approach was the *random assignment* of a smaller group of volunteers to the treatment, as most researchers' approaches are. Replication of the experiment with other groups may compensate the lack of a proper population random sample. Also, only narrative texts are currently adapted to zReader, so all the other text genres are left behind. The reading tests applied to validate zReader, however, were general reading skill classifiers and did not relied specifically in reading narrative texts. Even though we've only used these kind of texts, application dynamics seem to extend literacy learning beyond them.

Three types of experiments are currently being designed for further research in order to reinforce zReader results and investigate new research questions. The first one has the purpose of finding evidence about biological/cognitive reasons that may have caused the results we have found for 2^{nd} and 3^{rd} graders. The main possibility under investigation is that game dynamics improve children's attention into the text parts of the game, as described in Appendix D. The second one concerns the use of a few tablets with zReader installed (and blocked for all other applications) as an item children can borrow at school library. The third one is a replication of the last experiment with a bigger sample of 1^{st} graders.

There is a fourth possibility of future experiment, but it is still not being designed. It is motivated by an important informal observation that was the potential effects of publishing children's cartoons in YouTube. We did this only after the experiment was completed because we did not want a new factor to influence children's behavior – until all data was collected, they could only see their cartoons during zReader sessions, in the tablets. After publishing the cartoons, however, there was a high demand for making new stories and performing new informal sessions. Even parents who did not approve children participation back in the beginning of the experiment asked the research team to allow them to use the software. The effects of YouTube publishing seems, at first sight, to motivate children even more to use zReader.

6.1 Personal Remarks

Finally, it is important to note that I – the main author – have been conducting experiments with children in alphabetizing cycle for the past 4 years. From unsuccessful solutions, reworked design decisions, informal and pilot experiences to the current working version of zReader, I personally dealt with something like 400 alphabetizing children in 5 schools of 3 different cities.

It would take me another thesis to describe all the experiences I had with all these children when attempting to create a technology to improve their reading skills and behavior – specially in informal exploratory sessions.

I heard them saying things like "I didn't like to read before, but I do now". I heard the crystal clear evolution of their prosody, something so hard or so expensive to measure, consider and analyze in digital terms but that is so easy to human ears to perceive and even to compare. I heard them creating nonsense sentences for image dialogues in the beginning and getting nicely into the storyline in latter sessions, going from "spitting" text in text dialogues to emphasizing sentences according to punctuation marks and characters' humor.

I saw them smiling so gracefully so many times with the stories.

So many times.

And, unfortunately, I also saw how some stereotypes were so sadly true when it comes to disadvantaged children. Kids that went to school mainly to eat, because they did not have any food at home, kids that didn't know who their fathers were, kids that were offered drugs at age 8, kids that got angry at me because I didn't realize they couldn't read at all even already being supposed to and they were ashamed of telling me so.

And still, they were there.

Week after week, word after word.

Sometimes even cheating on their teachers and escaping from ordinary classes or abdicating from school playground time only to, after all, read and tell a story.

Because if we take away all this "computer science stuff", this is what these games were all about: reading and telling a story.

All these little informal observations may change one's perspective on scientific research, on the importance of crossing over the computer science field limits but, unfortunately, they

do not support any acceptable scientific remark.

And that is the reason they are written here and not in Chapters 3 and 4.

They may not stand for scientific statistical inferences, results, conclusions...

But maybe they suit quite well for a final thought.

I hope this whole experience somehow sometime in the future will open some perspectives for these children.

All these invisible children.

Remarkable invisible children.

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Appendix A

zBooks Internal Structure

A zBook is an arbitrarily named compacted directory with several video and text files. Each text file is a game descriptor that must contain game information like inner text story or words and also must reference the video files used in the game.

The names of the video files are arbitrary.

SKey game descriptor filename must end with "SKEY.txt".

TVid game descriptor filename must end with "TVID.txt".

CPuz game descriptor filename must end with "CPUZ.txt".

One directory may have many Skey, TVid and CPuz descriptors, provided that they reference existing video files and are structured accordingly.

Next it is described, in abstract syntax and in examples, how information inside descriptor files must be structured.

A.1 SKey

Código Fonte A.1: SKey descriptor abstract structure

```
#sentence <WORD_1>
#media <FILENAME_1>
<SYLLABLE_1.1>
<SYLLABLE_1.2>
<SYLLABLE_1.M>
#end
#sentence <WORD_2>
```

```
#media <FILENAME_2>
<SYLLABLE_2.1>
<SYLLABLE_2.2>
<SYLLABLE_2.M>
#end
#sentence <WORD_N>
#media <FILENAME_N>
<SYLLABLE_N.1>
<SYLLABLE_N.2>
<SYLLABLE_N.M>
#end
```

Código Fonte A.2: SKey descriptor example

```
#sentence GRAPES
#media s1.mp4
GRA
PES
#end
#sentence HUNGRY
#media s2.mp4
HUN
GRY
#end
#sentence JUMP
#media s3.mp4
JUMP
PUMP
#end
#sentence AGAIN
#media s4.mp4
A
GAIN
VAIN
#end
#sentence DISSAPOINTMENT
#media s5.mp4
DISS
```

```
A
POINT
MENT
#end
#sentence DISDAIN
#media s6.mp4
DIS
DAIN
#end
#sentence AWAY
#media s7.mp4
A
WAY
I
#end
```

A.2 TVid

Código Fonte A.3: TVid descriptor abstract structure

```
#media <FILENAME_1> ; <FILENAME_1a>
#media <FILENAME_2> ; <FILENAME_2a>
#media <FILENAME_3> ; <FILENAME_3a>

#title <BOOK_TITLE>
<PARAGRAPH_1>
#
<PARAGRAPH_2>
#
<PARAGRAPH_3>
#
```

Código Fonte A.4: TVid descriptor example

```
#media s1.mp4;s1a.mp4
#media s2.mp4;s2a.mp4
#media s3.mp4;s3a.mp4
```

```
#media s4.mp4;s4a.mp4
#media s5.mp4;s5a.mp4
#media s6.mp4;s6a.mp4
#media s7.mp4;s7a.mp4

#title
A Fox one day spied a beautiful bunch of ripe grapes hanging from a vine
    trained along the branches of a tree.
#
The grapes seemed ready to burst with juice, and the Fox's mouth watered
    as he gazed longingly at them.
#
The bunch hung from a high branch, and the Fox had to jump for it. The
    first time he jumped he missed it by a long way.
#
So he walked off a short distance and took a running leap at it, only to
    fall short once more. Again and again he tried, but in vain.
#
Now he sat down and looked at the grapes in disgust.
#
"What a fool I am," he said. "Here I am wearing myself out to get a bunch
     of sour grapes that are not worth gaping for."
#
And off he walked very, very scornfully.
#
```

A.3 CPuz

Código Fonte A.5: CPuz descriptor abstract structure

```
#media <CONCEPT_1> , <FILENAME_1>
#media <CONCEPT_2> , <FILENAME_2>
#media <CONCEPT_N> , <FILENAME_N>

#title <BOOK_TITLE>
<PARAGRAPH_1>
#
```

```
<PARAGRAPH_2>
#
<PARAGRAPH_3>
#
```

Código Fonte A.6: CPuz descriptor example

```
#media grapes,s1.mp4
#media hungry,s2.mp4
#media jump,s3.mp4
#media again,s4.mp4
#media disappointment,s5.mp4
#media disdain,s6.mp4
#media away,s7.mp4

#title
A Fox one day spied a beautiful bunch of ripe grapes hanging from a vine
    trained along the branches of a tree.
#
The grapes seemed ready to burst with juice, and the Fox's mouth watered
    as he gazed longingly at them.
#
The bunch hung from a high branch, and the Fox had to jump for it. The
    first time he jumped he missed it by a long way.
#
So he walked off a short distance and took a running leap at it, only to
    fall short once more. Again and again he tried, but in vain.
#
Now he sat down and looked at the grapes in disgust.
#
"What a fool I am," he said. "Here I am wearing myself out to get a bunch
     of sour grapes that are not worth gaping for."
#
And off he walked very, very scornfully.
#
```

Appendix B

Pilot Study: Reading Skills and Reading Frequency

A Pilot Experiment for zReader was conducted from September to November 2016 with children in the second grade of the Bernadete Ginane elementary school at the city of Caicó, State of Rio Grande do Norte, Brazil.

In short, the experiment consisted of randomly assigning 2^{nd} grade children to either control or experimental group and then proceeding with technological interventions, for the experimental group, with implementations of SKey, TVid and CPuz. Literacy skill tests made before and after the interventions (pre and post tests) and quantity of monthly book borrows were observed as dependent variables and compared across groups for their values before and after the interventions in a way that research questions about reading skills improvement and reading frequency could be addressed.

B.1 Participants

The experiment involved N=18 children, 12 male and 6 female, from low socio-economic status living in the same low socio-economic neighborhood where the (public) school is located. All the children were in a regular situation concerning the grade/age recommendation and had, at least, one former year of formal literacy education. Experimental and control groups were randomly constituted regardless of gender or any other factor. Anyway, after randomization, both control and experimental groups consisted of 6 male and 3 female

children.

B.2 Experiment

The control treatment, applied to control group children, was regular computer classes and the experimental treatment, applied to experimental group, was implementations of SKey, TVid and CPuz.

A total of 7 sessions along 11 weeks were performed and both groups were treated at the same time, in different rooms (the 11 possible sessions were not completed due to school calendar restrictions). Technically, regular PC classes with curricular software training for reading development was replaced, in the experimental group, by game sessions with the proposed technologies. Research team had no influence on regular PC classes content.

The pre-test and the post-test were performed by school staff, as they perform them year after year, for internal evaluation, regardless of any research. The tests consisted of the two tests of "Provinha Brasil", as they measure literacy skill level.

The game sessions duration varied from 20 to 30 minutes and each child played in a separate tablet, all of them with the very same hardware and software configuration – 10.1 inches quad-core Galaxy Tab 4 with Android 5.0 as operating system. Each child played one game per session (except for when there was training). Once the children had to dub cartoons after each game session, they were organized in groups of 3 – there was no room available in school for distributing the 9 experimental group children and the dub process would be impossible if all of them were doing it at the same time.

B.3 Intervention Notes

A total of 7 sessions were conducted, each one concerning a different narrative story, implemented as different types of games for being played by differently skilled children. Whenever a new type of game were introduced, a 10 minutes training was conducted prior to the game playing. A total of 15 game implementations were used along the way, all of them implemented as Android 5.0.2 projects and installed on Samsung Galaxy Tab 4 tablets with quad-core 1.2GHz processor and 10.1 inches 1280 x 800 pixels screen size.

#	Story Title	Game Implementations (Properties)
1	Fox and Grapes	SKey (9 words)
2	The Suitcase at the Window	SKey (17 words)
3	The Mosquito and the Monkey	SKey (12 words) TVid (300+ words, 9 segments)
4	Little Prince in the Planet of the Drunk Man	SKey (9 words) TVid (180+ words, 10 segments)
5	Super Daddy	SKey (11 words) TVid (200+ words, 11 segments)
6	Doctor Destroyer	SKey (13 words) TVid (400+ words, 13 segments) CPuz (400+ words, 13 segments, 13 pieces)
7	The Scorpion and the Rhino	SKey (11 words) TVid (200+ words, 11 segments) CPuz (200+ words, 11 segments, 11 pieces)

Table B.1: Session Registry

Table B.1 lists all the implementations, by session, along with some specific implementation properties like word and segment counting. This table is presented for the sake of event registry, not for eventual replication. The games actually used depended on children performance and shall vary for new executions.

B.4 Analysis and Results

B.4.1 Literacy Skill Level

Firstly, pre-test level equality between groups was checked. The following null hypothesis was defined for that purpose:

H1-0: the pre-test level of the control group is statistically equal to the pre-test level of the experimental group.

Once the levels are ordinals and there was no evidence of normality ($p < 0.001$ in Shapiro-Wilk normality test for both groups), **H1-0** was tested by means of a Wilcoxon rank sum test, which is suitable for the characteristics of the data collected. The test showed no evidence to reject **H1-0** ($p > 0.5$), so it was assumed that the groups were equal in literacy skill level. Thus, further testing relied on post-test data in order to verify differences related to the experimental treatment.

Then, post-test literacy level equality across control and experimental groups was checked. The following null hypothesis was defined for doing so:

H2-0: the post-test level of the control group is statistically equal to the post-test level of the experimental group.

Again, non-normality evidences were found for both groups – $p < 0.006$ as calculated by Shapiro-Wilk normality test. But this time a following Wilcoxon rank sum test found evidence for **rejecting** the considered null hypothesis, **H2-0** ($p < 0.012$) – with the alternative hypothesis being that the control group post-test level is statistically less than the experimental group level.

This result answers the following research question: Is it possible to define a Portuguese language educational game technology that improves local low-income children literacy levels?

And the answer is positive. The **rejection of H2-0** evidences that the proposed mobile games of zReader showed a significant statistical difference in literacy level skills of children using them as as compared to children not using them. The difference is in favor of the children using the mobile games.

Once there was evidence to support that children from experimental group had a better literacy level in the post-tests, the effect size was calculated to quantify how much better were

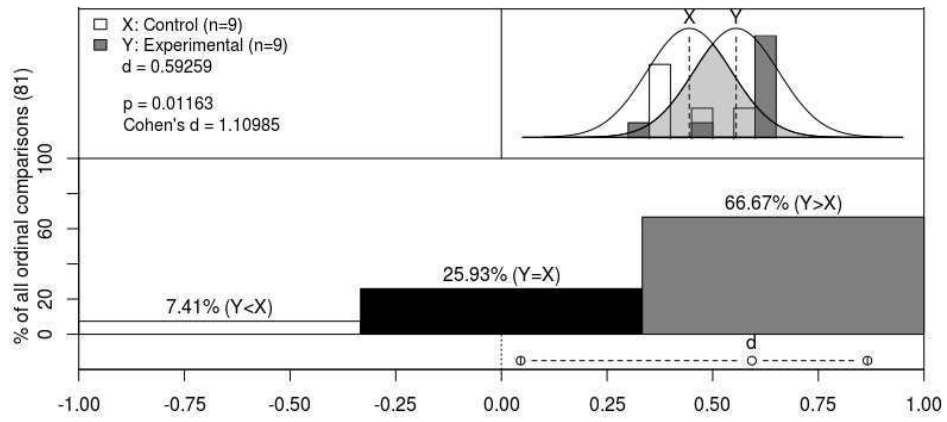


Figure B.1: Cliff's delta and 95% confidence interval for post-test data

the results from experimental group. Once again, ordinal non-normal data was collected, and Cliff's delta, a suitable dominance statistics measure [2] was used (it is an effect size measure that does not rely on mean, variance or interval). A visual report from test results is illustrated in Fig. B.1.

An effect size $d = 0.59259$ was found - Cliff's *d*, not to be confounded with popular continuous variable effect size measure *Cohen's d*. It is considered a large effect (it ranges from -1 to 1 and a Cohen's d equivalent is $d = 1.10985$). There is a chance of 66.67% that a value randomly chosen from the experimental group (Y) is higher than a randomly chosen value from the control group (X). The chance for a reverse statement is ($Y < X$ in Fig. B.1, that is, experimental<control) is 7.41 and the value of Cliff's d is the difference between these former values. The corresponding p value was found to be significant ($p < 0.01163$) – which could be used for rejecting **H2-0** as well. The confidence interval for d (also illustrated in Fig. B.1 as a dotted line under the letter d and just above x axis) does not include 0 or negative values that could favor control group *population* over experimental group *population*. It is, nevertheless, still a wide confidence interval, specially due to the small sample available for the experiment. It ranges from 0.045 to 0.866.

A follow-up quantitative literacy test (for 3rd graders) was performed in June'2017 (seven months after treatment sessions ended) and an effect size of 0.985 was found (experimental over control), this time measured as Cohen's d with parametric methods, a value that is quite close to the converted effect size obtained with the post-test analysis. This is an interesting finding, as we now explain.

Assuming that there was a point back in time where the children involved in the experiment had no literacy skill at all (which is quite obvious), all the instructions and everything else that could affect their literacy skill led to no statistical differences between both groups at the time of the pre-test, as the analysis already showed. That is, both groups went from 0 to their respective pre-test level almost uniformly. Just after the treatment, they were found at literacy levels that separated experimental group from control group by nearly 1 Cohen's d. Thus, their literacy skill did not varied uniformly for both groups, which was also already clear by previous analysis. Finally, for the following seven months, in the absence of the treatment, all the instructions and everything else that could affect their literacy skill led to literacy levels that separated experimental from control group by nearly 1 Cohen's d. Thus, both groups varied almost uniformly, just as they did before the treatment. That is, whatever caused the greater levels in experimental group children, it is directly associated with the experimental treatment.

These results answers the following research question: By how much potential improvement can by expressed?

The effect size was $d = 0.59259$, which is considered a large effect size, but this estimation is accompanied with a wide (and still positive) confidence interval. It expresses the chance, for a child using the proposed games, of being more skilled than a child not using them, ceteris paribus. It does not express how many levels, or standard deviations of levels the experimental treatment improves and it is suitable for the data collected in terms of ordinal nature, unevenly distributed value intervals and non-normal distribution.

B.4.2 Children's Reading Behavior

A further and final statistical analysis was conducted, this time in order to verify if there was some "history behind the data", some uncontrolled variable that was *causing* level increase exclusively for experimental group. Particularly, external reading practice was brought into the analysis, considering *external* as outside classroom/laboratory. Because if the experiment positively changed the behavior of children towards reading books, probably that variable would explain, at least in part, the significant level variation in experimental group.

The problem with external reading practice is quite obvious: it is a variable that is very difficult to measure. It was, then, arbitrarily quantified by book borrow counting on each

month on the school library. This is hardly a reliable measure nowadays, but given that the experiment was conducted on a poor neighborhood with no public library around for the children to have access to, it was taken as a reasonable measure of external reading practice.

So a repeated ANOVA test was performed over the book borrow data from March to November (there were no borrows for the other months). A planned contrast was run along with the ANOVA procedure so the book borrows before the experiment (March to August, 6 months) could be compared to the book borrows during the experiment (September to November, 3 months). Also, it was verified if the book borrowing behavior changed *within* subjects for at least one of the groups – this was done by checking if the interaction term *Time (month) x Treatment* was significant. The three following hypothesis were verified:

H3-0: the mean March-August book borrows is equal to the mean September-November book borrow for both groups.

H4-0: the mean March-August book borrows is equal to the mean September-November book borrow within control group.

H5-0: the mean March-August book borrows is equal to the mean September-November book borrow within experimental group.

Table B.2 summarizes the repeated ANOVA results:

Effect	**p-value**
month	< 0.001*
month: mar-aug v sep-nov	> 0.1*
treatment:month: mar-aug v sep-nov	0.0523

Table B.2: Repeated ANOVA Test Output Overview

The test was significant for individual month effect ($p < 0.001$), which means only that there is at least one month in which the book borrows where different from the other months – an obvious result that requires no post-hoc analysis.

The test was not significant for March-August to September-November months comparison ($p > 0.1$) and, for this, **H3-0** was **accepted**. It was also not significant for time/treatment interaction ($p = 0.0523$), always considering the planned contrast, so **H4-0** and **H5-0** were **accepted** without further post-hoc analysis.

The results suggested that, even thought the book borrow behavior changed among different months, the intervention had no effect over it. In other words, within experimental group, book borrow mean from March to August did not change as compared to September to November. The same stands for control group.

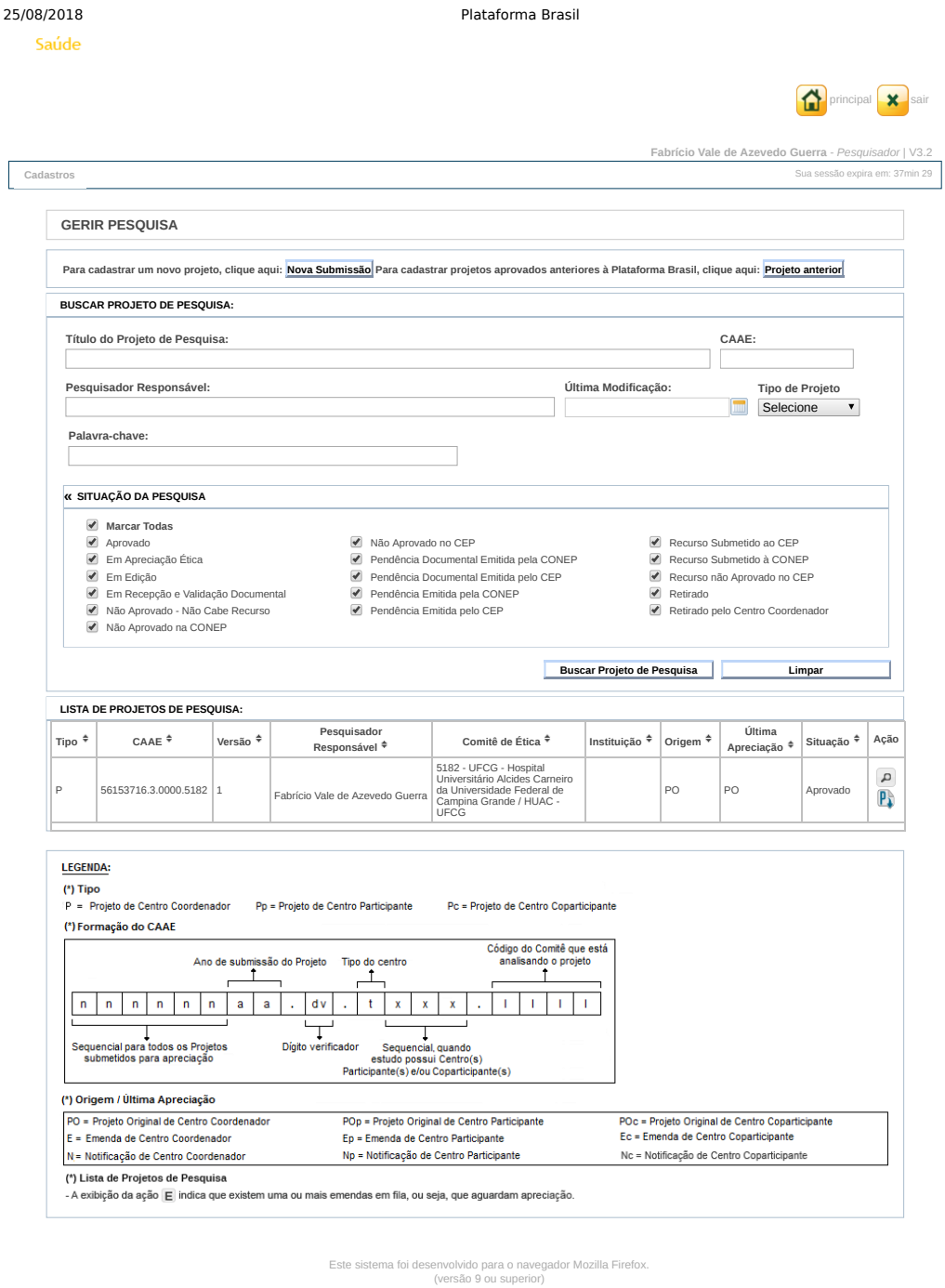
These results were, along with the **rejection of H2-0**, another evidence that the experimental treatment *caused* observed level differences between groups. And they answer another research question: Does reading digital books in zReader affects reading paper books?

And the answer is negative, based on the rejection of **H3-0**. Analyzing the children's behavior in this scenario may be tricky. Even thought it would be a great result if zReader sessions were associated with more paper reading in the experimental group, not being associated with less paper reading is already a reasonably good result, because except for two children who got stuck in SKey games for the entire experiment, they all (from experimental group) were reading texts/stories almost weekly, but in the mobile devices. So the overall reading may have been greater for experimental group children, and this must be subject for further investigation in future experiments.

Appendix C

Ethics Committee Related Documents

C.1 Government Page Snapshot



25/08/2018 Plataforma Brasil

Saúde

principal sair

Fabrício Vale de Azevedo Guerra - *Pesquisador* | V3.2

Cadastros

Sua sessão expira em: 37min 29

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BUSCAR PROJETO DE PESQUISA:

Título do Projeto de Pesquisa: CAAE:

Pesquisador Responsável: Última Modificação: Tipo de Projeto Selecione

Palavra-chave:

« SITUAÇÃO DA PESQUISA

Marcar Todas
Aprovado
Em Apreciação Ética
Em Edição
Em Recepção e Validação Documental
Não Aprovado - Não Cabe Recurso
Não Aprovado na CONEP
Não Aprovado no CEP
Pendência Documental Emitida pela CONEP
Pendência Documental Emitida pelo CEP
Pendência Emitida pela CONEP
Pendência Emitida pelo CEP
Recurso Submetido ao CEP
Recurso Submetido à CONEP
Recurso não Aprovado no CEP
Retirado
Retirado pelo Centro Coordenador

Buscar Projeto de Pesquisa Limpar

LISTA DE PROJETOS DE PESQUISA:

Tipo	CAAE	Versão	Pesquisador Responsável	Comitê de Ética	Instituição	Origem	Última Apreciação	Situação	Ação
P	56153716.3.0000.5182	1	Fabrício Vale de Azevedo Guerra	5182 - UFCG - Hospital Universitário Alcides Carneiro da Universidade Federal de Campina Grande / HUAC - UFCG		PO	PO	Aprovado	

LEGENDA:

(*) Tipo

P = Projeto de Centro Coordenador Pp = Projeto de Centro Participante Pc = Projeto de Centro Coparticipante

(*) Formação do CAAE

Ano de submissão do Projeto
Tipo do centro
Código do Comitê que está analisando o projeto
n n n n n n a a . dv . t x x x . l l l l
Sequencial para todos os Projetos submetidos para apreciação
Dígito verificador
Sequencial, quando estudo possui Centro(s) Participante(s) e/ou Coparticipante(s)

(*) Origem / Última Apreciação

PO = Projeto Original de Centro Coordenador	POp = Projeto Original de Centro Participante	POc = Projeto Original de Centro Coparticipante
E = Emenda de Centro Coordenador	Ep = Emenda de Centro Participante	Ec = Emenda de Centro Coparticipante
N = Notificação de Centro Coordenador	Np = Notificação de Centro Participante	Nc = Notificação de Centro Coparticipante

(*) Lista de Projetos de Pesquisa

- A exibição da ação E indica que existem uma ou mais emendas em fila, ou seja, que aguardam apreciação.

Este sistema foi desenvolvido para o navegador Mozilla Firefox. (versão 9 ou superior)

C.2 Full process

HOSPITAL UNIVERSITÁRIO ALCIDES CARNEIRO / UNIVERSIDADE FEDERAL DE

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Estudo Longitudinal Sobre Efeitos da Tecnologia Sobre a Leitura em Crianças do Ensino Fundamental

Pesquisador: Fabrício Vale de Azevedo Guerra

Área Temática:

Versão: 1

CAAE: 56153716.3.0000.5182

Instituição Proponente: UNIVERSIDADE FEDERAL DE CAMPINA GRANDE

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 1.638.175

Apresentação do Projeto:

Este trabalho tem por contexto os vários problemas de leitura e escrita envolvendo crianças no ciclo de alfabetização e objetiva testar e quantificar eventuais efeitos positivos do uso de programas de produção de animações computacionais, neste público, sobre seu desempenho em testes padronizados de compreensão textual e de escrita.

Objetivo da Pesquisa:

Objetivo Primário:

São 2 os objetivos primários deste estudo, em face das questões de pesquisa delineada. O primeiro objetivo é o de melhorar a capacidade de leitura das crianças através da utilização dos programas de software produzidos para as práticas didáticas e o segundo é o de melhorar a capacidade de escrita das crianças, também através da utilização dessas tecnologias.

Objetivo Secundário:

Como desdobramento dos objetivos primários traçados, este trabalho apresenta os seguintes objetivos secundários: - aferir o quanto as soluções

melhoraram o desempenho das crianças, tanto em relação à leitura quanto à escrita (o chamado "effect size")- verificar a validade da estratégia

Endereço: Rua: Dr. Carlos Chagas, s/ n
Bairro: São José **CEP:** 58.107-670
UF: PB **Município:** CAMPINA GRANDE
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C.3 Full process

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Continuação do Parecer: 1.638.175

utilizada para a construção dos programas computacionais utilizados nas práticas didáticas

Avaliação dos Riscos e Benefícios:

Riscos:

Não há riscos às crianças neste experimento.

Benefícios:

- Melhoria na expressão oral, entonação e decodificação grafema/som (em virtude das dublagens, em especial)- Melhoria da capacidade de
abstração (em virtude da possibilidade de construção/visualização dos eventos descritos nos textos) - Melhoria na capacidade de leitura e escrita
(pelo conjunto das proposições);

Comentários e Considerações sobre a Pesquisa:

Trata-se de um trabalho interessante, que visa a melhorar a capacidade de leitura e escrita
das crianças através da utilização dos programas de software produzidos para as práticas didáticas.

Considerações sobre os Termos de apresentação obrigatória:

Foram apresentados:

Folha de rosto devidamente assinada;
Declaração de compromisso do pesquisador responsável, devidamente assinada, de anexar os resultados da pesquisa na Plataforma Brasil;
Declaração de Divulgação dos resultados;
Projeto;
Termo de Consentimento Livre e Esclarecido;
Autorização das instituições a ser realizada a pesquisa;

Recomendações:

Sempre definir os riscos, constrangimento ou outro imprevisível.
Adequar o cronograma ao parecer do CEP.

Conclusões ou Pendências e Lista de Inadequações:

Projeto de pesquisa adequado a Resolução nº 466/ 2012 em seus aspectos éticos.

Endereço: Rua: Dr. Carlos Chagas, s/ n
Bairro: São José **CEP:** 58.107-670
UF: PB **Município:** CAMPINA GRANDE
Telefone: (83)2101-5545 **Fax:** (83)2101-5523 **E-mail:** cep@huac.ufcg.edu.br

C.4 Full process

HOSPITAL UNIVERSITÁRIO ALCIDES CARNEIRO / UNIVERSIDADE FEDERAL DE

Continuação do Parecer: 1.638.175

Considerações Finais a critério do CEP:

O Colegiado acata o parecer APROVADO do relator em reunião realizada em 15 de julho de 2016.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_677019.pdf	17/05/2016 04:45:28		Aceito
Projeto Detalhado / Brochura Investigador	projeto_detalhado_final.pdf	17/05/2016 04:38:01	Fabrício Vale de Azevedo Guerra	Aceito
Declaração de Instituição e Infraestrutura	TermoAnuenciaMFernandes_Assinado2.pdf	12/05/2016 16:21:19	Fabrício Vale de Azevedo Guerra	Aceito
Outros	CV_Nazineide_Brito.pdf	02/05/2016 00:00:14	Fabrício Vale de Azevedo Guerra	Aceito
Outros	CV_Monilly_Ramos.pdf	01/05/2016 23:59:33	Fabrício Vale de Azevedo Guerra	Aceito
Outros	CV_Dalton_Dario_Serey_Guerrero.pdf	01/05/2016 23:58:12	Fabrício Vale de Azevedo Guerra	Aceito
Outros	CV_Jorge_Cesar_Abrantes_Figueiredo.pdf	01/05/2016 23:56:35	Fabrício Vale de Azevedo Guerra	Aceito
Declaração de Instituição e Infraestrutura	TermoAnuenciaSPLab_Assinado.pdf	01/05/2016 23:10:38	Fabrício Vale de Azevedo Guerra	Aceito
Declaração de Instituição e Infraestrutura	TermoAnuenciaSantaTeresinha_Assinado.pdf	01/05/2016 23:10:14	Fabrício Vale de Azevedo Guerra	Aceito
Declaração de Instituição e Infraestrutura	TermoAnuenciaLente1_Assinado.pdf	01/05/2016 23:09:05	Fabrício Vale de Azevedo Guerra	Aceito
Declaração de Instituição e Infraestrutura	TermoAnuenciaLabCog_Assinado.pdf	01/05/2016 23:07:41	Fabrício Vale de Azevedo Guerra	Aceito
Declaração de Instituição e Infraestrutura	TermoAnuenciaBGinane_Assinado.pdf	01/05/2016 23:05:43	Fabrício Vale de Azevedo Guerra	Aceito
Declaração de Pesquisadores	TermoCompromissoDivulgacaoResultados_Assinado.pdf	01/05/2016 23:01:05	Fabrício Vale de Azevedo Guerra	Aceito
Declaração de Pesquisadores	TermoCompromissoPesquisadores_Assinado.pdf	01/05/2016 23:00:12	Fabrício Vale de Azevedo Guerra	Aceito
TCLE / Termos de Assentimento /	TCLE_pais.pdf	01/05/2016 22:57:22	Fabrício Vale de Azevedo Guerra	Aceito

Endereço: Rua: Dr. Carlos Chagas, s/ n
Bairro: São José **CEP:** 58.107-670
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Telefone: (83)2101-5545 **Fax:** (83)2101-5523 **E-mail:** cep@huac.ufcg.edu.br

C.5 Full process

HOSPITAL UNIVERSITÁRIO ALCIDES CARNEIRO / UNIVERSIDADE FEDERAL DE

Continuação do Parecer: 1.638.175

Justificativa de Ausência	TCLE_pais.pdf	01/05/2016 22:57:22	Fabrício Vale de Azevedo Guerra	Aceito
Folha de Rosto	folhaDeRostoAssinada.pdf	26/04/2016 09:19:44	Fabrício Vale de Azevedo Guerra	Aceito

Situação do Parecer:
Aprovado

Necessita Apreciação da CONEP:
Não

CAMPINA GRANDE, 15 de Julho de 2016

Assinado por:
Januse Nogueira de Carvalho
(Coordenador)

Endereço: Rua: Dr. Carlos Chagas, s/ n
Bairro: São José **CEP:** 58.107-670
UF: PB **Município:** CAMPINA GRANDE
Telefone: (83)2101-5545 **Fax:** (83)2101-5523 **E-mail:** cep@huac.ufcg.edu.br

Appendix D

Pilot Study: Cognitive Evidences

In order to investigate possible cognitive activities that may be associated with the results regarding improved reading skills in children using zReader, a pilot study was performed comparing attention levels of two children.

The purpose of the study was not to draw definitive conclusions but to delineate potential further investigations that must be subject of a proper follow-up experiment. Precisely, we wanted to observe brain attention metrics, in two different readers, while reading the same text in zReader and in paper.

D.1 Participants

A 3rd grade reader that participated on a previous experiment in the experimental group and a 3rd grade reader that participated in the same previous experiment in the control group were selected based on their score on a standard reading test [56]: the top score child from each group was selected for this pilot study.

D.2 Experiment

We collected brain attention metrics once a second with low-cost non-intrusive EEG hardware BrainLink Pro[1]. The hardware provides attention levels, from 0 to 100, based

[1] http://neurosky.com/2017/06/introducing-the-brainlink-pro-an-eeg-headset-for-those-with-mental-wellness-on-their-mind/

on actual brain waves measured by its sensors.

Control child read a text on paper while using the hardware and attention data was collected by a third party mobile application connected to the hardware via bluetooth.

Experimental child also read the same text, with the same text properties (font, color and size), but in a CPuz session. Again, attention data was collected by a third party mobile application connected to the EEG hardware via bluetooth. Attention when reading text in the text screen of CPuz was tagged differently from attention when playing the game parts of CPuz.

In sum, 3 sets of data were collected: attention from control child while reading text in paper, attention from experimental child while reading text in CPuz and attention from experimental child while playing CPuz.

D.3 Results

The attention levels collected from experimental reader were greater than the ones collected from control reader, as depicted in Figure D.1. The red line represents control child attention levels and the green line represents experimental child attention levels over time (in seconds). It is interesting to note that experimental child took more time to read the text, still keeping greater overall attention levels – recall that attention levels while playing are not depicted in the Figure. The attention line for experimental child expresses attention while reading CPuz inner book pages.

All collected data sets may be visually compared to each other in Figure D.2, where notched box plots for **control (text)**, **exp. (text)** and **exp. (game)** are depicted.

By analyzing the confidence intervals denoted by the notches, it is clear that attention level confidence interval for **exp. (text)** is well above the corresponding confidence interval for **control (text)**, which is coherent with the scenario depicted in previous Figure.

Interestingly, confidence interval for **exp. (text)** was also well above confidence interval for **exp. (game)**. That is, experimental child paid more attention to the text parts of the game than to the game itself, and also paid more attention to the text than control child did.

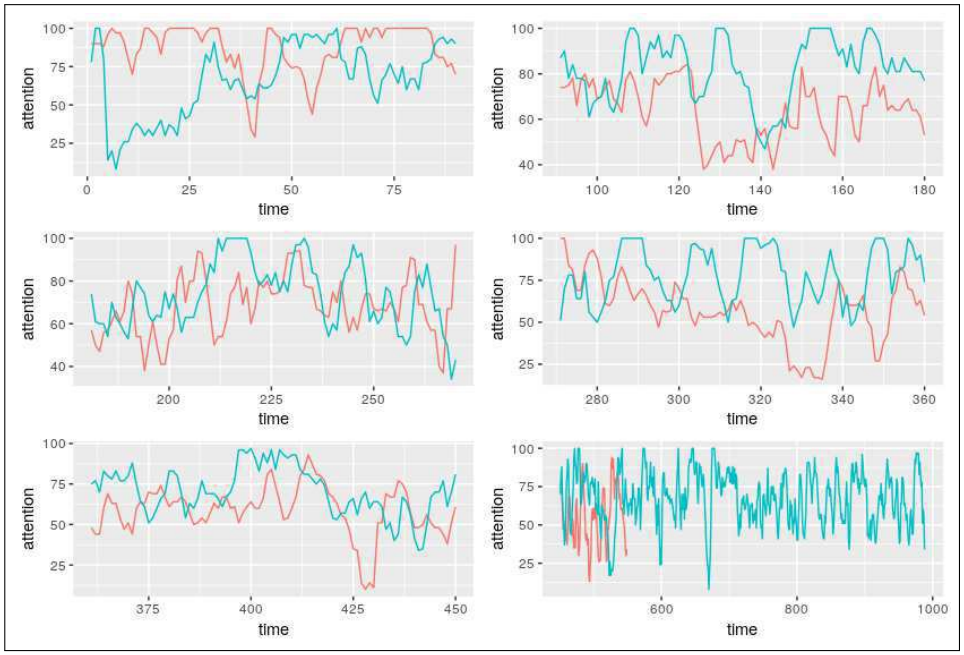

Figure D.1: Attention levels over time

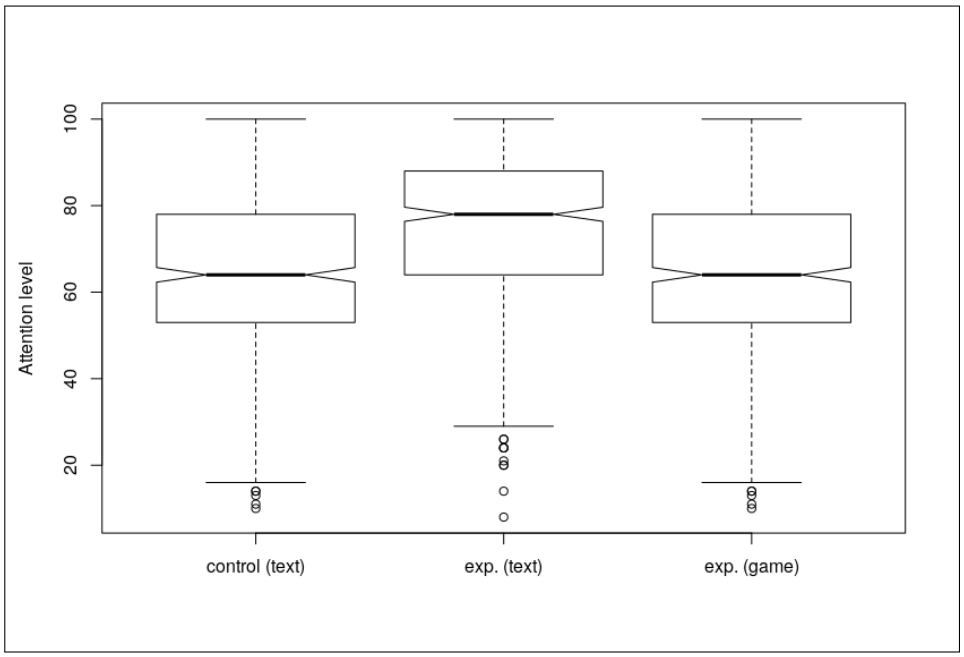

Figure D.2: Box plots for attention levels

D.4 Further investigation

One cannot state, by these initial results, of course, that zReader help focusing child attention into the inner text of its game. By now, one can only state that this was the case for that particular experimental group child.

In the same sense, one cannot state, by these initial results, that a zReader trained child shows more attention levels to a text than a non-trained child reading in paper. By now, one can only state that this was the case for two particular children in that particular moment.

Nevertheless, these somewhat speculative results, these particular and informal observations are important for they delineate research questions for a future experiment, with a bigger sample size and with inferential properties analysis.

Appendix E

Best Practices for zReader Sessions

Too many subjective observations were made during zReader sessions and some of them are discussed in this Appendix. They were not part of any formal data analysis but we find them useful for any researcher or teacher interested in using zReader games with children in educational environments.

E.1 Prosody

Even though we could not formally observe children's prosody (their pattern of intonation and stress according to punctuation marks and word constitution), it was quite clear that their evolution in that matter was considerable. It was easily perceived by the ears of researchers and teachers involved in the experiment.

In early recording sessions, a "plain decoding" of text dialogues was quite common for almost all children, even for those with good reading skills.

The research team always asked for the right emphasis on punctuation marks, providing examples of how to interpret the lines according to them. Many children just ignored periods, exclamation and interrogation marks, and none of them knew how different would a line ending with ellipses be pronounced as compared with the same line ending with a single dot.

The context in which the children dubbed the dialogues made it easy to explain them how they should pronounce the lines. Because they had already read a story and knew about character's humor. So, it is not just about stressing the right words in a special way, it's about stressing the right words in a special way considering the text marks and characters' humor.

An interrogation mark, for instance, forces a particular stress on the last word of the line for Portuguese language. But the whole interrogation line may be said with anger, irony or joy, depending on the story.

There is not a formal procedure for teachers and researchers, however. It was a very informal experience, the one concerning children's prosody. Basically, we just asked them to repeat some text dialogues, explaining the right way to pronounce the lines.

E.2 "Leave those kids alone"

Is is impossible to perform complete zReader sessions inside a common classroom sized space with good results in terms of final cartoons. There is a simple reason for that: tablet microphones capture a wide range of sounds, including ambient sounds and, with many children dubbing stories in the same room, there are lots of incidental voices from different children into stories from each other. There are some possibilities to prevent this kind of problem.

1. Make zReader sessions group sessions. About 77 percent of children that used zReader claimed to prefer using the software in group, against nearly 11 percent of children that claimed to prefer playing alone. One possible reason for this result was that all the stories have more than one character.

2. Use mobility features. Dubbing the narratives is their moment, so let children go to different places in school in order to perform this task without anyone to disturb them. Places where different children dubbed cartoons during experimental sessions include: computer labs, classrooms, ordinary empty rooms, open air playgrounds, school libraries, teacher's room etc. If they have any doubts about what to say, they will come back and ask.

3. if there is not a lot of space available, consider buying specific microphones that avoid ambient sounds. Remember, making the cartoon *is* the game reward for them, so research/educational team must prepare the conditions for this process. If the cartoons are noisy, children may be less motivated to play new sessions.

E.3 "Empty spaces" are room for creativity

Always - always! - encourage children to speak all the time while recording animation pieces - provided that what they say have something to do with the story and/or characters.

Common places for "empty spaces" - animations intervals without any voice being heard - are text dialogues and ordinary actions.

When any action is being performed - a character is walking or two characters are fighting, for instance - children can dub freely any thought or dialogue they can improvise. Some children actually improvised a "soundtrack" in some of these moments.

The text dialogues should always be read the way they are written in the balloons, because they are meant to improve reading fluency. But skilled children very often finish a given text balloon some seconds before it disappears from screen, leaving an empty space in the animation. In this case, they are encouraged to add some improvised lines to continue with the dialogue until the balloon disappears from screen. Less skilled children mostly repeat the recording so they can finish reading just before the balloon disappears.

E.4 Informal levels

There are different sized stories in zReader (for TVid and CPuz), and children in 2nd and 3rd grades are meant always to begin with TVid games.

Some narratives are text-dialogue independent – that is, their dialogues are all made with image dialogues and there is no need to read text when recording these stories. Also, these stories are smaller than other stories – they have less words.

It is important to make zReader sessions gradual in terms of text sizes for it will provide a better experience for the children.

Always begin with text-dialogue independent TVid games, as if they were a first "internal level". If a child shows no problem in playing these simpler stories, he/she can move to TVid games with narratives containing only small text dialogues – their inner narratives will also be relatively small, but the child will have to perform some reading during recording session. Next, the child can play TVid games with bigger text dialogues, for their inner narratives will also be bigger in size. Finally, if a child shows no problem in playing this latter "internal

level", he/she can move to playing CPuz games.

E.5 Movie sessions

Movie sessions are sessions in which children's cartoons are played with the help of a media projector and a speaker. There is no game playing in movie sessions – it is meant for children to watch the cartoons they had previously produced.

Children laugh a lot and have a lot of fun in these sessions but, of course it is meant for motivating and involving children with the whole idea of playing zReader sessions rather than actually developing any of their reading skills.

One very important point for teachers and/or researchers to be aware of: do not make movie sessions until there are cartoons with the voice of all children. Also, avoid playing the same story over and over again with different children making the voices.

E.6 Collective sessions

Some experiences were made in private schools with collective sessions where the teacher played one zReader session with all the students. These collective sessions were well popular with children but they do required some extra hardware, a different session dynamics and, of course, teacher training. However, in the end of each collective session, the teacher had a cartoon in the construction of which all of his/her students participated.

The hardware required – besides the Android tablet with zReader – are: a media projector, a device capable of mirroring the screen of the tablet in the projector (we used a Chromecast), a speaker and a wireless microphone. The microphone must be connected to the speaker and the projector sound must also be connected to the speaker.

The session dynamics are as follows:

1. the teacher explains briefly the story that will be read;
2. the teacher randomly chooses one child to read the current page of a TVid/CPuz game;
3. the chosen child reads the page (from the projector) in the wireless microphone;

4. the teacher randomly selects another child to decide on the right choice for the text just read. If it is a TVid game, the teacher plays the two options, asks for the right one and asks for an explanation (why not the other one?). If any other student disagrees, he/she can say it. If it is a CPuz game, the teacher asks the chosen child which concept should be touched until the child chooses one option. If any child in the class disagrees on the choice made, he/she can say it.

5. steps 2, 3 and 4 are repeated until all the text is read. The game, then, moves to a Record Room session;

6. the teacher plays the current piece of animation to be recorded and randomly selects children to play the involved characters;

7. selected children leave their chairs and go recording in front of the class until they are satisfied with the recording. All other children must make silence;

8. the teacher moves to the next animation piece to be recorded;

9. steps 6, 7 and 8 are repeated until all animation pieces are recorded

Considering a 10 page CPuz/TVid story (common zReader stories are way bigger) with only 2 characters (often, there are way more), the teacher could have a final cartoon where every other child participated by either reading, choosing or voicing even if the class had 40 students (Brazilian alphabetizing classes are smaller than that, generally speaking). The selection does not really need to be random, the teacher can choose according to the skills of his/her students. It is important to always choose a child that have not yet participated in the collective session.

It is possible to adapt the dynamics to SKey collective sessions. No tests were made with theses games on this type of sessions, however.

Appendix F

Narratives

Many narratives were written and/or adapted from existing stories – some of theses created by famous authors like Antoine de Saint-Exupéry or by children involved in parallel experiments. Other narratives were taken from children's text books exactly as they were written. All the texts were in Portuguese language and we present here, for copyright reasons, only the ones that were created/adapted by the researcher and the children involved.

F.1 A Mala

Original text by Fabrício Guerra.

Havia uma janela bem alta.

E uma grande mala apareceu nela.

Aí veio um pato.

E tentou derrubar a mala com uma faca.

Depois veio um tatu.

E tentou derrubar a mala com um copo.

Uma vaca também foi por lá.

Jogou uma boneca na mala, mas a mala nem se mexeu.

O gato chegou e pulou, mas também não derrubou.

Jogou uma gaveta e nada.

Jogou uma peteca e nada.

Então, parou, pensou e teve uma ideia.

Botou uma mola debaixo da janela.

O gato jougou a vaca sobre a mola, a mola jogou a vaca pra cima, a vaca bateu na mala e a mala caiu.

Tiraram um sapato da mala e jogaram fora.

Tiraram uma pipa da mala e jogaram fora.

Tiraram um ovo, mas também jogaram fora.

Até que tiraram uma salada.

Sendo que apareceu um ratinho e toumou a salada da vaca e do gato.

O rato disse que ia comer a salada sozinho e saiu correndo com ela.

F.2 As Três Amigas

Original text by Mariana and by Fabrício Guerra, adapted from a **story** by Mariana.

As amigas de Marina eram Camila e Lulu. Elas foram ao cinema assistir ao filme "As Vampiras".

Quando elas saíram do cinema, Lulu, estava morrendo de medo.

Marina, então falou:

- Camila, você gostou do filme?

E Camila respondeu:

- Sim, Marina. Por quê? Você não?

E Marina continuou:

- Eu sim, mas parece que Lulu teve medo.

Lulu, então respondeu:

- Eu mesmo não, mas tenho que ir agora que minha mãe já chegou.

E Lulu danou o pé na carreira.

No outro dias as 3 amigas foram para a praia brincar um pouco.

Lulu perguntou:

- Migas, para onde vocês vão nas férias?

Marina respondeu:

- Ora, Lulu! Vou para a casa de minha tia na Disney.

Camila, por sua vez, disse:

- Pois eu vou para a China e para o Japão.

E Lulu, impressionada, concluiu:

- Ai, migas, como vocês são chiques!

Quando chegaram as férias Lulu encontrou Marina e Camila em frente à Ilha de Santana.

Achou estranho e foi logo dizendo:

- Ei, Marina, você não ia para a Disney não?

Marina, meio sem jeito, respondeu:

- Mulher, tá só faltando energia lá na Inglaterra, aí eu desisti de ir.

Lulu ficou desconfiada:

- Mas a Disney não é nos Estados Unidos não?

E Marina, sem saber bem o que dizer, disse:

- Não sei, só sei que foi assim.

Lulu continuou estranhando a situação:

- E você, Camila? Não ia para a China?

Ao que Camila respondeu:

Menina, eu acabei de chegar de lá...

Lulu não desistiu de pegar a amiga na mentira:

- Mas leva bem dois dias de avião daqui para a China, e eu vi você hoje de manhã. Como foi essa viagem?

Camila, também sem saber o que dizer, disse:

- Não sei, só sei que foi assim.

Lulu percebeu que ia ser uma mentira atrás da outra. E lembrou que ela própria também tinha mentido quando disse que não teve medo do filme das vampiras. Disse, por fim:

- Migas, vamos brincar no parque daqui de Caicó que dá mais futuro.

E as 3 amigas deram boas risadas.

F.3 Asa Verde e a Bruxa do Mar

Text by Yasmin and by Fabrício Guerra, adapted from a **story** by Yasmin.

Em uma noite escura, Asa Verde estava voando pelo céu.

Foi quando ela ouviu um grito vindo de um prédio:

- Socorro!

Asa Verde viu que se tratava de uma senhora gritando e foi ver o que tinha acontecido.

Perguntou, então:

- O que foi, senhora?

E a senhora respondeu:

- Alguém feriu minha filha e a levou embora para o mar.

Asa Verde tranquilizou a pobre senhora:

- Não se preocupe! Eu sou Asa Verde, e Asa Verde sempre pega o vilão!

Asa Verde saiu voando ligeiro.

Mas, na pressa, acabou até esquecendo para que direção tinha que ir.

Voltou e perguntou à senhora.

Esta indicou-lhe o caminho do mar e Asa Verde partiu na direção certa.

A filha da mulher do prédio chorava sentada à beira da praia, junto à Bruxa do Mar.

Foi quando Asa Verde chegou por lá.

A Bruxa disse:

- Ora, ora! Minha velha inimiga Asa Verde!

E as duas começaram a brigar.

A Bruxa do Mar atacou com seu poder de água duas vezes, mas Asa Verde desviou dos ataques.

Aí a Bruxa deu uma voadora e derrubou Asa Verde, mas a heroína rapidamente se levantou.

Então a Bruxa foi pra cima dela novamente, mas desta vez Asa Verde deu um mortal para trás e derrubou a vilã.

Depois disso usou seu poder do sol mesmo na cabeça da Bruxa do Mar, queimando seus cabelos.

A inimiga levantou-se, reconheceu a derrota e ainda lamentou o estado de seus cabelos:

- Eu tinha acabado de fazer uma chapinha...

Asa Verde disse:

- Quero nem saber, Bruxa do Mar. Asa Verde sempre pega o vilão!

E levou a Bruxa embora, voando.

Quando chegou de volta no prédio, Asa Verde largou sua inimiga e disse para a senhora:

- Pronto, a Bruxa do Mar não vai mais incomodar a senhora.

A senhora tentou dizer alguma coisa:

- Sim, mas...

Entretanto, Asa Verde a interrompeu, dizendo:

- Não precisa me agradecer, Dona Maria. Só não esqueça que Asa Verde sempre pega o vilão.

E saiu voando dali.

E a pobre da senhora ainda gritou com cara de chôro:

- Mulher, eu queria era minha filha!!!

F.4 As Duas Amigas

Original text by Fabrício Guerra.

Chica Galêga e Rita Gasguita eram duas grandes amigas.

Certa vez elas estavam sentadas na calçada enquanto brincavam com seus celulares.

- Rita Gasguita, vamos jogar no celular - disse Chica Galêga.

- Chica Galêga, eu acho melhor ver desenho no youtube - respondeu Rita Gasguita.

Foi quando chegou João Mandão, o menino mais chato da cidade.

João Mandão, que tinha esse apelido porque queria mandar em todo mundo, foi logo dizendo:

- Ei, podem sair do meio da calçada que eu quero passar!

As meninas logo se levantaram.

- E por que a gente tem que sair, João Mandão? - perguntou Chica Galêga.

- Porque Franciscleiton Ernestus disse que era pra todo mundo de obedecer! - respondeu João.

- E a gente deve nada a esse tal de Francis não sei o que? - perguntou mais uma vez Chica Galêga.

João Mandão ficou danado de raiva. Disse que elas iriam ver só o que ele ia fazer.

Aí ele meteu o grito por Franciscleiton Ernestus.

Sendo que Franciscleiton era, na verdade, um cachorro enorme que pertencia a João. O animal logo atendeu ao chamado e se aproximou de seu dono.

E assim que ele chegou, João foi logo falando pras meninas:

- Me obedeçam, se não eu mando Franciscleiton Ernestus pegar vocês.

Mas o menino não sabia era que Rita Gasguita estudava mágica.

E que levava sempre sua varinha para resolver qualquer problema.

Ela, então, disse o seguinte encanto:

- Varinha, varinha, grande amiga minha... transforme o cachorro numa galinha.

Aí, assim que ela disse o encanto, um raio azul saiu da varinha, bateu no cachorro e o transformou numa grande galinha.

Coitado de Franciscleiton. Ao perceber em que tinha se transformado, caiu no chôro.

Vendo o que aconteceu, João Mandão ficou com mais raiva ainda e disse:

- Eu vou acabar com vocês duas, Chica Galêga e Rita Gasguita!

Sendo que Rita não estava pra brincadeira com João. Ergueu a varinha e fez outro encanto:

- Varinha, varinha, do meu coração, transforme o menino num feio sapão.

E, ligeiro, o menino se transformou num enorme sapo.

Chica Galêga, vendo aquele sapo do tamanho de um menino na frente dela, disse pra sua amiga:

- Mulher, mas eu morro de nojo de sapo!

Rita, que também tinha nojo de sapo, bem ligeiro respondeu:

- Eu também, mulher. é que na hora da mágica eu nem pensei nisso.

E as duas, morrendo de medo do sapo, danaram o pé na carreira e sairam dali.

João Mandão agora estava mais para João Sapão. Mas, vendo que elas tinha ido embora, disse, todo feliz:

- Hahaha eu sabia que elas iam me obedecer e sair da calçada. Vamos, Franciscleiton.

E os dois saíram andando pela calçada.

Franciscleiton triste por ter virado galinha sem ter nada a ver com a briga de João com as meninas.

E João feliz.

Para ele, só o que importava era que ele mandasse e os outros obedecessem.

F.5 A Velha e o Lobo

Text by Fabrício Guerra, adapted from **fable** by Esope.

Uma senhora e seu neto estavam dentro de casa, no meio da floresta. O menino chorava muito e sua avó pedia que ele parasse de chorar.

Não muito longe dali dormia o Lobo. Ele não comia nada havia muito tempo e estava morrendo de fome. Chega remexia as pernas enquanto dormia e sonhava com um pedaço de carne...

Não demorou muito para que o choro do menino o acordasse.

- Melhor eu ir ver o que é isso - pensou o Lobo.

Curioso e faminto, ele andou até a janela da casa onde a senhora estava com seu netinho.

Lá do lado de fora, ouviu a velhinha repreendendo o menino:

- Se você não parar de chorar, eu deixo o lobo levá-lo, de noite.

O Lobo ficou feliz com a possibilidade de poder levar o menino e matar sua fome, mas ainda estava de dia. Então, ele voltou para o lugar onde estava dormindo.

E ficou esperando até anoitecer. Enquanto esperava, só conseguia pensar em devorar a pobre criança.

Depois que a noite finalmente veio, ele pensou consigo:

- Já está de noite. Agora é só eu ir buscar o moleque.

E caminhou novamente até a casa.

Aí começou a chamar pela velhinha até que ela aparecesse.

Foi quando ela saiu e perguntou:

- O que o senhor quer aqui, Seu Lobo Mau?

O Lobo respondeu:

- Vim buscar seu neto. A senhora disse que, de noite, eu podia levar.

E a vovozinha disse, finalmente:

- Pois o senhor vai ver o que é que o senhor vai levar.

Em seguida ela puxou ligeiro uma arma e apontou-a para o Lobo.

Ele chega arregalou os olhos de tão surpreso que estava! Quem diria que aquela bondosa velhinha seria braba daquele jeito?

E bem ligeiro meteu o pé na carreira, morrendo de medo de levar bala.

E a vovozinha gritou:

- Venha pra cá, caba safado, pra você ver o que é bom!

Ela ainda deu uns dois tiros para assustar ainda mais o Lobo.

Depois de muito correr, o animal escondeu-se atrás de uma árvore e disse, revoltado:

- Nan... Naquela casa o povo diz uma coisa e faz outra.

F.6 Bruce Lindo e o Robô Azul

Original text by Fabrício Guerra.

Bruce Lindo era um lutador de caratê que só andava sem camisa. Certa vez, ele estava caminhando sozinho pela floresta.

Um Robô Azul extra-terrestre, então, chegou também por lá.

O Robô provocou Bruce Lindo.

Este respondeu levantando o braço.

Bruce Lindo soltou um raio azul no Robô e ele foi bater longe, muito longe.

Saiu rolando e rolando pelo chão até parar perto de uma árvore.

O lutador ficou foi rindo da situação. Quem era aquele robô feio para desafiá-lo? Ele lá tinha medo de robô...

Mas, pouco tempo depois, o Robô se levantou com sede de vingança.

Ele, então, lançou um raio mágico na direção de Bruce Lindo.

Quando chegou perto do lutador, o raio mágico transformou-se num pequeno cachorro. Bruce Lindo ficou confuso.

Pensou então, em ir lá perto do cachorro e alisar sua cabeça.

Mas, para sua surpresa, o cachorrinho aplicou-lhe um golpe mortal.

Bruce Lindo chega rodou no ar, tanta foi a força do movimento.

Ele se levantou, morrendo de medo, e danou-se na carreira.

Contunuava sem medo de robôs.

Mas nunca mais quis chegar nem perto de um cachorrinho.

F.7 O Menino, o Urubu Vermelho e a Raposa

Text by Fabrício Guerra, adapted from **fable** by Esope.

Uma família vivia no meio da floresta.

Certo dia, a mãe ia entrando com seu filho em casa.

Como já era hora do almoço, ela disse que ele fosse comer uma coxa de frango que estava sobre a mesa.

Mas o garoto tinha, em sua consciência, um diabinho que sempre o aconselhava errado.

Então o tal diabinho apareceu e foi logo dizendo pra ele ir jogar no celular.

Mas acontece que ele também tinha um anjiho que sempre o aconselhava certo.

O anjiho apareceu e disse que ele fosse comer, conforme sua mãe havia pedido.

O menino ficou na dúvida: alomoçar ou ir jogar no celular? fazer o que ele achava divertido ou o que a mãe disse para ele fazer?

Na dúvida, ele decidiu que comeria o frango depois. Sentou-se ao chão, puxou o celular e começou a jogar.

Sendo que o frango que sua mãe fez estava delicioso e o cheiro se espalhou pelo ar.

E se espalhou tanto que chegou ao nariz de um urubu vermelho que descansava sobre o galho de uma árvore.

O urubu vermelho, que já estava com fome, ficou com mais fome ainda ao sentir o cheiro do frango assado.

Pensou logo em ir comê-lo para tirar a barriga da miséria.

E, assim, ele voou em direção à casa do menino.

Ao chegar lá, entrou pela janela, doido pela deliciosa coxa de frango.

Logo a pegou com o bico e fugiu antes que o menino pudesse fazer alguma coisa.

E o moleque, vendo que ficaria sem seu almoço, danou-se a chorar.

Nosso faminto urubu vermelho levou, então, a comida para o galho da árvore. O pobre bicho não tinha mãos, então tinha que segurar o osso pelo bico mesmo.

Assim que ele chegou de volta ao galho, uma esperta raposa o viu.

Ela também estava com fome. Mas, como não sabia subir em árvore, ficou pensando em alguma maneira de roubar a comida do pássaro antes que ele comesse.

E a raposa, de besta, não tinha nada. Começou ligeiro a elogiar o urubu vermelho.

Disse que ele era um animal maravilhoso e que deveria cantar, porque sua voz com certeza era a mais bonita da floresta.

O urubu acreditou nas palavras da raposa. Ficou envaidecido e se achando um verdadeiro cantor.

Aí ele começou a cantar.

Só que, para cantar, ele teve que abrir o bico.

E a coxa de frango, que ele segurava justamente pelo bico, caiu ao chão.

A raposa, esperta, foi lá e comeu tudo.

E ainda riu da cara do pobre urubu vermelho antes de ir embora.

O urubu, coitado, ficou morrendo de raiva.

Raiva da raposa, que pegou sua comida.

E raiva de si mesmo, por ter acreditado nos elogios enganosos da raposa.

F.8 O Fazendeiro, seu Filho e o Burro

Text by Fabrício Guerra, adapted from **fable** by Esope.

Um fazendeiro deixou seu sítio e foi andando junto com seu filho e seu burro, um atrás do outro.

- Vamos vender nosso burro no mercado, meu filho - disse o fazendeiro.

No meio do caminho eles encontraram algumas meninas. Quando elas viram os três andando um atrás do outro, caíram na risada.

Depois de muito mangar dos rapazes, uma das meninas disse:

- Já viram que bobos? Andando a pé, quando deviam montar no burro.

O fazendeiro chega ficou vermelho de vergonha.

Olhou pro seu filho e disse:

- Monte no burro, pois não devemos parecer ridículos.

O menino, ligeiro, pulou para cima do burro e os três seguiram seu caminho. O pai ia a pé, enquanto o filho ia montado sobre o animal.

Mais adiante eles encontraram dois velhos irmãos fazendeiros, que também caíram na risada quando os avistaram.

- Aí vai um exemplo de geração moderna - disse um velho.

- O rapaz muito bem refestelado no animal, enquando o velho pai caminha com suas pernas fatigadas - disse o outro velho.

O fazendeiro resolveu dar ouvidos aos dois velhos e disse ao seu filho: - Talvez eles tenham razão, meu filho. Ficaria melhor se eu montasse e você fosse a pé.

O menino, então desceu do burro, para que o pai montasse. E asssim os três seguiram em frente, o pai montado no burro e o menino a pé.

Foi então que eles encontraram duas camponesas de vestidos vermelho e branco. E elas também caíram na risada ao avistá-los.

Uma foi logo dizendo: - A crueldade de alguns pais para com os filhos é tremenda.

E a outra complementou: - Aquele preguiçoso muito bem instalado no burro, enquanto o pobre filho gasta as pernas.

E mais uma vez o pai deu ouvidos à opinião dos outros. Disse para o menino: - Suba na garupa, meu filho. Não quero parecer cruel.

Ele fez o que o pai mandou, e os dois seguiram viagem montados no burro, que não gostou nada da história.

Quando eles chegaram mesmo de frente para o mercado, encontraram dois vaqueiros. Os vaqueiros também caíram na risada ao avistá-los.

- Oh! Pobre burro maltratado carregando carga dupla - disse um dos vaqueiros.

- Deviam carregar o burro às costas em vez de este carregá-los - disse o outro.

O fazendeiro mais uma vez resolveu dar ouvidos aos outros. Ele e seu filho, então, desceram do burro e levaram o animal nas costas.

O burro, dessa vez, achou foi bom.

Quando eles finalmente entraram no mercado, o povo todo que tava lá caiu na risada. Porque não tinha cabimento um burro montado sobre duas pessoas. Aí o fazendeiro jogou o animal no chão e foi embora com seu filho.

E o burro ficou rindo e pensando:

- Caba besta! Queria agradar a todo mundo e terminou não agradando a ninguém.

F.9 O Grande Monstro Vermelho

Original text by Fabrício Guerra.

Dois amigos que viviam brigando, Maurinélson e Disneylândio, iam juntos para a escola.

Foi quando avistaram várias pessoas jogando lixo no Açude do Recreio: tinha homem, mulher e até mesmo um ninja japonês.

De tanto o povo jogar porcaria nele, o açude já estava todo poluído. Lá debaixo d'água, os peixes comiam lixo e morriam.

Um desses peixes, entretanto, sofreu uma mutação extraordinária ao ter contato com o lixo.

Ele transformou-se num enorme monstro vermelho, com duas garras que mais pareciam bocas com dentes bem afiados.

Ao se transformar, o monstro foi logo saindo das águas.

E saiu brabo, fazendo medo a tudo e a todos.

Entrou numa caverna que tinha por ali por perto e tudo quanto é animal saiu correndo de lá, todos morrendo de medo do assutador animal desconhecido.

Já na cidade, um rapaz que andava de muleta, quando viu o bicho, jogou a muleta fora e correu em disparada. E Bruce Lindo, o famoso lutador de caratê? Foi tentar enfrentá-lo mas se deu mal, muito mal. O monstro deu-lhe uma mãozada com suas garras de dentes que o pobre do Bruce Lindo ficou só a caveira.

Enquanto isso os dois amigos bricavam na praça que fica em frente à escola deles.

Maurinélson era muito habilidoso para jogar bola e estava fazendo embaixadinhas quando Disneylândio gritou:

- Toque a bola pra mim!

Maurinélson, chateado, meteu uma bolada na cabeça do amigo e ainda fez graça, dizendo:

- Toquei.

Aí Disneylândio meteu o grito pela professora deles:

- Tiiiiiia! Maurinélson deu uma bolada em mim.

A professora veio até eles e Maurinélson se fez de santo:

- Foi culpa minha não, Tia.

E a professora, pra acabar com a conversa, mandou que eles fossem os dois para dentro da escola.

Mas, antes mesmo que os meninos fossem para lá, o monstro apareceu.

A professora e os outros alunos danaram o pé na carreira, deixando apenas os dois amigos briguentos por ali. Quando o monstro aproximou-se, Disneylândio ficou morrendo de medo. Mas, na hora em que ele ia ser devorado, Maurinélson o salvou. Eles correram e jogaram duas latas de lixo no monstro, mas ele as comeu e ainda ficou maior e mais forte.

Maurinélson e Disneylândio conseguiram despistar o monstro arrodiando o prédio da escola.

Disneylândio, que estudava muito e era um menino muito inteligente, propôs um plano para ele e o amigo salvarem a todos.

Enquanto isso, lá no centro da cidade, o monstro destruía tudo. Já tinha botado fogo em prédios e casas, quando chegou uma viatura da polícia. Ele a pegou com a garra e bateu no chão até que o policial que a dirigia fugisse.

Mas, eis que uma bola futebol atinge a parte de trás da cabeça do monstro. Ele se vira morrendo de raiva e avista os dois amigos.

O monstro parte em direção aos meninos e Maurinélson, que segurava uma grande lata de lixo, a joga em direção ao vilão. Ele a devora da mesma forma como havia devorado as outras.

Sendo que, dessa vez, ele não só encolhe, como se transforma novamente num inofensivo peixinho vermelho. Ou seja: o plano de Disneylândio deu certo!

Chegando em casa, Maurinélson encontrou sua avó.

- Isso é hora de chegar da escola, Seu Maurinélson?

- Mas vó, eu tava salvando o mundo de um monstro vermelho que virou peixe.

- E eu quero você com negócio de salvar o mundo, menino? Você vá é estudar!

Aí ela saiu correndo atrás do neto. E Maurinélson, incompreendido herói que derrotou um terrível monstro junto com seu amigo, acabou a história correndo para não levar uma pisa de sua rigorosa avó.

F.10 O Leão Apaixonado

Text by Fabrício Guerra, adapted from **fable** by Esope.

Estava o Leão caminhando pela floresta quando viu passarem duas moças.

- Feiosas! - disse ele.

Eis que apareceu, então, uma terceira moça.

Era Lindonéia, filha de um bravo e esperto caçador, e ela deixou o nobre Leão completamente apaixonado:

- Eita que gata! Quero casar com ela!

O animal, então, apressou-se em declarar seu amor:

- Oh, Lindonéia, bela das mais belas, case-se comigo.

Lindonéia apaixonou-se na mesma hora pelo já apaixonado Leão.

Mas o pai dela, que estava ali por perto, não gostou nada da história:

- Nada de casamento! Lindonéia, passe já pro seu quarto!

Ela ficou com raiva do pai, mas obedeceu.

Mas o Leão ficou foi brabo.

Caminhou até o pai da moça, mostrou suas garras, seus dentes afiados e perguntou com ironia:

- É mesmo? Não tem nada que eu possa fazer pro senhor mudar de ideia?

O pai pensou um pouco e sugeriu ao animal:

- Minha filha tem medo das garras e dos dentes afiados... Se o senhor os arrancasse...

O Leão, cego de amor e paixão, nem pensou duas vezes.

Correu dali e foi ligeiro arrancar dentes e garras.

Ao voltar, disse:

- Pronto, Seu Zé. Arranquei tudo. Posso casar com sua filha agora?

Ah, Leão besta. Nem percebeu a armadilha em que se meteu.

É que sem os dentes e as garras, ele não fazia medo a ninguém.

Aí o homem pegou um pedaço de pau e pôs o animal para correr.

Ainda chegou por lá a avó da moça, que era uma velhinha muito braba: - Cadê? Cadê aquele caba safado, meu filho? - Já botei ele pra correr, mamãe - respondeu o homem. Então a velhinha foi embora, danada de raiva.

E o Leão, coitado, ficou com o coração partido.

Perdeu a cabeça, por amor.

E acabou perdendo também os dentes e as garras.

F.11 Humanos x Nobs

Text by Fabrício Guerra, Lucas and Ricardo, adapted from a **story** by Lucas and Ricardo.

Era uma vez uma ilha perdida no meio do mar.

Um menino, chamado Steve, e seus dois amigos, chamados Ricardo e Lucas, foram levados pela corrente marítima até lá, num enorme tronco de árvore.

Steve disse:

- Lucas, Ricardo, estamos perdidos.

E Lucas respondeu:

- Estamos sim, Steve.

Ricardo, então, deu uma ideia:

- Vamos procurar recursos para sobreviver.

E os três amigos saíram a explorar a ilha.

A primeira coisa que encontraram foi um estranho cachorro vermelho.

Lucas logo aproximou-se do animal, mas foi repreendido por Ricardo:

- Lucas, é melhor não mexer com esse cachorro.

Steve concordou:

- é Lucas. Ele pode ser brabo. E tem outros ali atrás.

Mas Lucas não quis nem saber. Respondeu aos amigos:

- Vocês tão é com invejo porque o bichinho gostou de mim.

E começou a alisar a cabeça do cachorro enquanto dizia:

- Chegue, Totó. Chegue...

Mas o cachorro selvagem não gostou nada desse alisado e botou os três amigos para correr de lá.

O tempo passou e os meninos conseguiram montar um acampamento, mas Ricardo estava preocupado com a segurança deles depois de quase foram mordidos pelo cachorro vermelho. Ele disse:

- Steve, faça umas espadas pra gente. Precisamos nos proteger.

Steve respondeu:

- Deixe comigo, Ricardo.

Enquanto Steve saía, Ricardo disse para Lucas:

- E você, Lucas, nada de mexer com nenhum animal.

Lucas, desconsolado, respondeu:

- Eu ainda acho que ele gostou de mim...

Mas o que os amigos não sabiam era que a ilha era mal-assombrada pelo espírito do Herobrine.

Um dia eles andavam com as espadas que Steve fez quando avistaram um Nob, um esqueleto usando uma lança.

Assim, que os viu, o esqueleto lançou sua arma na direção de Lucas, que usou a espada para se salvar.

Foi quando Steve gritou:

- Vamos matar esse esqueleto!!!

Sendo que o espírito do Herobrine apareceu do nada e, com sua magia, fez mais três esqueletos armados de espadas enormes. Ricardo e Steve gritaram:

- Guerra! Lucas disse que teve uma ideia e saiu correndo dali. Steve e Ricardo ficaram foi com raiva, pois teriam que encarar os esqueletos sozinhos.

E a briga de espadas começou. Os esqueletos atacaram mas os meninos se defenderam bem.

Então os esqueletos atacaram mais uma vez e conseguiram tirar as espadas de Ricardo e Steve.

Eles imploraram para que os esqueletos não os matassem, mas os esqueletos nem ligaram.

Mas eis que chega Lucas. Ele tinha ido atrás dos cachorros vermelhos, porque lembrou que cachorro adora osso. De fato, os cães estavam correndo para pegar Lucas, mas quando avistaram os nobs, mudaram de ideia e foram pegá-los. Os amigos agradeceram.

- Valeu, Lucas!

- Você salvou a gente!

Lucas, todo feliz e convencido, respondeu:

- Eu disse a vocês. Os animais me adoram...

Aí o espírito do Herobrine apareceu de novo e fez os 3 amigos desaparecerem da ilha.

E eles foram transportados mesmo para a frente da escola. A professora deles os avistou e foi lá brigar com eles:

- E isso é hora de sair da escola?

Os meninos se defenderam, tentaram explicar a ilha, o esqueleto, o espírito, mas foi tudo em vão, porque a professora não acreditou em nada.

- Passem já para a sala todos os 3 e deixem de conversa!

E os 3 amigos entraram na escola. Felizes pela aventura, tristes porque ninguém ia acreditar.

F.12 O Lobo e o Cordeiro

Text by Fabrício Guerra, adapted from a **fable** by Esope.

O Cordeiro caminhava perto de um riacho seco quando viu o Lobo aproximar-se.

O Lobo, doido para devorar o Cordeiro, tentou arranjar uma briga:

- Andando no meu riacho sem minha permissão! Muito bonito pra sua cara, cordeirinho!

O cordeiro respondeu:

- Não, Seu Lobo. Eu não tô nem pisando no riacho do senhor.

E o Lobo insistiu em acusar:

- Tá não, mas foi você que sujou a água dele!

O Cordeiro tornou a se defender:

- Mas, Seu Lobo, dizem que esse riacho tá seco faz mais de cinco anos. Como eu poderia sujar a água de um riacho sem água?

E o Lobo não desistia de arrumar confusão:

- Tá seco porque você bebeu a água dele todinha! Caba safado!

Enquanto o Cordeiro não desistia de argumentar:

- Mas eu não tinha nem nascido quando o riacho secou. Tenho apenas três anos de idade.

Impaciente por não encontrar nenhuma razão justa para brigar com o cordeiro e devorá-lo, o Lobo disse:

- Meu amigo, deixe de conversa que eu vou devorar você de qualquer jeito!

Aí ele pegou o pobre cordeiro e o devorou sem nenhuma pena.

Porque, para os malvados, qualquer desculpa vale para praticar suas maldades.

Ou até mesmo nenhuma desculpa.

F.13 Lloyd e o Jogo Real

Text by Fabrício Guerra and Sérgio Luiz, adapted from a **story** by Sérgio Luiz.

Lloyd era uma criança de 10 anos, um menino magro e corajoso.

Certa vez ele passava em frente à escola quando alguns valentões, mais velhos e mais fortes, começaram a zombar dele.

- Ah bicho magro - disse o primeiro.

- Parece um calango com 15 dias de fome - continuou o segundo, enquanto o terceiro caía na risada.

Lloyd ficou muito triste, até com vontade de chorar e foi embora dizendo consigo mesmo:

- Eu queria ser grande e forte que nem os meninos.

Quando ele chegou em casa aconteceu uma coisa muito estranha. Misteriosamente, um portal surgiu e estava sugando seu pai, que segurava a mão de Lloyd para se salvar.

Já quase soltando as mãos do filho, o pai disse:

- Filho, nunca esqueça: seu maior poder é ser você mesmo!

Já sem forças, soltou as mãos e foi tragado pelo portal.

Lloyd, que amava muito seu pai, disse:

- Tenho que ir salvar meu pai!

E pulou bem alto para alcançar o portal e ser sugado por ele também.

Lloyd foi transportado para outro mundo, e antes que pudesse pensar duas vezes o Homem Vídeo-Game aproximou-se e disse:

- Esse é um jogo real. Você precisa vencer o chefão do Level 3 para salvar seu pai. Você pode fazer um avatar aqui no controle.

O homem estendeu uma de suas mãos de controle e Llloyd fez seu avatar. E fez maior e mais forte que ele próprio, parecido com os meninos que provocaram ele mais cedo. O homem disse:

- Ah avatar feio dos infernos! Se quiser voltar ao normal, diga seu nome de trás pra frente.

Mas Lloyd não quis.

Ele foi direto pro Level 1, que era o Level "o chão é lava".

Ele escapou de um enorme pterodáctilo que tentava pegá-lo, mas a lava não deixava

Lloyd passar.

Aí ele teve uma ideia: abaixou-se e quando o pássaro passou, ele pulou, pegou em seu pé, e foi voando com ele por cima da lava.

O enorme pássaro-dinossauro deixou Lloyd no Level 2, que era o Level da selva.

O Robô Azul veio correndo lhe dar uma cabeçada, mas nosso herói livrou-se dele.

- Vem que tem e não vai faltar ninguém - disse Lloyd, com muita confiança.

Aí veio o Homem Nervoso pra cima dele, mas Lloyd deu-lhe um super-soco tão certeiro que seu adversário voou longe.

Chegando ao Level 3, Lloyd avistou seu pai sentado e imóvel.

Não demorou para aparecer o chefão, o grande ET Vermelhão.

- Desista enquanto pode, moleque.

- Eu vou salvar meu pai, seu cara de camarão!

Lloyd começou a bater no monstro, mas seus socos e chutes não surtiam efeito.

- Faz nem cócegas - disse o chefão, antes de derrubar o herói com dois murros.

Lloyd, então, teve uma ideia: disse seu nome de trás pra frente e ficou com seu corpo normal, magrinho, mas extremamente rápido. Iria vencer o monstro com a inteligência e agilidade que ele sempre possuiu, em vez de com a força bruta de seu avatar.

Em seguida, ele provocou Vermelhão:

- Duvido você me pegar.

O ET ficou com tanta raiva que partiu pra pegar Lloyd, mas agora ele estava muito rápido e escapou pulando por cima do vilão.

Logo em seguida o monstro saltou sobre o menino, mas este escapou passando por baixo. Atrapalhado, o chefão acabou caindo com a cabeça no chão e ficou desacordado. Antes que ele levantasse, Lloyd correu e tocou em seu olho negro, que era o ponto fraco do monstro. Ele desapareceu logo depois e Lloyd venceu o Level 3.

O Homem Vídeo-Game, então, apareceu e reanimou o pai, que estava sentado sem perceber nada do que acontecia.

O pai correu até Lloyd e lhe deu um forte abraço em agradecimento.

Ao se abraçarem, os dois fizeram abrir um portal que os transportou de volta pra casa.

Já tranquilo e de volta à vida real, o Pai perguntou a Lloyd:

- Obrigado, meu filho. Mas como foi que você me salvou?

E nosso herói, por fim, respondeu:

- Eu seugui seu conselho, Pai. O meu maior poder foi ser eu mesmo.

F.14 O Macaco e o Besouro

Text by Raquel and Fabrício Guerra, adapted from a **story** by Raquel.

Era uma vez um Macaco que viu um Besouro em cima de seu cacho de bananas, lá no alto de uma bananeira. O Macaco, com muita raiva, mandou o Besouro sair de lá.

O Besouro, que era muito danado, nem ligou para a raiva do Macaco e ainda lhe deu a língua, o que deixou o Macaco com mais raiva ainda.

Então ele ameaçou jogar uma chinela na cabeça do Besouro se ele não saísse de cima das bananas.

Mas o Besouro fez foi dizer que ele era um animalzinho muito brabo e que não tinha medo do Macaco.

Aí foi que começou a confusão. O Macaco pegou ligeiro uma chinela vermelha e foi pra debaixo do pé de banana, mas o Besouro ficava andando dum lado pro outro só pra atrapalhá-lo.

Então o Macaco resolveu pular, mas o Besouro foi mais esperto e ficou voando pra que a chinelada não pegasse nele.

Vendo que o Macaco nao tinha conseguido dar a chinelada, o Besouro sentou novamente sobre as bananas e ficou foi rindo da cara dele.

Mas o dono das bananas não desistiu. Saiu dali e voltou dentro de um robô gigante.

O Macaco controlava o robô de dentro dele, e fez com que o grande rabo de metal disparasse fogo no pobre Besouro, que ficou com a cabeça pegando fogo e saiu voando atrás de água pra apagar.

Depois disso, o Macaco saiu de dentro do robô e pegou uma banana na árvore.

Pegou também uma água mineral dentro do robô.

Comeu um pouco da banana.

E bebeu um pouco da água, feliz da vida porque conseguiu fazer o Besouro ir embora.

F.15 Dois Amigos Incomuns

Text by Fabrício Guerra and Heitor, adapted from a **story** by Heitor.

Um certo dia o Escorpião estava sozinho na floresta.

O Rinoceronte ia caminhando e o encontrou.

Com medo de ser esmagado, o Escorpião disse:

- Me mate não, Doutor Rinoceronte, que eu sou pai de família. Tenha pena de minhas três filhinhas: Estefaneide, Veroclilda e Romanozilda.

O Rinoceronte, muito bondoso, sorriu e resolveu não machucar o pequeno escorpião vermelho.

Pulou por cima dele e seguiu sua jornada.

Algum tempo depois o Rinoceronte ia passando perto das três árvores gêmeas quando foi pego por uma rede que um caçador lançou.

O Caçador correu ligeiro pra perto do animal preso em sua rede. Ao chegar lá foi logo dizendo que estava com fome e que o Rinoceronte lhe serviria de jantar.

O Rinoceronte lembrou do que tinha acontecido entre ele e o Escorpião.

Resolveu, assim, apelar para a bondade do grande Caçador, dizendo-lhe:

- Me mate não, Doutor Caçador, que eu sou pai de família. Tenha pena de minhas três filhinhas: Astrocarla, Cristinícia e Greiciérica.

Sendo que o Caçador era um caba mau e não tinha pena de ninguém. Fez foi rir da desgraça do pobre Rinoceronte enquanto negava seu pedido de clemência.

Ele, então, virou-se e meteu o grito por seu mal-humorado cachorro Chicó:

- Chicó! Chicó! Venha me ajudar, caba preguiçoso da moléstia!

Chicó lançou uma corda sobre a rede e foi lá pra perto. Sendo que o Caçador fez foi ir embora e deixou o trabalho de levar o Rinoceronte apenas para seu cachorro.

Chicó não gostou nada desse negócio e gritou bem alto:

- E eu vou levar esse bicho desse tamanho sozinho, é? Vai-te embora, carniça!

O Caçador ouviu e voltou ligeiro com um facão do tamanho do mundo:

- Tá achando ruim, Seu Chicó? - esbravejou ele.

Chicó, que era mal-humorado mas não era besta, ao avistar o facão foi logo dizendo:

- Que nada, meu patrão. Rinoceronte é bicho maneiro. Quero é que o senhor pegue mais

dez pra eu levar tudin.

O Caçador se deu por satisfeito e foi embora.

E Chicó, coitado, foi arrastar o Rinoceronte sozinho, morrendo de raiva de seu dono.

Quando já estavam todos em frente à caverna do Caçador, o Escorpião correu até lá perto. O Caçador, morrendo de medo de levar uma ferroada, disse:

- Me mate não, Doutor Escorpião, que eu sou pai de família. Tenha pena das minhas três filhinhas: Pulcrita, Astrogilda e Hipocrizilda.

Mas o bravo animalzinho vermelho disse que não queria conversa com o Caçador porque sabia que ele planejava devorar seu amigo Rinoceronte.

Desesperado, o homem apelou para seu cachorro:

- Socorro, Chicó! Me salve!!!

Chicó veio, viu a situação toda e disse:

- Vai-te embora, carniça! Eu vou muito levar ferroada por sua causa!

E saiu correndo dali.

Em seguida, o Escorpião tascou uma ferroada no pé do Caçador, uma ferroada tão certeira que chega saiu sangue.

O Caçador, então, chorou e foi correndo procurar um hospital para tomar remédio contra o veneno.

E o Escorpião tirou a rede de cima do Rinoceronte, retribuindo a bondade que o Rinoceronte teve em não esmagá-lo quando o encontrou.

Os dois sorriram e se tornaram bons amigos, cada um ajudando o outro em qualquer situação.

F.16 Super-Carol

Text by Maria Isabel and Fabrício Guerra, adapted from a **story** by Maria Isabel.

Era uma vez uma menina chamada Carol. Ela e suas amigas queriam ir à sorveteria.

- Amigas, querem tomar um sorvete? - disse Carol.

- Mulher, só se for agora - respondeu uma amiga.

- Vamos pra sorveteiria, entao - sugeriu outra amiga.

E as três foram andando em direção à sorveteiria.

Foi quando Carol percebeu que dois ladrões estavam atrás delas.

Suas amigas ficaram morrendo de medo.

Mas Carol acalmou suas amigas. Ela não tinha medo de nada, pois tinha super-poderes para duelar contra os bandidos e ajudar suas amigas a chegar à sorveteria.

Quando os bandidos se aproximaram, começaram logo a rir das meninas, o que deixou Carol muito braba.

Ela então usou sua super-velocidade. Foi para as costas de um deles e usou seu super-raio, dando um choque tão grande que o bandido correu, amedrontado.

Suas amigas ficaram malhando do ladrão que saiu correndo.

Carol olhou, em seguida, para o segundo vilao. E disse:

- Agora é a sua vez, bandido feio.

O bandido implorou, de joelhos, para que a heroína não lhe fizesse nada.

Mas Carol usou seu sopro congelante, que levou o malfeitor para longe como se fosse uma folha de papel voando pelo vento.

Uma de suas companheiras exclamou:

- Arrasou, amiga!

E Carol disse:

- Agora vamos tomar nosso sorvete.

E se foram as três para a sorveteria e viveram felizes para sempre.

F.17 O Destemido Super-Força e Seu Amigo Raio

Text by Fabrício Guerra and Mateus, adapted from a **story** by Mateus.

Era uma vez um super-heroi chamado Super-Força e seu arqui-inimigo, o Doutor Destruidor.

Doutor Destruidor era um vilão muito forte, vestido numa armadura de pedra, que saía brigando com todo mundo. Brigou com um menino que estava brincando na rua, brigou com um policial, brigou ate com as árvores e o sol.

Já Super-Força era um menino muito forte mas não saía brigando com as pessoas sem razão. Ele estava tranquilo em sua base, jogando seu celular, quando ouviu os gritos das pessoas perseguidas pelo vilão.

- Isso é um trabalho para o Super-Força - disse o herói.

Ele saiu da base e encontrou logo o Doutor Destruidor:

- Eu vou acabar com você!

O vilão respondeu:

- Jamais! Eu vou atacar você, Super-Força!

Foi aí que o Super-Força começou a brigar com o Doutor Destruidor. Doutor Destruidor tentou agarrá-lo duas vezes, mas Super-Força é muito ágil e conseguiu escapar das garras do malfeitor.

Em seguida, o vilão jogou uma estrela da morte na direção do herói, mas este usou seu poder magnético para jogar a estrela de volta. Ela bateu no peito do Doutor Destruidor mas não aconteceu nada por causa da armadura de pedra.

- Hahahaha! Isso é tudo que você sabe fazer, Super-Fracote?

A piada enfureceu Super-Força, que deu uma super-voadora em Doutor Destruidor. Mas a armadura de pedra era muito resistente e o herói foi jogado pra trás sem causar nenhum ferimento ao vilão.

- Hahahaha! Fez nem cócegas! - riu o Doutor Destruidor.

- Pois eu vou chamar meu amigo Raio! Venha Raio! - respondeu Super-Força.

Raio desceu voando do céu para ajudar na luta contra o vilão.

- Que tal brigar com alguém do seu tamanho, Professor Destruidor - disse Raio.

Doutor Destruidor, que odiava quando não o chamavam de Doutor, respondeu:

- Eu sou Doutor, seu Faísca miserável! Doutor! E vou chamar meu amigo Exterminador pra acabar com vocês!

E tratou de chamar seu amigo do mal.

Exterminador era um robô gigante e assustador, mas Raio não se amedrountou:

- Hahaha! E quem tem medo dessa lata de sardinha?

Exterminador não gostou nada do comentário e, pelos seus grandes olhos de laser, disparou contra Raio.

- Ei, isso doeu, seu gafanhoto enferrujado! - disse o herói. E disparou um super-raio contra Exterminador.

Os dois começaram então a disparar um contra o outro. Enquanto isso Doutor Destruidor disparava estrelas da morte contra Super-Força.

Ele mais uma vez usou seu poder magnético para parar as estrelas. Mas, se jogasse contra o Doutor, as estrelas bateriam na armadura de pedra e cairiam no chão novamente.

Aí o herói usou a inteligência e jogou as estrelas nos olhos do Exterminador, justamente de onde saía o laser que ele estava disparando em Raio. As estrelas explodiram quando bateram nos olhos de laser e o Exterminador não conseguiu mais disparar. Raio e Super-Força caíram na gargalhada e Exterminador saiu correndo.

Unidos, Super-Força e seu amigo Raio derrotaram o parceiro do vilão, Exterminador.

Foi quando o Doutor Destruidor disse:

- Eu vou é sair daqui!

Super-Força ainda soltou uma piada pro vilão.

Em seguida, o prefeito da cidade resolveu premiar Super-Força e Raio com dois troféus mas, na hora em que ia entregá-los, Doutor Destruidor reapareceu, tomou os troféus, e disse:

- Prontos para a revanche?

Super-Força disse:

- Eu estou pronto - e completou antes de sair voando: - Vem, Raio!

Raio voou bem rápido e conseguiu chegar perto do Doutor Destruidor e disse:

- Esse é o seu fim, Vereador Destruidor!

Deu um murro nele e recuperou os troféus. Doutor Destruidor saiu voando e girando pelo céu de tão forte que foi a pancada, morrendo de raiva porque, mais uma vez, não tinha sido chamado de Doutor.

Eles voltaram para a cidade com os troféus e o prefeito disse:

- Agora, como prefeito, eu decreto que todo mundo vai viver feliz para sempre!

E Raio disse:

- Eu fico só imaginando onde estará o Pintor Destruidor numa hora dessas...

Naquele momento, o vilão ainda estava rodando pelos céus, e rodou tanto que saiu do planeta Terra e caiu sentado na Lua.

De lá, ficou gritando enquanto gesticulava com o braço:

- É Doutor, seu Faísca dos infernos! Doutor Destruidor!

F.18 Super-Giovana

Text by Maria Clara and Fabrício Guerra, adapted from a **story** by Maria Clara.

Era uma vez uma menina chamada Giovana. Num dia especial, Giovana estava indo à escola. Ao chegar na escola, ela falou:

- Bom dia, Tia Marcele.

- Bom dia, Giovana.

Giovana chegou em casa e foi brincar. Quando ela não estava sentindo o chão, ela estava voando.

- Eu estou voando, Mãe.

- Oi, filha.

- Mãe, eu estou voando.

- Como assim, filha?

- Mãe, olhe para os meus pés!

- é verdade, filha. Acho que você é uma Super-Heroína.

Dois anos depois...

- Mãe, vou ali salvar o mundo.

- Tá certo, filha. Mas termine o dever de casa primeiro.

E assim foi indo.

Todo dia era a mesma coisa. Quando gritavam, ia ajudar.

Cansou de fazer a mesma coisa, então, ela decidiu fazer algo diferente, tipo ir ao parque e outros cantos.

Certo dia ocorreu um problema bem grande na cidade: dois vilões bem maus!

Os vilões criaram um robô gigante, o Robô Mau.

Super-Giovana se juntou a uma equipe de heróis, então os heróis criaram um robô do bem.

E ele salvou a cidade, enfrentando o Robô Mau.

E todos os heróis ganharam um troféu e todos foram uma grande equipe e todos viveram felizes para sempre.

F.19 Super-Nathália e sua Amiga Ana Alice

Text by Nathália and Fabrício Guerra, adapted from a **story** by Nathália.

Era uma vez uma menina chamada Nathália. Ela estava no sítio Serrote Verde, que pertence à sua avó.

Nathália percebeu que estava com muita força.

Sua amiga Ana Alice foi montar num cavalo e, quando começou a cavalgar, o cavalo a derrubou.

Ela disse:

- Socorro! Socorro!

E Nathália respondeu:

- Não se preocupe, amiga, que eu levo você pra casa.

Ela levou Ana Alice para a casa do sítio. Ana Alice agradeceu e Nathália disse que ela não saísse de lá.

Em seguida, Nathália saiu pra resolver uns problemas no sítio.

Ana Alice, muito teimosa, saiu da casa, foi andar perto do açude e caiu dentro dele, sendo que ela não sabia nadar.

Passando por lá, uma pessoa ouviu um grito:

- Me ajude!

- Não posso pois agora tenho que ir cuidar das vacas.

Ela já estava quase se afogando, quando Nathália passou perto do açude.

- Ana Alice, eu disse pra você não sair de casa!

- Sim, mas eu queria conhecer o sítio...

- Era só ter me falado.

- Mulher, dá pra você me salvar primeiro e conversar depois?

Nathália ajudou sua grande amiga e levou-a para conhecer o sítio.

F.20 O Super-Papai

Text by Filipe and Fabrício Guerra, adapted from a **story** by Filipe.

Era uma vez um menino que se chamava Filipe.

Um certo dia ele foi à floresta, viu de longe uma caverna e ficou curioso.

Ele foi andando até a caverna para ver o que tinha dentro dela.

Ao entrar na caverna, ele viu uma cobra de duas cabeças.

Percebeu, então, que a cobra queria devorá-lo. Ficou morrendo de medo e gritou: - Socorro!!!

Seu pai ouviu o grito, lá da floresta. - Isso é um trabalho para o Super-Papai - disse ele.

E saiu correndo até a caverna.

Quando chegou lá, foi logo dizendo pra cobra que não tinha medo dela.

A cobra ficou enfurecida, porque não estava acostumada a ver ninguém com coragem de enfrentá-la.

Mas o Super-Papai pegou um pedaço de pau e lascou duas cacetadas na cobra. Uma em cada cabeça.

E depois ainda deu-lhe um chute tão forte que a cobra chega voou pra longe dali.

Aí o Super-Papai jogou o pedaço de pau fora e correu pra perto de seu filho, dizendo: - Nunca mais ande sozinho na floresta, meu filho, porque é perigoso.

E Filipe ficou muito feliz e abraçou o Super-Papai, seu verdadeiro herói.