E-book: development and its potentiality

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ABSTRACT. This article discusses the use of electronic books (E-Book), its potentiality and the analysis made for the construction of an E-book by the Mathematics teachers in a continuede ducation, developed with the purpose of working Digital Literacy with the involved ones. A survey instrument with open and closed questions was applied in order to seek the opinion of Math teachers about the use of E-books. This initial step was used to choose tools that can be performed during teacher education. One of the developed activities during the formation, consisted of face-to-face meetings and distance learning, another activity was the didactic materials construction through Digital Technologies, leading teachers to reflect on their practice using these tools, placing them as active subjects in the proposed actions, aspect concerning Digital Literacy. From the perspective of this research, we understand that it is necessary the development of a Digital Literacy by the teacher to later help his student develop his own Digital Literacy.

Keywords: digital technologies; digital literacy; E-book; didactic material.

E-book: elaboração e suas potencialidades

RESUMO. Este artigo trata da utilização de livros eletrônicos (E-book), suas potencialidades e a análise feita para a construção de um E-book por parte de professores de Matemática em uma formação continuada, desenvolvida com o objetivo de trabalhar a Literacia Digital dos envolvidos. Para o desenvolvimento da formação foi aplicado um instrumento de pesquisa com questões abertas e fechadas buscando a opinião de professores de matemática sobre o uso de E-books. Esta etapa inicial foi utilizada para a escolha das ferramentas que seriam trabalhadas durante a formação de professores. Uma das atividades desenvolvidas durante a formação, constou de encontros presenciais e na modalidade à distância, outra foi a construção de materiais didáticos por meio de Tecnologias Digitais, levando os professores a refletirem sobre sua prática ao utilizar estas ferramentas, colocando-os como sujeitos ativos nas ações propostas, aspecto concernente a Literacia Digital. Na perspectiva desta pesquisa, entendemos ser necessário o desenvolvimento de uma Literacia Digital por parte do professor para que posteriormente este auxilie seu aluno a desenvolver sua própria Literacia Digital.

Palavras-chave: tecnologias digitais; literacia digital; E-book; materiais didáticos.

E-book: elaboración y sus potencialidades

RESUMEN. En este artículo se trata de la utilización de libros electrónicos (E-book), sus potencialidades y el análisis realizado para la construcción de un E-book por parte de profesores de Matemáticas en una formación continuada, desarrollada con el objetivo de trabajar la Literacia Digital de los involucrados. Para el desarrollo de la formación se aplicó un instrumento de investigación con preguntas abiertas y cerradas buscando la opinión de profesores de matemáticas sobre el uso de E-books. Esta etapa inicial fue utilizada para la elección de las herramientas que serían trabajadas durante la formación de profesores. Una de las actividades desarrolladas durante la formación, constó de encuentros presenciales y en la modalidad a distancia, otra fue la construcción de materiales didácticos por medio de Tecnologías Digitales, llevando a los profesores a reflexionar sobre su práctica al utilizar estas herramientas, colocándolas como sujetos activos en las acciones propuestas, aspecto concerniente a la Literacia Digital. En la perspectiva de esta investigación, entendemos que es necesario el desarrollo de una Alfabetización Digital por parte del profesor para que posteriormente éste auxilie a su alumno a desarrollar su propia Literacia Digital.

Palabras-clave: tecnologías digitales; literacia digital; E-book; materiales didácticos.

Introduction

This article is a excerpt from the thesis entitled 'The Process of Building a Digital Literacy Culture in the Classroom: A Training with Math Teachers from a Local School'. In this academic paper we understand that the use of Digital Technologies in a classroom is an necessary element nowadays. There is a need for the development of a Digital Literacy by the teacher so that later helps his student to develop their own Digital Literacy.

One of the developed activities in this project was the construction of classroom materials through Digital Technologies, leading teachers to reflect on their practice when developing and using these tools. The goal is to place them as active individuals in the proposed actions, aspect referring to Digital Literacy. In this excerpt we are going to discuss about the E-book construction by the participant teachers in the training and their evaluations on this process.

Authors such as Folb, Wessel and Czechowski (2011) and Smyth and Carlin (2012) have already discussed about the use of E-books in higher education Institutions, presenting important considerations in terms of its use. To the mentioned authors, E-books are already used, where the favorite method of access by the users are laptops or desktop computers. However we asked ourselves about the use of the ones in our reality, and what would be the characteristics an E-book would need to present to be used in our classroom, especially in the field of math subject.

Thinking about that, it was developed a survey instrument with open and closed questions in order to seek the opinion of Math teachers about the use of E-books. This initial step was indispensable to learn the real teacher's need in the classroom, for the future selection of tools which would be worked during the continued teacher's education.

The training consisted of face-to-face meetings and distance learning modality in which a lot of technologies were envolved, with the bias of authorship and critical development defended by Digital Literacy. The analyzed material in this article consists of excerpt from different moments of the 17 meetings development, for better understanding, they are presented and analyzed in chronological order. In the Theoretical Background section we present authors we think are relevant for the reflection about the E-books use and creation, in our reality. In the Methodology Section we are going to present input methodology which guided our studies. In the Production and Data Analysis Section we are going to present the data elicited during the teacher's education, developed in Canoas City, Rio Grande do Sul State, as well as the referred connections to the theoretical contributions.

Theoretical background

The technology is described by Organization for Economic Co-operation and Development (OECD, 2015), as an integral part of an individual, enabling their use to reach more developed stages of knowledge. With this in mind, a report was developed by the organization that reflects the role of Digital Technologies in the classroom. The report highlights the need to reflect on the teacher's practice and the intentionality of the nuances experienced in the school environment, since:

> For the first time, parents and teachers nowadays have little experience with the tools children are going to use every day in their adult life. [It seeks to debate] the implications for the educational politics, the need of equipping the students with fundamental abilities to participate fully in digitalized and hyper connected societies (OECD, 2015, p. 185).

Among the abilities mentioned in the report which are important to be worked with the students are pointed: to know how to collect and use information derived from the internet in a critical way, to manage the reliability of information, to extract inferences, to navigate in digital content and solve problems. We found that the report produced by OECD does not mention Digital Literacy, however it describes the abilities related to the use of digital technologies and the use of them in a critical and constructive way. What it is in line with the definition of Digital Literacy presented by many authors.

The idea of Digital Literacy is not new, and it was already used by authors in the middle of 1990, but made official by Paul Gilster, in his book Digital Literacy (1997) as:

> [...] the ability of comprehension and use of information in wide range formats of sources when is presented through computers. The concept of Literacy goes beyond simply of being able to read; it always meant the ability to read meaningfully and understand. It is the fundamental act of cognition. The Digital Literacy also widens the boundaries of definition. It is cognition of what you see on the computer screen when you use the internet (Gilster apud Martin, 2006, p. 168).

The concepts are built by abstractions, inducted of observations and particular studies, the very concept of Digital Literacy was redefining itself with subsequent changes in technologies, even while retaining the ideologies brought by Gilster. To Bawden (2018, 2001), literacy is a term translated from English 'literacy', which also can be synonym of alphabetization. However, in the educational context, these words can have distinct meanings, even though they are related to symbolical aspects of construction and representation of the knowledge.

To Buckingham (2008), the Digital Literacy implies much more than a functional question of learning how to use a computer, a mouse, a keyboard, or how to do online researches. In line with this idea is Martin (2006, p. 155), who points that "[...] digital is (almost) omnipresent, and its possibilities can be both: creatives and destructives in the quest for identity".

Both authors highlights the role active of the individual because Digital Technologies allow the individual to present himself to the rest of the society by creating and transmitting personal statements either with blogs creation or personal profiles, contributing to online forums, sending e-mails, text messages and, even though, presenting a resumè. Influencing the development of social identity by enabling interaction with others individuals. Whether they are members of strong groups, such as families or friends, or weak groups, such as online communities in which the rigor of identity demanded is not very existent.

Therefore, this social concern of Digital Technologies' influence is brought to school. The students as active beings can reach different levels in different technological tools, for example: children learn how to find and select content, how to use browser, hyperlinks and search engine, the Digital Literacy surpasses this phenomena, since, if it stopped there, it would be just Instrumental or Functional Literacy.

We considered, consequently, E-book can be a relevant resource that can assist in the Digital Literacy development, that's why an initial investigation t o leranwhat a resource like this, in the teacher's perception, should offer to be used in the classroom, specially in math subject. Eliciting aspects to be considered in the development subsequently was made with teachers in Canoas city.

According to Mikki and Stangeland (2006), the first attempts of working with E-book, were in the 70's, through the Project Gutemberg that was a scientific movement to digitalize, to file and to distribute cultural work using and digitalizing books. The project remains up to now, characterizing as one of the biggest collection in the world.

According to the same authors, later, in the 1980s, along with access to personal computers, a movement began in the economic market of the potentiality of commercialization of such product. However, their use fell into disuse due to the different file formats available at the time, and were later overcome with the implementation of formats such as PDF and EPUB.

The authors point out that in several countries there are changes in the use of these technologies, driven by tactile equipment such as the tablet, transforming education and learning into an interactive and social process that can lead to changes in society. It also indicates as a positive aspect the possibility of experimentation in different environments. These technologies emphasize the possibility of authorship to the individual when building its knowledge.

Agreeing with these authorship ideas is the constructionist perspective by Papert (1994). The Constructionism, for this author, can be considered a strategy for the education that has one of its main focus the use of technology. This view considers the cognitive development as an active process of construction and reconstruction of mental structures, in which the student participates actively in the project developments.

If the construction process developed by the student is taken into consideration when using the technologies, the issue with math can be avoided, mainly if possible to have access how the software and programs are built and how they relate to math. For that matter I understand the current proposal research extrapolates my personal concerns and comprehend discussions that involve understanding the use of technologies, for this matter of searching effective ways for its consolidation.

The authors present three hurdles in the use of technologies, the same as the ones addressed in a critic and reflexive way. The first is the hurdle of participation, which consists in unequal access to opportunities, experiences, abilities and knowledge that help in the social inclusion. The second are transparent problems, which comprehend the challenges faced to learn how to see the ways how media influence the world. The third hurdle is named the ethical challenge and is about the break of traditions in terms of professional and socialization training (Jenkins, 2006).

According to Jenkins and his collaborators (Jenkins, Purushotma, Weigel, Clinton, & Robison), the school must assume the role to prepare the future students for the challenges of the new century. Among the aspects highlighted as challenges, the Digital Literacy is addressed, that is, the ability to handle and interpret digital media.

Even the young can develop these abilities by their own, without the intervention or supervision of an adult, often, the children and the young know more about these new media environments that most parents and teachers, each adult is required to meditate. In the classroom we have a pedagogical perspective. This way, to Jenkins and collaborators, the Digital Literacy transcends the simple handling of Digital Technologies, to something deeper and problematic, in order to become the teacher's role to involve the students in critic dialogues that assist to articulate more strictly their intuitive understanding of these digital experiences.

Thinking on this perspective, we developed a training that instigated reflection and construction situations by the teachers, in order to raise awareness of Digital Literacy importance in their classroom and, consequently, in the institution of directed culture to this practice. In the following section we are going to describe how this training happened and the individuals involved in it.

Methodology

The research stands in a qualitative bias, according to Goldenberg (2005) consists in a social research focused on individuals that are inserted in a way where the researcher also makes part and has an active role, this way the research is not restricted but feasible of changes.

In addition, we justified the approach highlighted for providing the possibility the researcher interpret the phenomena that originated the data production, from their own subjective perspectives. Thus the "[...] qualitative researcher must develop a sensibility situations or experiences considered in its totality [...]" (Esteban, 2010, p. 129).

The data production occurred in a math teacher education course with Digital Technologiesperspective. The course sought to present to the teachers ideas about Digital Literacy concept and diversified tools could be used in the classroom.

The current article presents a excerpt, from the produced data in this training, which will analyze the proposal of using the E-book in the classroom and the perception of the teachers about this tool. We consider correlating the situations experienced during the training with aspects that indicate evidences of the process for the formation of the concept of Digital Literacy.

In the meantime, the Qualitative Research becomes consonant with the research when considering the sharing of people, facts and places which constitute as research objects, in order to extract this interaction meanings that are only perceptible through sensitive attention and reflection.

Results and analyzes

The National Curricular Parameter anchor the use of technologies in the classroom and bring in their general objectives, the students are able to "[...] know how to use different sources of information and technological resources to obtain and construct knowledge" (Parâmetros Curriculares Nacionais. Matemática, 1997, p. 6).

To learn the teacher's reality and elicit relevant tools to be worked with them and the differential that this should offer to become interesting. Some aspects were pointed such as innovation, accessibility, to have interactivity, among other aspects. We highlighted the lines of Interviewee One when he/she states "[...] it allows the articulation of different digital media (video, websites, podcasts, images, software suggestion, hypertext [...])". The Interviewee Two stated it allows "[...] minimalize costs I can present media the E-book provides me, such as videos, images, Gif and technologies and in the paper I cannot present".

Using those interviews, we considered to identify criteria that could help in the tools election which were worked in the training course for an E-book elaboration, that's why we highlight the aspects such as accessibility, low cost, user-friendly and interactivity. Seeking to meet these demands we chose the tools highlighted in Table 1.

Table 1. Tools for the E-book creation.

Youblisher	Platform that converts PDF files to books and magazines which can be leaf through, improving its esthetic presentation. This is an online free service, to use you only have to create a profile on the website. Besides its accessibility, the platform allows few interaction from the user to the created E-book.
Digital Books:	Platform to create E-books similar to a text editor, user-friendly and in Portuguese. It allows the text insertion, images and internet links. It is an online free service, it is necessary to create an internet account; and E-book created can be downloaded in PDF to be used offline.
IBooksAuthor:	Free app, available to Apple computers, that allows interactive E-books creation with image galleries, videos, interactive diagrams and objects in 3D. Besides the interactivity provided, the E-books created can be accessed only in Apple devices.
InDesign:	Paid App for magazines and books creation and diagramation; it allows the user interactivity through the insertion of videos, links, and content associated to texts and PDF form insertions. The E-book created can be used in any device, such as computers or tablets freely, but the user needs to pay for an Adobe Cloud account to download the app that works offline.

During the development of the proposed formation, the E-book was used in different moments, in order not only to instruct the teacher, but also to lead the teacher to reflect on a critical view of the potential that this tool offers and ways of using it. l The platforms were used in 3 distinct moments: (i) when the researcher presented the Scratch E-book Manual Installation, (ii) in a specific meeting in which we discussed the different kinds of E-books creators, when it was discussed positive and negative aspects the E-book offered when it was thought in the field of classrooms these teachers experienced; and (iii) during one of the developed activities Distance Education, in which the teachers should create an E-book that could be used in their classroom.

The first moment, where the E-book Manual were presented, it was important to awake the teachers' attention, in relation to this kind of tool. It was highlighted in this activity, by the group, the importance of this material because "[...] we came to this training and, sometimes, everything goes so fast, so when we arrive at school and we try to use it, we do not remember how to do it" (Teacher 3). This way, we realized many of the things the teacher expects refer to give instruments, facing different Digital Technologies.

The instrumentaization is important, because as Buckingham (2008) points out before reaching higher and complex levels of criticality, where we understand the Digital Literacy is, it is important for the individual to know and master the tools, because the reflection only can happen if the person is comprehending what it is analyzing, so then, to build a value judgement. The author characterizes the mastery of technological tools as instrumental literacy or functional literacy.

When presented to the edited manual by the researcher, the teachers questioned how this one was done "[...] since it opens direct on the computer screen like a book" (Teacher 8).

Due to the attention showed, the researchers brought at presential meeting subsequent a presentation of different E-book creators that could be used by the teachers, including that one that created the provided material; this meeting characterizes the second moment in our analysis.

In the second moment were presented to the teachers, the four tools used to create the E-book, which were searched and highlighted previously (Table 1). In combination with the presentation, links and softwares were provided so the teachers could manipulate, create and edit materials while the presentation was happening. What it is in combination with the ideas defended by Martin (2006) Duncan (2005) and Bawden (2001). The individual needs to exercise an active role in the use of Digital Technologies, in order to express and create ideas that can lead the society to think about their paradigms.

This moment was important, regarding the aspects we understand as Digital Literacy, since, during the handling of the proposed tools, the teachers were highlighting the positive and negative aspects of it, what we consider to be the beginning of a reflection about the worked technology.

Talks such as, 'I think I could not use it because it is in English' referring to the Youblisher and InDesing E-book creators were constant. As well as 'This one is easy to access, it can be used in any digital platform', in relation to tools as Digital Books, Youblisher and InDesing. This last one was the less pleased generator for the teachers, since to them, 'it was the hardest one to use' and 'I think it does not run on the computers at my school, because they are old'.

A highlighted aspect by the teachers is that the most accessible tool to be used in the classroom, the Digital Books, is totally in Portuguese which would facilitate its using both for the teachers and the students. However a negative aspect is the necessity of online connection constantly for the E-book creation.

From 14 teachers that concluded the training, 6 stated the necessity of internet would be an obstacle for the use of this research in their classroom. This situation is in accord with the resulting of the implementation process of Digital Literacy in European regions, as Rantala and Suoranta (2008) points, where the high costs of equipment and telecommunication were obstacles to use the internet and for the dissemination of Digital Literacy.

After the presential meeting, in which we discussed the potentialities of these tools and the importance of allowing the students to have more active role in the classroom, principles concerning Digital Literacy, teachers showed interest to add these principle in the classroom, as seen in Figure 1.
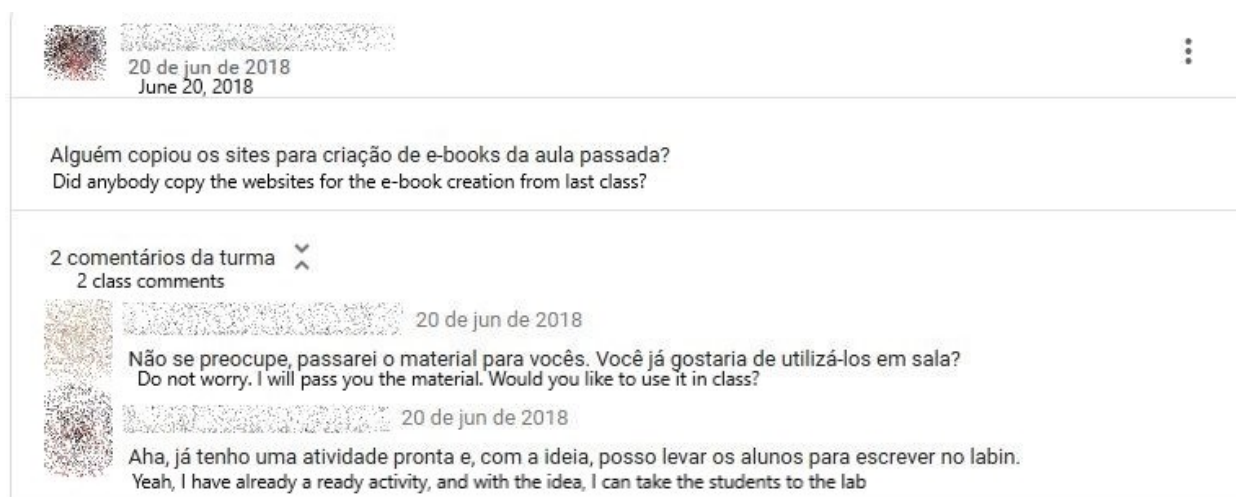
Figure 1. Interest showed by E-book.

As seen previously, even indicating limitations for the use of tools, the teachers showed themselves satisfied with the use of E-book generators, what we also observed, during the third moment of our analysis. The task that composed this occasion was the construction of an E-book by each teacher with, at least, five pages with content, three images and two external links; that could be submitted in the Virtual Environment of learning in file or attachment form.

To assist the teachers in the performance of this task, it was provided the article 'E-book in the classroom' (Sápiras & Bayer, 2017) material produced by these researchers and published in the VII International Math Teaching Congress, with the E-book generators distribution worked in this training. This article was relevant, since it had pertinent explanations about each generator and access websites to them, which the teachers could consult for the task accomplishment or to use for subsequent consultations; corroborating the intention to provide relevant pedagogical materials for the teacher practice.

In this activity were produced, by the teachers, materials that could be used in the classroom, as a way of facilitating the student access while established a reflection and sustainability, since there is no need to print material. This practice is in line with relevant aspects to Digital Literacy defended in this research that points the needf the own production of the individual to become more conscious of their possibilities and limitations.

In the Figure 2, we see the cover of four E-books which were produced by the teachers during the continued training. This excerpt referring materials to Functions, Fractions, First Degree Equations and Integral Numbers.

The developed material in this practice and posted by the teachers in the learning process was relevant to the analysis. Among the 14 teachers that returned to the activity, only one did not conclude the second established criteria, when questioned she stated she had not had time to execute the proposal. The most part of the teachers used online platforms, totaling 10 people; and only three teachers used offline tools to text editing.

Emphasizing the teachers interest by online platforms, which offer different resources to be used and, in turn, they do not need to spend time to installation and program configuration. The online platform most used by the teachers was Digital Books, with seven accessions. When questioned about the reason of choosing this platform, the main reason presented was to be available in Portuguese and to offer the availability of downloading the PDF file or online acess.
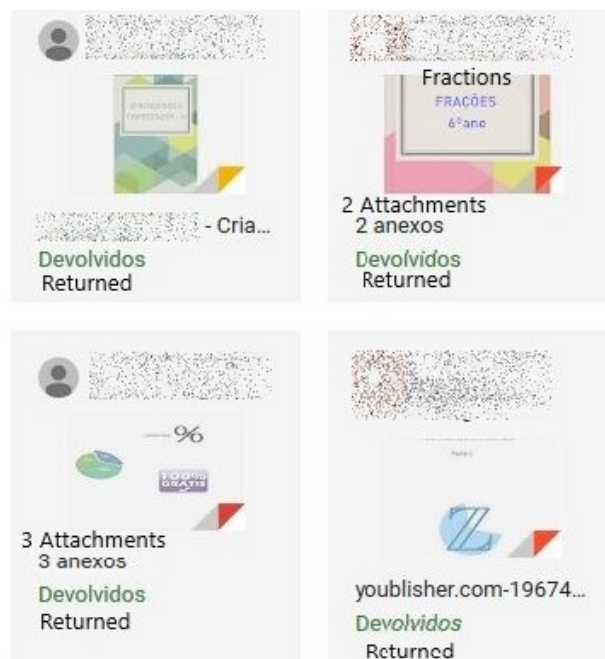
Figure 2. Teachers Production.

Erstad (2008) highlights the use of Digital Technologies, as E-book generators is related to the critical and logical thinking, recover, evaluate, store, produce, present, change information, communicate and participate the network using the internet.

In the production performed by the teachers, abilities as evaluating and storing the material available were highlighted. To produce E-book, as a different way of presentation that would use, mostly, on online network.

At the end of the training, the teachers were asked about their satisfaction with the e-book making activity, as we can see in Figure 3.
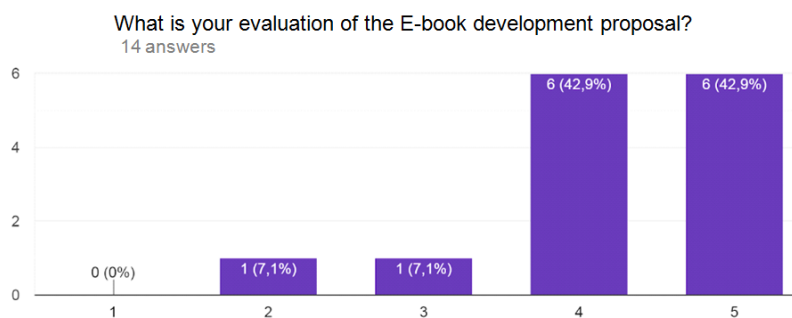

Figure 3. Satisfaction about the E-book development proposal.

The evaluation about the E-book making proposal, by the teachers, in the classroom, was positive, whereas 14 individuals who performed: twelve considered positive, one considered neutral, only one person evaluated negative and one teacher did not performed the activity. This data show the teacher's satisfaction with the presented proposal what corroborates the idea that is possible to produce knowledge about technological tools in continued training, to use them in classrooms and, later, to develop this knowledge with the students (Vanini, Rosa, Justo, & Pazuch, 2013). So, as in our research, the authors argue that this happens in a process that is continuous in the production of specific and pedagogical knowledge. We emphasize that, despite the potential presented by the E-book, physical books do not lose their value, but present themselves as another source in the construction of knowledge. There are always those who prefer them over their virtual version, as we see in the speech:

> I think the digital books are easy to use, didactic, you can format your book, choose covers, figures, layouts, the liberty of creation, digital books are accessible and it is available to the reader since this one has access to internet through compatible tools. Besides innumerable advantages I still prefer the physical book, the pleasure of leafing and handling is priceless [...] (Teacher 4).

We highlight that one of the main strengths of this training was its collaboration for the process of development of the Digital Literacy of the teachers participating in the meetings. We highlight the relevance given to the author's authorship in the creation of his E-book with insertion of texts, exercises and videos in the speech of Professor 9, which is in line with the ideas of Constructionism defended by Papert (1994, p. 34), when he says that:

> I found the E-book presented in the training very interesting because I didn't know this app and I really liked it. A plus point of this app is that it is free and easy to use. In addition to allowing the teacher to assemble as you wish by adding explanatory texts, exercises, videos, etc. And it enables the student to assemble his E-book. One downside is that some students do not have internet access to use the online eBook. But as it is possible to use it in print, it would be a way of solving this negative aspect in some way.

We also highlight in the speech above the importance of teachers' awareness of empowering their students so that they can elaborate their E-book', highlighting the possibility of these students to experience their own process of development of Digital Literacy.

Final considerations

This article analyzed the process experienced from the choice of tools that would be worked with teachers, to the activities developed during a math teacher training, in a excerpt of materials and discussions produced with the help of Digital Technologies, more specifically, the generators.

We understand that the process experienced by teachers in the field of training was relevant as it provided moments of reading, reflection and discussion. We also believe that, in general, the eBook generators were well accepted by the study group that showed interest since the beginning of their presentation, and the same was deepened in the moments of explanation and construction experienced by the group.

We observed that when asked, what would be the best way for the E-book to be worked in the classroom, most teachers interviewed pointed out interactive aspects: many videos, simulations and animations. Based on this, the research selected e-book generators that contemplated such ideals to be, in turn, actually worked with the math teachers selected by the municipal department of education in this continuing education.

As we moved to the stage of using generators with a group that would build an E-book, teachers pointed out the difficulty of using these more sophisticated generators, such as InDesign, which are those that offer tools for inserting videos, simulations and animations directly. in the file. The argument used was the difficulty of construction and configuration required to install this software.

These data corroborate to the importance to take into consideration the space, resources and social media the training is addressed, because the opinion of the most part of the interviewed in the beginning of the research, it was not in accord with the experienced reality by the group that participated in the training. This reflected in E-books created by the group that chose the simplicity in their creations and simpler generators to be, in turn, worked later with the students.

We understand the choice of Digital Book E-book, was due to the performance facility in many Digital Technology sources, as cellphones, which are accessible by the most part of the students. Since the teacher's training emphasized the difficulty of use of some computers, classifying them as old.

We still emphasize the importance of construction, to enable teachers to know and explore the tools that were worked in the continuing education course. For, it is in the midst of this practice that the teacher begins to take hold of the tools, and doubts may arise that can be answered by the trainer, in this case the researcher in question. We believe that simply pointing out tools without the practice of building, even if instructive, may turn out to be just another piece of software information available that may be forgotten over time and classroom turmoil.

We see to be necessary to encourage and support the use of these tools, since, when the training period passes, it is important to offer the teachers technical and descriptive materials that could be consulted in future moments. This was supported by the speech of Professor 3, highlighting that, after periods of training, complementary materials are relevant to the teaching practice using these resources.

Even we believe E-book is an interesting solution and it presents many potentialities, we would like to emphasize its efficiency for the knowledge construction by teachers and students, depending on the way of use. The more reflection in the E-book construction, the more useful it could be in the classroom.

We understand this way of working also presents limitations in (i), physical aspects: available internet, suitable computers and available hardware; and in (ii) cognitive aspects: Digital Literacy of the individual for the construction of critical knowledge. Because we infer that teachers are experiencing a process of Digital Literacy construction, which is not watertight, but progressing with the conscious and critical use of different technologies.

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