

Materiality and evanescence in app-books: interactive digital books for children and obstacles to digital education

Alice Atsuko Matsuda

UNIVERSIDADE TECNOLÓGICA FEDERAL DO PARANÁ
ORCID: 0000-0003-3046-7317

Jaqueline Conte

UNIVERSIDADE TECNOLÓGICA FEDERAL DO PARANÁ
ORCID: 0000-0001-8879-3129

ABSTRACT

Based on the award-winning works in the Children's Digital category of the Jabuti Awards (2015-2017), this article highlights some of the challenges that digital books for children face, particularly so that they can become an alternative tool for literary education. Among these challenges are the actual materiality of these productions and the evanescence of the works. The article also comments on digital libraries, a new business model under development in Brazil, which has united some schools and digital literature. This work is based on discussions undertaken by several researchers, including Hayles (2002, 2009), Antonio (2011), Teixeira (2015), Corrêa (2016), Kirchof (2009, 2013), Ribeiro (2017), Frederico (2018), Morgan (2013) and Kommers (1996). The methodology used was exploratory with a bibliographical basis, comparative descriptions and immanent analysis of the award-winning works, as well as considerations based on interviews with stakeholders in this market.

KEYWORDS

children's digital books; app-books; materialities of literature; evanescence; digital libraries.

RESUMO

A partir das obras premiadas na categoria Infantil Digital do Prêmio Jabuti (2015-2017), este artigo pontua alguns dos desafios que se apresentam aos livros digitais para crianças, especialmente para que possam se tornar uma ferramenta alternativa para a educação literária. Entre esses desafios estão a própria materialidade dessas produções e a evanescência das obras. O artigo também comenta sobre as bibliotecas digitais, novo modelo de negócio em desenvolvimento no Brasil, que vem aproximando algumas escolas da literatura em meio digital. O trabalho fundamenta-se em discussões trazidas por diversos pesquisadores, entre os quais, Hayles (2002, 2009), Antonio (2011), Teixeira (2015), Corrêa (2016), Kirchof (2009, 2013), Ribeiro (2017), Frederico (2018), Morgan (2013) e Kommers (1996). A metodologia empregada consiste em pesquisa exploratória de base bibliográfica, descrições comparativas e apreciações de caráter imanente das obras premiadas; além de considerações a partir de entrevistas com agentes desse mercado.

PALAVRAS-CHAVE

livros digitais para crianças; app-books; materialidades da literatura; evanescência; bibliotecas digitais.

I. PRELIMINARY CONSIDERATIONS

This article presents a summarised and comparative analysis of certain characteristics of the e-book applications that won the Jabuti Award (Brazil), in the Children's Digital category, between 2015 and 2017, and sheds light on some important aspects of interactive digital literature for children: their materiality, which directly affects the production and access/consumption of these works, and their evanescence. These issues may represent obstacles to the expansion of digital literary education in the country, whether in a domestic or school environment. It also points to a new business model that has been developing in Brazil, working on bringing schools and digital literature together, namely digital libraries.

The work derives from research carried out to conclude the Master's Degree in Language Studies, at the Federal Technological University of Paraná (Conte, 2019), which included methodological tools, exploratory bibliographic research, comparative descriptions and immanent analysis of the winning works, in addition to considerations obtained from interviews with stakeholders in the Brazilian publishing market. The theoretical foundation of this article is mainly based on works by Katherine N. Hayles (2002, 2009), Jorge Luiz Antonio (2011), Deglaucy Jorge Teixeira (2015), Alamir Aquino Corrêa (2016), Edgar Roberto Kirchof (2009, 2013), Ana Elisa Ribeiro (2017), Aline Frederico (2018), Hani Morgan (2013), and Piet Kommers (1996).

The objects of study were 13 digital books awarded the Jabuti Award, the most traditional and widespread award in the Brazilian book market. The Award was created in 1958 by the Brazilian Chamber of Books (CBL), with the aim of recognizing quality works produced by authors, editors, illustrators and other professionals in the publishing market. In its 60 years of existence - until 2018 -, it had already granted 1,873 awards to more than 1,579 authors, in the 149 different categories that have been introduced and withdrawn over the decades.

In 2015, in its 57th edition, Jabuti established the Children's Digital category on an experimental basis, with the objective of rewarding "digital

books consisting of literary texts intended for children”¹. The initiative was inspired by the Bologna Ragazzi Digital Award, an award that had been instituted by the Bologna Children's Book Fair, in Italy, three years previously. The criteria for evaluating the Children's Digital category of the Jabuti Awards were language/code/thematic appropriateness to the age group of the target audience; contribution of interactivity reader /coding language to enriching the work; and originality and technical quality of images, audio, video and animations.

The Award category lasted for only three years, a period during which there was a significant drop in the number of applicants. In 2015, when registrations for books produced at any time were accepted, not just in the year immediately preceding the award, the category had 38 registrants; in 2016, there were 16 and, in 2017, only six. Possibly due to this fact and other objective and market factors (Conte, 2019), in the 60th edition of the Award, in 2018, when CBL removed or merged 11 categories, reducing them from 29 to 18, the Children's Digital category ceased to exist.

However, observing the competitors that ranked first, second and third in those three years, it is possible to outline what was being produced and considered of quality in the market for interactive digital books in Brazil, as well as point out the difficulties that this type of publication faces, especially so that it can become a viable alternative among the tools for literary education in a school environment.

The next section will provide an overview of the award-winning works.

II. THE AWARD-WINNING PUBLICATIONS IN THE CHILDREN'S DIGITAL CATEGORY

In 2015, the winners were *Meu aplicativo de Folclore (My Folklore App)*², by the renowned writer and illustrator Ricardo Azevedo (São Paulo: Ática, 2013), *Milky Way by Olavo Bilac*, by Samira Almeida and Fernando Tangi (São Paulo: StoryMax, 2014) and *Flicts*, the digital version of the classic printed book of the same title, by writer and illustrator Ziraldo (São Paulo: Melhoramentos, 2014). In 2016, *Tiny Great True Stories*, by Oamul Lu and Isabel Malzoni (Caixote, 2015), *Mãos mágicas (Magic hands)*³, by Tereza Yamashita and Suppa (SESI-SP, 2015) and *Chove chuva - Aprendendo com a natureza: sabedoria popular (It rains rain - Learning from nature: folklore wisdom)*⁴, by Magali Queiroz (São Paulo: Alis, 2015). In 2017, the winner was Itaú Kidsbook (Africa Agency,

1 As established by the regulations in the Guidelines for the 57th Jabuti Award, reproduced in Conte, 2019.

2 Our translation. This app does not have an English version.

3 Our translation. This app does not have an English version.

4 Our translation. This app does not have an English version.

2016), with five original digital works, developed on the Facebook Canvas platform; *Nautilus (Twenty Thousand Leagues Under the Sea)*, based on the original book by Jules Verne (StoryMax, 2016), by Maurício Boff and Fernando Tangi; and *So Many Butts!*, by Isabel Malzoni and Cecilia Esteves (Caixote, 2016).

Looking at these eight individual books and the collection of five titles that received awards in this period, we can see a number of similarities and differences, which allow for certain considerations to be made.

The first award-winning books in application format⁵ were based on texts or texts and illustrations originally created for printed works by renowned authors (Figure 1). The new productions used multimedia and interactivity to expand aesthetic possibilities and propose a new way of reading. Over the years, original texts received awards, but there were also attempts to reach new audiences with renowned classical texts (Figure 2). Although all works are original, having incorporated other techniques and other levels of reading when perceived and (re)created as digital interactive books, only the Itaú Kidsbook Collection (Figure 3) and the work *So Many Butts!* (Figure 4) originated from texts/plots and images entirely developed for the digital medium.

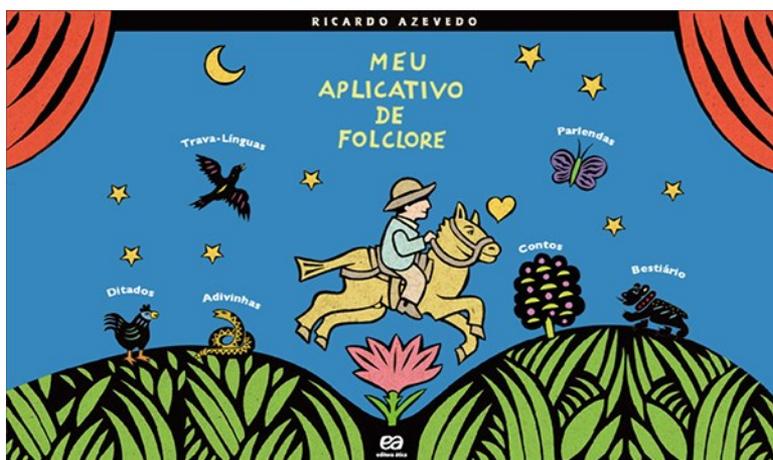


Figure 1. Home page of *Meu aplicativo de folclore (My Folklore App)*, winner of the first edition of the Children’s Digital category, with texts and illustrations by the renowned author Ricardo Azevedo (iPad screen capture)

⁵ According to Aline Frederico, “From a multimodal social semiotics perspective, literary apps are multimodal texts in which different modes of communication are orchestrated to convey a narrative” (2018: 25).



Figure 2. Movement sequence in the book *Nautilus*, version of the classic *Twenty thousand leagues under the sea* (iPad screen captures)



Figure 3. Home screen of the book *Flying bicycle* (Itaú Kidsbook Collection) and its continuation, with credits (iPhone screen capture)



Figure 4. Home menu of *So many butts!* (iPad screen capture)

Although they use multimediality and, in some cases, hypermediality⁶, and exploit new material formats and new resources, it cannot be said that Jabuti award-winning works were absolutely ground-breaking to the point of being disruptive.

It was noted that some works broke with linearity, to suggest multi-sequential navigation, while most followed a predetermined logic. Some provided extra pedagogical content (Figure 5), while others offered games and ludic activities aimed at entertainment. There were books that only offered simpler interactions – often slightly broadening the reading experience, while still very close to the printed version (Figure 6) – and works in which the user’s experience was based more on a logic of actual navigation to establish reading continuity (reactive interaction), rather than a truly mutual

⁶ It is worth mentioning here the difference between the concepts of multimedia and hypermedia. According to Kommers, “Hypermedia are computer-based applications for consulting multimedia information resources. The accessing of new information is equivalent to the previously described hypermedia method: clicking on relevant areas in texts; pictures; and video, animation, and sound fragments. (...) Hypermedia give a better idea how to use multimedia resources. Whereas, the term ‘multimedia’ indicates only that the variety in modalities of information is big, the term ‘hypermedia’ implicitly advocates how to access information elements and how to crisscross in information space. The spatial metaphor is typical for the complexity that arises in creating and using hypermedia”. (1996: 6) As Kirchof explains, the hypermediatic literature is hybrid and “based on multimedia resources that add different languages” (2009: 50). In short, we could say that the multimediality of a product is the characteristic of having elements from different kinds of media (illustration, photography, video, animation, sound, music, for example), while hypermediality is the use of computerized resources that provide access to these different media elements within the product, thereby interconnecting them.

interaction, where interaction directly affected the other⁷. Other books also made better use of the materiality of a digital book through exploiting certain features that enable greater interactions between the reader and the book. This includes, for example, the possibility of recording the reader's own narration (using the microphone from a mobile device to capture audio) and listen to it later (e.g., *Meu Aplicativo de Folclore [My Folklore App]* and *Tiny Great True Stories*, Figure 7). In addition, it may bring features for something different to occur in the scene, such as flying stars (from the sound of the user's breath, for example, such as in *Milky Way*, Figure 8). Others include varying effects caused by touching a screen, such as the ability to create a song by touching coloured keyboard keys (*Flicts*, Figure 9), or interactions such as moving the device, which was able to cause scenes to change simply by tilting the tablet or phone while reading. In the Kidsbook Collection, for example, children can use the gyroscope to explore a scene beyond that which appeared in the physical screen space (Figure 10); in *Milky Way*, the use of this gravity feature allowed elements of the scene to “fly” or move across the screen.

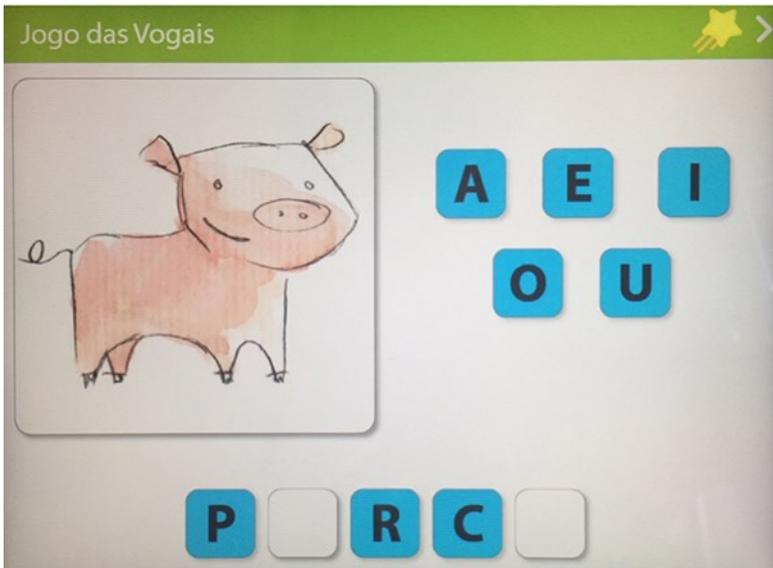


Figure 5. Screenshot of the book *Chove chuva (It rains rain)*, with the activity “vowel game” (Android tablet screen capture)

⁷ In most of the books analysed, it can be seen that the suggested interactions are more reactive than mutual interaction (in which the behaviour of one interactor affects the behaviour of another and vice versa). According to Primo (2000), reactive interaction presents “unilateral and linear relations, and the reagent has little or no condition to change the agent” (7). This would be called “stimulus-response”. This is the case, for example, when you need to click an arrow to move to the next screen or turn audio on and off in a scene.



Figure 6. Final scene from *Mãos mágicas* (*Magic hands*). By touching, characters fly out of the screen (iPad screen capture)

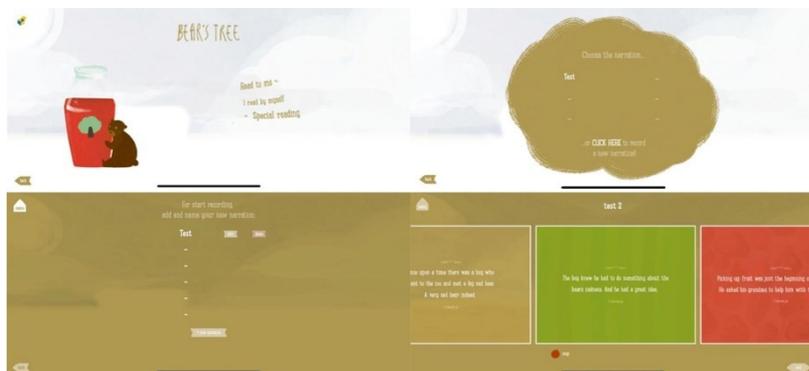


Figure 7. Screen sequence for audio recording in the English version of the tale *The Bear's tree*, from the book *Tiny great true stories* (iPhone screen capture)

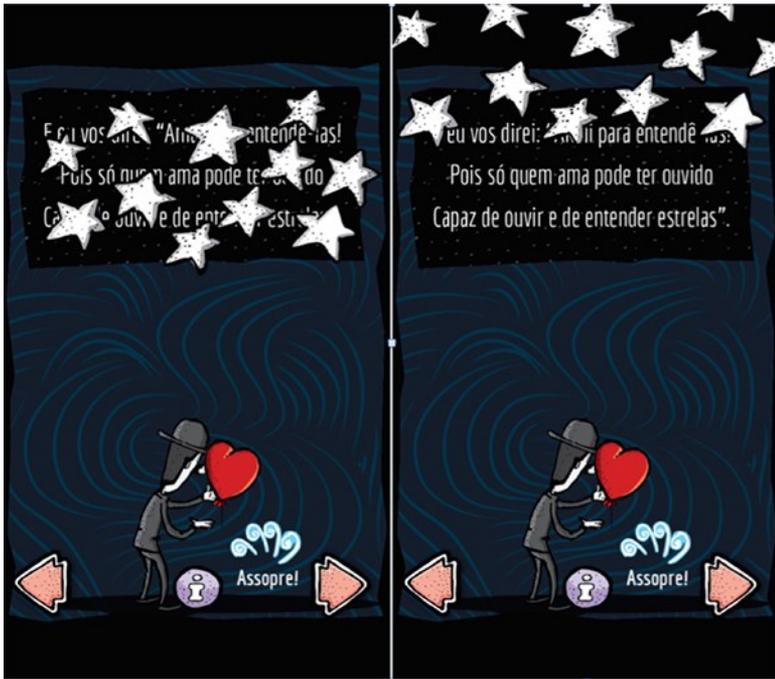


Figure 8. Screenshot of *Milky Way* with interaction driven by sound, displayed on an iPhone, before and after blowing (screen captures)



Figure 9. Screenshot of *Flicts* which shows a colour keyboard, which produces sounds when the keys are touched (iPad screen capture)



Figure 10. *O sétimo gato* (*The seventh cat*), from the Itaú kidsbook collection: a wider scene is shown when the device is tilted sideways (iPhone screen captures)

Some works used redundant signs (Figure 11) such that the reader was sure of what he or she should do to continue reading (reflecting the producers' doubt about the reader's ability to understand the logic of that reading and not give up on completing it); other books worked with subtler indications. There were short books - from ten scenes - and books that had up to 170 screens; "light" books, which used up less device memory (starting from 30 Megabytes), and books that were rich in animations and audio that used up to 484 Megabytes. There were books that used music in the main body of the story, while others did not have any, including just sound effects; there were books with and without audio storytelling; works with long animated scenes, and others with very simple movements.



Figure 11. Screenshot of *Tiny great true stories*, which indicates what the reader must do with written text, by moving circles and narration (iPad screen capture)

Such products took advantage of the ease of digital media and the possibility of sales in other parts of the world (a great difference with digital regarding distribution) to offer text options and narration in different languages; others focused only on the Portuguese-speaking areas. Six of the nine winners are available only in Portuguese; one is bilingual (*Tiny Great True Stories* has Portuguese and English versions) and two are trilingual (*Milky Way* and *So Many Butts!* have Portuguese, Spanish and English versions).

Some digital books had links to web pages outside the book (hypertextuality), others did not. Some books were offered for free (through projects that included sponsorship or through laws providing incentives); others were marketed at selling prices that might differ depending on the target audience and the type of operating system and device they used. On average, the interactive books studied cost 31.6% of the value of their printed counterparts⁸.

However, one of the particularly important points shown by this study was the different choices editors/publishers made about the system and device on which the book would be made available. There were books made for a single operating system (one is exclusive to the Android operating system: *Chove chuva* (*It rains rain*), which placed third in 2016; and two, exclusive to the iOS operating system: *Tiny Great True Stories* and *Mãos Mágicas* (*Magic hands*) - (also from 2016), and books that worked on both operating systems, either on a single device or on more than one type of mobile device (tablet and/or smartphone). Four books only work on tablets: *Meu aplicativo de folclore* (*My folklore app*) and *Nautilus* (tablets only, both systems), *Chove chuva* (*It rains rain*) - Android tablet only), and *Mãos mágicas* (*Magic hands*) - (iOS iPad only). The others can be read on tablets and smartphones, and some also on iPod Touch.

The choice of operating system and device is a critical factor when considering the dissemination of these titles. IOS devices are much more expensive than Android tablets and smartphones. This impacts the number of people who can access such devices and consume the products offered, as well as the user experience, since the memory capacity of the devices, for example, is different, so it is not always able to download or run books with a heavy content load, such as those containing many animations and narrations.

Therein lies the problematic of the materiality of these digital books, especially those developed as applications, as is the case with those studied

⁸ This data and other information provided in this article were collected in the master's research undertaken (Conte) and supervised (Matsuda) by the authors and is detailed in: Conte, Jaqueline. *Interactive Digital Books for Children: Materiality and Evanescence, Demand and Market - a reading of Jabuti Award-winning app-books*. 2019. Master's Thesis. (Master in Language Studies) - Academic Department of Language and Communication, Federal Technological University of Paraná.

here; there is also the issue of evanescence, insecurity about the operational life of these books, topics that will now be addressed.

III. THE CHALLENGES OF MATERIALITY AND EVANESCENCE

In the final years of the second decade of the 21st century, there is an extremely diverse and varied range of literary formats available aimed at children and young people. However, according to Hayles, electronic literature is that which is “‘digital born’, a first-generation object created on a computer and (usually) meant to be read on a computer” (Hayles, 2009: 20). In their digital versions, one can find books produced as simple PDF⁹ or EPUB files, even elaborate augmented reality books. Indeed, the most widely used format for e-book production today is EPUB (electronic publication), developed by the International Digital Publishing Forum (IDPF), a free format open to developers (open source).

In the interactive digital book scenario, however, those which nowadays allow for the greatest level of interactivity - going beyond the enhanced ebooks produced in EPUB3 - are application books or app books; books developed as software for specific operating systems: iOS or Android and which can be downloaded on Apple mobile devices (iPhone, iPad, iPod Touch for iOS) and tablets and phones with the Android operating system. Because they are software, these books are obtained from app stores (AppStore and GooglePlay) and not from specific digital book stores (such as the iBooks Store, for example), and so are competing in terms of exposure with all sort of apps including games.

Through observing the trajectory of available application books, it is possible to identify a major problem regarding the challenges of digital literature, which is the ever-present risk of production evanescence.

In 2011, Jorge Luiz Antonio (2011: 112) mentioned how rapidly digital literary productions could become obsolete. When talking about techno-art-poetry in Brazil, he commented on the challenge of rescuing the creative processes of digital poetry pioneers, through file conversion programs and other recreation processes, as many works had been lost due to technological change. Similarly, in 2016, Almir Aquino Corrêa stressed the difficulty

⁹ It is good to bear in mind that books in simple PDF files cannot be considered as digital literature, only as digitized books. As Edgar Kirchof explains: “Unlike digitized literature, digital literature is not characterized by the mere digitization of a previously existing text in printed form. Rather, these are literary experiments that make simultaneous use of literary language and a computer programming language for the construction of texts. Therefore, since digital works are already born as a hybrid between two codes, most of them can be read only in a digital environment (...)” (2013: 129)

in developing research on literature in digital media due to such transformations:

Research into such objects cannot be repeated, giving scholars unimaginable power - that of being relied upon their word, due to the non-existence of objects eventually disposed of through corporate decision, software sales by companies that prefer to dispose of them, disinterest due to their technological aging or even fortuitous facts, such as the loss of the right to use site domains. It is as if we are dealing with extinct civilizations or cultures - building a theory about nothingness. Traces of these materials suggest the birth of a cyber archaeology dealing with almost contemporary Rosetta stones. (2016: 244, translated by the authors¹⁰)

In interactive digital books, especially those developed as applications, the need for technological adaptation and the issue of obsolescence, or “evanescence”, as referred by Corrêa (2016) - is also very present and greatly hinders the enjoyment and dissemination of this type of work, as well as research.

From a comparative analysis of the Jabuti Award-winning books in the Children’s Digital category, expressed in tabulated format, it was realized that only two books had not been updated for bug fixes, improvements and adaptations, since being made available, and that three of the app books could no longer be downloaded. *Meu aplicativo de Folclore*, the first winner in its class, could no longer be purchased on the app stores of both systems because it had not been updated. The book had a “shelf life” of almost five years: it was made available in May 2013, had to be updated in 2013 and 2014 to be compatible with new system versions, but by the end of March 2018 it was no longer sold in app stores, when the iOS system App Store displayed the following message: “The developer of this app needs to update it to work with iOS 11”. *Flicts*, which was released in December 2014, was still available for iOS devices in July 2018, but unavailable on GooglePlay store for Android. When checked in January 2019, the app was not found in either store. Available in December 2015, the book *Chove chuva - aprendendo com a natureza: sabedoria popular*, which ranked third in the 2016 Award, “lasted” just over two years.

Well-known application books, such as *The Fantastic Flying Books of Morris Lessmore*, the first interactive book developed by Moonbot Studios, with text

10 Pesquisas sobre tais objetos não podem ser repetidas, dando aos estudiosos um poder inimaginável – o de uma confiabilidade pela inexistência dos objetos eventualmente eliminados por decisão corporativa, venda de softwares por companhias que preferem eliminá-los, desinteresse em razão de seu envelhecimento tecnológico ou mesmo fatos fortuitos, como a perda de direito de uso de domínios de sítios. É como se estivéssemos a lidar com civilizações ou culturas extintas – a construir uma teoria sobre o nada. Rastros desses materiais sugerem o nascimento de uma arqueologia cibernética a lidar com pedras da Rosetta quase contemporâneas. (Corrêa, 2016: 244)

by William Joyce, or the Brazilian *Quem soltou o PUM? (Who let FART out?)*¹¹, from Companhia das Letras, with text by Blandina Franco and illustrations by José Carlos Lollo, are no longer available. Made in 2011, *Quem soltou o PUM? (Who let FART out?)* became a finalist in the first holding of the Bologna Ragazzi Digital Award in 2012, and sales were suspended in January 2018. The coordinator of the publisher of Digital Books Marina Pastore reported:

The three applications [which had been made by Companhia das Letras] had their sales suspended as of January this year. We thought they no longer provided such a good reading experience, as we just couldn't invest in the updates needed to make apps work well on newer versions of iOS. (2018, in an email interview, apud Conte, 2019 - translated by the authors)¹²

Changes and updates should be made whenever there is a bug to fix, something to improve the user's experience, but especially when major players in the mobile device market update their operating system versions. These changes often make the proper functioning of application books unfeasible. Empirically observing the logic of both systems, Samira Almeida, a partner at StoryMax, a digital publisher twice awarded in the Jabuti Children's Digital category, estimates that there is a major change to the operating system every four years:

[...] I don't know if this is a rule ... I have observed this on my apps. [...] I have observed in my market that every four years it is mandatory. So, when I talk about projects that I know will require partnership with a company, a project that I won't be able to carry on my own, I plan it in advance. We know that every year will be different and after some time it will have to be rebuilt. (Almeida, 2018, in an interview with the author, apud Conte, 2019 - translated by the authors)¹³

The information offered by digital publishers heard in the survey shows how dynamic the process of maintaining a functioning product for readers is, and how much this depends not only on the commitment of the publishing companies (which also have to worry about this being financially viable), but also on the companies that distribute these applications. Upgrades gen-

11 Our translation. This app does not have an English version.

12 Os três aplicativos [que haviam sido feitos pela Companhia das Letras] tiveram as vendas suspensas a partir de janeiro deste ano. Consideramos que eles já não forneciam uma experiência de leitura tão boa, já que acabamos não conseguindo investir nas atualizações necessárias para que os apps funcionassem bem nas versões mais recentes do iOS. (Pastore, 2018, in an email interview, apud Conte, 2019)

13 [...] eu não sei se isso é uma regra... eu tenho observado isso pros meus apps. [...] Eu observei no meu mercado que de quatro em quatro anos é mandatório. Então, quando eu vou falar de projetos que eu sei que vai ter uma empresa, que não vai ser só meu, eu já planejo isso. 'Oh, Ano 1 é isso, isso, isso; Ano 2, Ano 3, Ano 4 nós vamos reconstruir'. (Almeida, 2018, in an interview with the author, apud Conte, 2019)

erate material and/or human costs, whether undertaken internally or externally, and should be a constant concern if the goal is not to let books get lost in time. This is also a challenge when considering using these books in the classroom.

Speaking generally about digital literature in the classroom, Corrêa (2016) states that:

Both reading, as an aesthetic experience, and studying, as reception and criticism, become problematic in the face of certain obstacles such as georeferencing access according to copyright, the transience of the object linked to the continuous financial maintenance of hosting and the domain (when access is online), and the internal construction of the object in ineffective languages and applications on new computers. These conditions end up affecting both authors and users, as a serious setback for the canonization of the material and its use in teaching, requiring proposals for their organization and preservation. (243, translated by the authors)¹⁴

Evanescence thus proves to be a real danger for both content producers and the reading public, whether in a private or school environment.

It was also noted that technical issues and lifespan are intrinsically linked to the materiality of the digital book, which will now be considered.

In her book *Writing Machines*, Katherine Hayles (2002) stated that materiality can no longer be considered a subspecialty in literary studies, otherwise a consistent description of how literature is changing with the impact of information technologies cannot be constructed. She defines materiality as emerging from the interactions between the physical properties and artistic strategies of a work; as something that emerges from the dynamic interaction between the physical world and human intelligence, which shapes this “physicality” to create meaning:

Materiality thus emerges from interactions between physical properties and a work’s artistic strategies. For this reason, materiality cannot be specified in advance, as if it preexisted the specificity of a work. As emergent property, materiality depends on how the work mobilizes its resources as a physical artifact as well as on the user’s interactions with a work and the interpretive strategies she develops – strategies that include physical manipulations as well as conceptual frameworks. In the broadest sense, materiality emerges from the

14 Tanto a leitura, enquanto experiência estética, quanto o estudo, como recepção e crítica, se tornam problemáticos diante de alguns obstáculos como o georreferenciamento de acesso conforme o direito autoral, a transitoriedade do objeto vinculado à contínua manutenção financeira da hospedagem e do domínio (quando o acesso é em linha), e a construção interna do objeto em linguagens e aplicativos ineficazes em novos computadores. Essas condições acabam por afetar tanto autores quanto usufruidores, como um grave contratempo para a canonização do material e o uso dele no ensino, exigindo propostas tentativas de sua organização e preservação. (Corrêa, 2016: 243)

dynamic interplay between the richness of a physically robust world and human intelligence as it crafts this physicality to create meaning. (Hayles, 2002: 33)

For Hayles, literature has never been limited to merely immaterial words and verbal constructions; literary texts have bodies like human beings, which profoundly influence the production of meanings (2002: 107).

Likewise, Ana Elisa Ribeiro (2017) highlights the implications of the materiality of books for human, professional and social existence, as “objects of mobilization, interaction and power games”.

Books are existences, either printed or digital, self-sufficient as objects or, more recently, device-dependent, which connect us to each other, weave relationships, and alter meanings in human existence. It is not enough to think of them as sections of an inanimate world, as we might have long and somewhat inadvertently described them. We need to think of them as part of this great interaction that we are all part of, as books encapsulate our ideas, good or bad, acting as synapses when they are read, reread, discussed, reviewed, criticized, copied, quoted, collected, donated, burned, reprinted, or forgotten to be remembered. They are not hybrids of human and object, but, instead, they are objects of mobilization, interaction and power games.

The materiality of books has implications not just for their very existence - on paper as such, with spine, earmarks, covers, or digital, shown on X or Y-dimensional equipment, such as memory or processing capacity, and suchlike... - but for our human, professional and social existence. (online article - translated by the authors)¹⁵

Thus, by mixing the medium and message, as Marshal McLuhan used to say in the 1960s (McLuhan, 2011 [1964]: 21-22), and with the support of Hayles and Ribeiro, one can understand the meaning and importance of the study of materiality in the field of literature: the literary text, even in digital media, is embodied, and its materiality emerges from the interactions between artistic strategies and the physical characteristics and properties of each work. Materiality alters and completes meanings, combining what the

15 Os livros são existências, impressas ou digitais, autossuficientes como objeto ou, mais recentemente, dependentes de *devices*, que nos conectam uns aos outros, costuram relações e alteram sentidos na existência humana. Não basta pensá-los como se fossem seções de um mundo inanimado, como poderíamos, desde há muito tempo e um tanto inadvertidamente, descrevê-los. É preciso pensá-los como integrantes desta grande interação de que todos fazemos parte, já que os livros encapsulam nossas ideias, boas ou ruins, atuando como sinapses, quando lidos, relidos, discutidos, resenhados, mal falados, copiados, citados, colecionados, doados, queimados, reimpressos, esquecidos para serem lembrados. Não são híbridos de humano e objeto, mas são objetos de mobilização, interação e jogos de poder.

A materialidade dos livros traz implicações não apenas para sua própria forma de existir - em papel, tal ou qual, com lombada, orelhas, capas, ou digital, mostrado em um equipamento de dimensão X ou Y, tal ou qual capacidade de memória ou processamento, e assim... -, mas para nossa existência humana, profissional, social. (Ribeiro, 2017, artigo on-line)

creators propose in literary and artistic terms, from verbal texts to aesthetic resources, to the physical form in which the work presents itself; this influences the enjoyment of this literary object, the creation of new meanings and the experience of reading and interaction with human beings.

Therefore, focusing on the objects of study, it is proposed here to understand the “materiality of the interactive digital book” as the generating factor of the artistic and human experience that results from the sum of three basic elements: digital media + format + reading device, to the content itself (textual, literary, aesthetic), a set that will influence how a reader will enjoy this object and what their reading experience will be like.

The interactive digital book, in addition to its content, is more than a medium (digital medium), more than the software in which it is developed, and more than the device on which it is read. Such products are multi-dependent: if accessed over the Internet, for example, they depend on the digital medium and its connections; if developed using software, they depend on the software's use policy (whether it is open source or proprietary); whether they can only be read on one type of operating system or device. Hence, they depend on the support for the reading device (which can be more or less accessible, depending on its market value and availability, and the good functioning of which, in general, depends on the operating system update policies adopted by the production companies). All these aspects influence the user's reading experience.

Thus, we could say that the materiality of the book *Meu aplicativo de Folclore*, for example, is that of an app-shaped digital book for tablet-type mobile use on Android and iOS systems (an app-book for Android and iOS tablets). The materiality of the book *Tiny Great True Stories*, in turn, is that of an app-shaped digital book for enjoyment on iOS system phones and tablets (an iOS-only mobile app-book). And so on.

It is believed that the proposed definition, although highly descriptive, enables us to glimpse the possibilities and limitations of these literary objects, both in terms of the language and resources they may encompass, as well as cultural, technological and consumer products (considering the people who will have access to these works), revealing a little about the books as “objects of mobilization, interaction and power games”, as Ribeiro (2017) tells us.

IV. DIGITAL LIBRARIES AS A MEANS OF LINKING WITH SCHOOLS

In a historical period in which questions of materiality and evanescence, especially in relation to application books, have fundamental importance and compromise the greater dissemination of these productions, especially as

literary tools for school use, a distinct business model has developed in Brazil, which has been increasing its share of the school market. This is digital libraries, which have been gradually conquering space, bringing children and adolescents closer to digital reading. Among them, platforms such as *Árvore de Livros* and *Elefante Letrado* stand out nowadays.

Created in 2014, *Árvore de Livros* is a digital reading platform which is available to children and teachers from 200 schools, and which, in May 2018, had a collection of over 10,000 books from 180 publishers. The company's focus is on private educational institutions, although it has also been used (primarily non-commercially) by some public schools. The schools hire the platform to be used by the classes of their choice. Through the system, teachers suggest books according to students' grades, monitor reading with real-time reports, and perform pedagogical activities.

In 2017, the platform reported more than 200,000 readings (based on the actual access of more than 60% of each book). According to the co-founder and director of the company, João Leal (2018, email interview, apud Conte 2019), more than 85% of the books in the digital collection are in EPUB format. There are also PDF books and some interactive works, most of them aimed at early childhood education. Books can be read on computers and mobile devices, in or out of school. Access can also be from an app through which students can read books even without internet access (offline reading).

Leal states that the focus on digital content "came from students' actual needs and also from the need to solve the logistical problem of access to books, and this increased students' reading after the implementation of the platform: "last year we were able to increase the number of books read by students by 2.3x compared to periods when they did not use this" (2018, email interview, apud Conte, 2019). For him, what makes the platform stand out is easy access, book quality, vast and varied content, availability of updated reading reports in real time, teachers' work feedback, development of reading projects and pedagogical advice for schools.¹⁶

Another reading platform that has stood out in Brazil is *Elefante Letrado*, also founded in 2014, but which actually began its activities in 2015. In 2018, it was accessed by 115 schools and their 20,000 students, focusing on the early years of elementary school, mainly children from 6 to 11 years of age. According to the executive director, Mônica Timm de Carvalho, the platform "curates children's literature and provides reports to teachers and managers on evidence of student learning in relation to the formation of reading habits and the development of reading comprehension." (2018,

¹⁶ In 2019, the company merged with the gamified platform for reading news, *Guten*, to form *Árvore Educação* and, in September 2019, it was already providing a service to 200 thousand students from 500 Brazilian schools, with 30 thousand titles from 600 publishers. (Publishnews, 2019)

email interview, apud Conte, 2019). Elefante Letrado offered about 540 books in Portuguese and 430 in English, to be read on computers, tablets and smartphones, all made in fixed EPUB3 layout:

Most of them have some kind of animation/interaction, but they respect the limits of what a book is. We do not make video clips of books. The desired experience is that of reading. Students can listen to the audio narration of part of the collection in Portuguese (books classified for beginners) and for the entire collection in English (in order to have access to pronunciation and reference intonation). In addition, all books feature zooming and the ability for the student to record their own oral reading. (Carvalho, 2018, email interview, apud Conte, 2019 - translated by the authors)¹⁷

In this case, there is a concern to make books available in formats that are better suited to the digital media (books in PDF format are not included) and using other resources such as the possibility of recording the narrations made by children.

The company Elefante Letrado observes that the average annual number of books read per student on the platform is 34, while the average number of books read in Brazil per elementary school student is only 4 books.

According to Carvalho, at the beginning, the company also offered its services to individuals, but it came to the conclusion that the system needed more qualified reading mediators to follow the reports and intervene, and so the individual model was discontinued.

Carvalho believes the market will grow in order to meet the need to teach children in the digital environment:

We can't deny the fact that the 21st century has established the digital environment as one more text depository - and these depositories are becoming increasingly present in what we call the 'reading ecosystem'. The new social practices of reading and writing involve the digital world. An example is the answer I give digitally to these questions ... Digital books are a growing reality. Not teaching children in this environment is the same as condemning them to live in a century that is over. (2018, email interview, apud Conte, 2019 - translated by the authors)¹⁸

17 A maior parte deles têm algum tipo de animação/ interação, mas sempre respeitando os limites do que vem a ser um livro. Não fazemos vídeos de livros. A experiência desejada é a da leitura. Os estudantes podem contar com o áudio das narrações de parte do acervo em português (livros classificados para o leitor inicial) e para todo o acervo em inglês (com o objetivo de que tenham acesso à pronúncia e entonação de referência). Além disso, todos os livros contam com o recurso de 'zoom' e com a possibilidade de o aluno gravar a sua própria leitura oral. (Carvalho, 2018, email interview, apud Conte, 2019)

18 Não há mais como negar um fato: o século XXI instituiu o ambiente digital como mais um portador de textos - e esses portadores vêm se tornando cada vez mais presentes no que chamamos de 'ecossistema da leitura'. As novas práticas sociais de leitura e

Carvalho's statement refers to the need to prepare children and young people for digital reading practices so that they can be more fruitful and meaningful.¹⁹ Although most Brazilian schools are still cultural environments with few technological resources, and attached to a traditional teaching model, digital literacy should be a goal (even as children increasingly have access to information and communication devices outside the school environment). The final words of the quotation are harsh but necessary; children cannot be condemned "to live in a century that is over".

V. CONCLUSIONS

This article, through the presentation of some of the findings of the Master's research carried out by the authors, as a master's student and as a supervisor, has offered a comparative perspective on the characteristics of interactive digital books which received the Jabuti Award, in the years from 2015 to 2017, when there was a Children's Digital category in the main awards for the Brazilian book market.

We were able to observe the variety of products and resources used and also a real threat, which is the evanescence of the works. Due to the lack of updating of applications by digital producers (often because the financial return does not justify this investment in production and maintenance), many works cease to exist a few years after being released. In order to remain available, maintenance would be necessary, especially after the updating of the operating systems of the devices on which the books are downloaded. This highlights the dependence that exists between the companies that produce digital books and the major players that control the market for mobile devices and operating systems, an additional difficulty for the dissemination of these works.

It can be seen that the very materiality of these digital books - which is considered here as the sum of the medium (digital), the format of the book used (app, E-PUB file, etc.) and the reading device for which it is produced (which device and which operating system) - influences the way the readers will enjoy such objects and the reading experience they will have, as well as

escrita envolvem o mundo digital. Um exemplo é a resposta que faço digitalmente a essas perguntas... Livros digitais são uma realidade crescente. Não letrar crianças nesse ambiente é o mesmo que condená-las a viver num século que já passou. (Carvalho, 2018, email interview, apud Conte, 2019)

¹⁹ There are studies that even indicate that teaching from multimodal books can help the development of children who have reading difficulties (Morgan, 2013).

the possibility of accessing the book, since certain products and certain devices are more, or less, expensive, more, or less, accessible to certain parts of the population.

Thus, materiality and evanescence are challenges so that the interactive digital book can really be used on a large scale in Brazilian schools, especially in public institutions, which are always technologically needy.

Within this panorama, a different business model has started to appear, that of the digital libraries. They offer a variety of digital literary products, albeit simpler (generally not app-books, with more elaborate resources, but EPUB files) and facilitate the work of teachers by jointly offering schools that are willing to hire them pedagogical advice, as well as individualized reports on the reading performed by students on different devices.

It is not possible to predict with certainty what will happen in the coming decades. It is certain, however, that much remains to be considered and developed so that digital literature for children in Brazil can effectively become a viable option for literary enjoyment and education and even for the expansion of learning strategies and developing the world's capacity to understand. New research in this regard will always be welcome.

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