

# **Object of Study of Literacy: a learning object based on mobile learning to aid in the process of child literacy**

**Kaio Alexandre da Silva**

Msc in Computer Science, Professor at Federal Institute of education, science and technology of Rondônia.

Porto Velho, Rondônia, Brazil.

Email: kaio.silva@ifro.edu.br

**Bruno Felipe da Silva**

## **Abstract**

*The basic literacy is a complex phase, composed of several stages that require dedication to the conclusion of the process. Nowadays, with the evolution of electronic devices and with the advent of data mining technology, respectively, the teaching and monitoring of the stages of literacy can be facilitated by the introduction of its principles into the educational process. Based on this, this paper proposes the presentation of a learning object, consisting mainly of a mobile application and a follow-up system, named Object of study of Literacy, Objeto de Estudo de Letramento (OEL), for teaching and monitoring the initial stages of the process of basic literacy.*

**Keywords:** literacy; mobile; educational; learning

## **1. Introduction**

According to (ICAE 2003) the basic literacy is defined as the learning of reading, writing and numbering. The authors (Santos et al 2005) report that learning the alphabet writing system is a long, complex and constituted of several steps. These are specified by (Foulin 2000), which classifies them as: logographic, alphabetical and orthographic. In the first stage of the learning of the apprentice is able to recognize the name and elements he already know; in the second stage, the child can recognize the phoneme of letters and their graphemes; and in the third, the child can recognize a word in its entirety, without a need to fragment the simple sounds of the letters that make it up the word. (Soares 2011) expands a discussion about the knowledge of reading and writing, addressing the term "literacy." For the author, the literacy is the ability to use these knowledge in social practices that require writing, that is, in addition to having the capacity for recognize mechanically the words that make up a text, the student must be able to understand, knowing on the that they are referring to.

Basic literacy in Brazil began to be taught through traditional methods consisting in the teaching of staged writing. In these stages, the student first learn the letters; after this, the letters are combined with each other for the formation of syllables and words; they spell the syllables; they spell the words; and, in the finish,

they read short sentences and stories. In this type of method, booklets of literacy with a grapheme and their respective phoneme were used. This type of learning was considered by critics as the most tiring and tedious for children (Oliveira et al 2014). From the 80's, appear questionings and criticisms of the traditional method. These questions helped to replace the use of this method by constructivism in the literacy, introduced by the researcher Argentina Emilia Ferreiro in her works in the psychogenesis of language. This transition can be visualized by the analysis of the document "National Curricular Parameters" (Mortatti 2006) Constructivism says that the child builds his knowledge. This is a theory applied in the process of learning of the writting emphasizes the following concepts: the appreciation of the child's prior knowledge; analysis of errors as constructive indicators; appreciation of the literacy environment; the teacher seen as like a mediator of knowledge; expansion of the concept of literacy; and children interacting with social practices. (Benjamim 2014) Despite the transition from the traditional method to a constructive philosophy, in the Brazil, there is still difficulty in literate the children. These difficulties are disclosed belatedly in numeric data collected by government agencies. The Brazilian Institute of Geography and Statistics (IBGE) (IBGE 2014) announced that, in Brazil, the number of people who not know read and write, with an age group over 10 years, is 16 million. According to Nogueira et al 2005, literacy is one of the most important important steps in the entire educational process, and solutions to help this process are welcome. In order to attend this important stage of the educational process, creative solutions can be proposed. According to (Teleco 2017) the amount of mobile devices used in the Brazil is of 242.2 million, resulting in a density of approximately 116 phones per 100 in habitants. With this excessive number of enabled device units, invest in this type of technology as a potential agent in the assist of the process of teaching can facility the learning, making it more diverse and flexible. Flexibility in teaching is a feature presented in mobile learning (m-learning). According (Kukulka-Hulme 2005) the m-learning enables the user to learn anywhere, anytime. (McGreal 2005) states that in the near future, Mlearning will become common for education, becoming a complementary modality to traditional teaching applied in society, gaining visibility and relevance, significantly affecting traditional learning. (Bacich et al. 2015) complements that the use of digital technologies offer different possibilities of learning, and can contribute to the student learning more and better. The learning in m-learning is supported by learning objects, which according to (Carneiro and Silvera 2014) are any electronic materials, such as simulations, that aid in the learning process, can be used and recombined with others learning objects. Based on this definition, softwares, graphic and sound resources, among others, used for educational purposes are considered learning objects. M-learning has demonstrated satisfactory results when applied to the teaching process. The author (Ndafenongo 2011) conducted a survey at a school in South Africa. In their research, the participating students had access, during class, to videos stored on their cell phones about the Pythagorean Theorem. These videos were used as a material to assist the trigonometry lessons. At the end of the research, the authors perceived an evolution in the learning of the participating students, evidencing that m-learning is effective when applied to teaching (Kallo and Mohan 2012) confirm these good results. When this authors applied an evaluation of the influence that a mobile application called MobileMath, whose focus was the teaching of elementary algebra contents, under the mathematical performance of students from the country of Trinidad and Tobago, after three months of use, adquired good results. In fact, students who used the application after three months demonstrated an improvement in learning algebra The use of mobile technologies in the

learning process can influence the teaching process and improve it. Allying the benefits of mobile learning, supported by learning objects - specifically softwares, with technologies that monitor student performance and alert the teacher to student's difficulty is an interesting perspective. (Moran 2004) defends this point of view by emphasizing that teaching with new media will be a revolution if there are changes that allow the work together between teachers and students, otherwise only new technologies will be introduced, without essential changes in teaching. A way to allow the teacher to supervise as student interactions with learning objects, is the developed of a monitoring system, baseaded of a recommendation system. With this system, the teacher could monitoring through graphs, the performances of his students. In addition, the system notifies the tutor about the students that is presenting learning lags. A Recommendation System is a system that offers recommendations to the user based on their inclinations and, according to (Cazella 2012), help in increasing the capacity and efficiency of the indication process, already common in social relations among human beings. In the case the monitoring system, this solution indicates, to the teacher, students that are below a certain established average, saving him the time that would invest in an onerous analysis of the data stored in the graphs. Based on what has been exposed, this work intends to report the development of a learning object to be used in the m-learning paradigm, with the purpose of assisting in the early stages of child literacy, specifically in the alphabet teaching, of students of the kindergarten. It is a education material for assist the teaching, consisting of a mobile application, web service, database, and monitoring system developed to function as a recommendation system. This learning object aim at facilitating the assimilation of subsequent stages of the extensive process of acquisition of reading and writing skills, and its application in the social environment. In order to facilitate the understanding of the functioning of the learning object, as well as its theoretical reference, this article was divided into the following sections: Related work - there is the report of works related to the developed; Methodology - explanation of the nature of the research, applied teaching method, and operating philosophy of the monitoring system; OEL - detailed explanation of the functioning of each tool that composes the learning object; Conclusion and Future Work- relating the conclusion and future work.

## **2. Related Work**

The process of virtualization of stages of literacy is something that has already been explored by researchers in the field of informatics in education. Through the cataloging of learning objects in conferences, events, and magazines, it is possible to find a range of softwares with the objective similar to that reported in this work, which is to facilitate the teaching of literacy. In spite of this, none of these tools offer solutions so that the teacher can follow the progress of his students, in a simpler way ... In a quick search, the following softwares were found: "alfabetizando", "abcAutista", and "digita". Alfabetizando, detailed in (Rodrigues 2014) is an educational software designed to assist the adult public in the learning of the literacy and in the acquisition of skills related to motor coordination during the handling of electronic equipment - such as mouse and keyboard. The user during the use of the software has access to several types of activities that are restricted to questions related to the composition and correspondence between graphic representation and writing of objects. The ABC Autista, detailed in (Farias et al 2015), is an educational application developed for mobile devices, basically formed by 4 levels of difficulties, each level consisting of 10

activities. Its goal is to teach the skills needed to teach literacy in children with autism and in your cognitive development. For this, this learning object discriminates its activities in levels, having as criterion the complexity and nature of the one nature that pretends to be worked, being that the first two levels only aim to work with the cognitive capacity of the user and the rest generally requires the association between sound and element, letter sequencing, and word composition. In (An et al 2013), an educational game for the aid of literacy is shown. This game, presented by the name of Digita, uses problems in situations created, for the user to solve from the formation of the word of the object that solves the situation. For example, there is a situation where the cat is stuck in a tree, so the child should select the item that can help the cat to descend from the tree, after the selection, form the name of this object.

### **3. Methodology**

The nature of this work is exploratory. Its elaboration is based on research on the flexibility in teaching brought about by the introduction of new technologies during the learning process. For the development of the parts of the learning object, specifically the application and the follow-up system, some aspects were sought through the literature review: in the case of the application - teaching methods that have already demonstrated effectiveness when applied in children, visual characteristics for the creation of a pleasant interface to the target audience; and in the followup system - mechanisms that would allow it to be able to participate during the process of supervision, and efficient ways of visually deposit the data so that the teacher could interpret them without difficulty. In order to explain the methodology applied in the application and in the monitoring system, this section has been subdivided into the following subsections: the application, and the monitoring system.

### **4. Application**

The teaching method used in the application is the phonic, belonging to the set of synthetic methods. This method is approached by the author Isabel Cristina Alves da Silva Frade, phd in education by the federal university of Minas Gerais. This method makes the analogy of sounds with the letters of the alphabet, starting from the alphabetical principle to the domain of orthographic skills. (Frade 2017) The use of phonic methods in the literacy has been shown to be successful when applied to non-literate children. (Bradley and Bryant 1983) demonstrate the efficiency of using these methods in a field survey of 403 children. In this research, the authors compared the children's phonological level with their reading skills. The results of the research evidenced a strong correlation between these abilities. Subsequently, the same authors chose 65 children from the previous evaluation who presented very low levels of phonological knowledge. These children were divided into 4 groups and submitted to different interventions to try to improve reading and writing skills. At the end of these interventions, it was verified that the children belonging to group 1 and 2, who underwent grammatical and phoneme association phonologies and grouping of words by sound similarity, had a better reading performance than the children in group 1 and 2.

## 5. Methodology applied in the monitoring system

The monitoring system, as explained in the introduction section, was developed to act as a recommendation system. The logic applied in this system was to find students who had obtained a average of errors, in a certain activity, higher than the class. After finding these students, the system notifies the teacher the student's name, followed by the letter of the alphabet, presented in the activity, that the student presented greater difficulty to chose the correct alternative. These notifications are stored in a special system tab, available on your home screen - the first screen presented to the teacher after logging in to the system.

## 6. OEL

The user, when starting his interaction with the application, has access to an interactive alphabet, shown in figure 1. This is the main interface of the application, made up of interactive letters, that can be selected by the user. Each selection of the user in a letter plays an audio containing its sound representation. The sound response to the apprentice's touch allows him to associate phonology with the grapheme.



Figure1. Main Interface of the application

After the audio has finished playing, the application category screen starts. This screen is composed of interactive images of, respectively, food, animal, female name, male name, all with names starting with the selected letter. The adoption of this way of teaching the alphabet is defended by the phonics methodology, explained in the methodology section, and it is a way of teaching children the letters of the alphabet by means of analogies with objects. Despite the difficulty, it was sought to maintain a normalization regarding image choices, aiming to collect images of objects that were already included in the child's experience set. Figure 2 represents the category screen.



Figure 2. Screen of Category

After the interactions of the child with the alphabet and with the category screens, the apprentice can perform activities to validate what was taught. These activities were developed to be immersive, with a schematic of operation that allows the learner to evaluate their knowledge leisurely. The student first selects the enunciation of the question, initiating the audio with the instructions of the steps necessary to carry out the question. After the end of the enunciation, it drags an alternative to an orange box. If the dragged alternative is correct, he is congratulated and is transferred to another question; and if the alternative is the wrong answer, occurs the starts an audio warning to drag another alternative. In order to encourage users to continue using the application, the application contains a system of ranking available on their main screen to record the score of 20 students in the user's class, rewarding the first three with medals and giving them notoriety, with their placement in a special ranking guide . Figure 3 represents the ranking of the application. The application interface has been built to make the learning process immersive and attractive to the target audience. For this, colored and caricatured interfaces were developed, but with a minimalist design and focused on the content, characteristics perceived in figures 1 and 2. The use of letters with different colorations was done to facilitate the memorization of the alphabet.

## 7. Web service

The web service is a data transfer interface for applications that do not share compatibility. It is a mediation channel between two incompatible platforms, which has the function of transferring data from one platform to another. In the learning object the web service was used to carry data from user interactions with the letters and images to the external database. This data tells the database that the user has interacted with a certain element of the application, for example ,tells the database that the user has selected a certain letter of the alphabet. The database is designed to store user interaction data with the application. This data repository serves as consumption for the monitoring system. It is through this consumption that the graphs are assembled and, with their mining, the notifications to be made available in the system are created. According to (Fayyad et al), data mining is a technique that consists of data analysis and the application of

discovery algorithms that, under computational limitations, produce patterns of certain data.

## 8. Monitoring System

The monitoring system is a mirror of data provision and notification for teacher visualization. It is a system consisting of a home screen - intended to accommodate the notifications of students who are presenting an apparent learning gap, and a guide of graphics for consulting the individual and general performance of, respectively, individual student and all students, who teacher teaches.

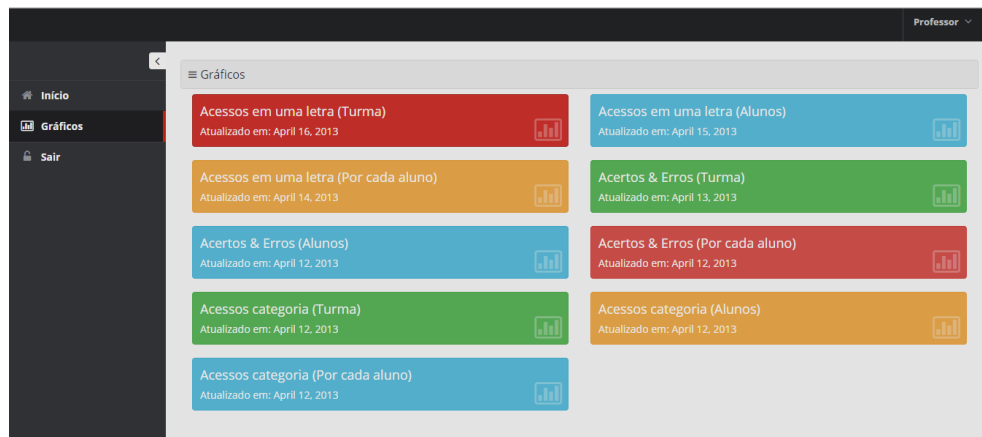


Figure 3. Interface of monitoring system

## 9. Conclusion and Future Work

This work presented the report of the development of a learning object, supported in the m-learning modality to facilitate the teaching of the initial phases of the literacy process. It is intended with this system to benefit students and teachers during the teaching. For the teacher was created, using the principles of the recommendation system and data mining techniques, the monitoring system that allows him to more easily follow and identify the possible learning deviations that may arise in his students during the use of the application, and for in the students, the mobile application was developed, so that they could have access to an immersive and pleasant education. As future work, it is intended to use this object of learning in schools, making them available to teachers and students. The purpose of this implementation is to verify the benefits that it can bring to the teaching process, and to make changes, if necessary, based on the needs of educators and apprentices, to refine the tool.

## 7. References

An, D. Y.; Silva, C. D.; Ribeiro, D. M. G.; Rocha, P. B. R.; Maltinti, C.; Nunes, V. B.; Favero, and Rutinelli da Penha. 2013 . Digita - um Jogo Educativo de Apoio ao Processo de Alfabetização Infantil. In: XXIV Simpósio Brasileiro de informática na Educação(SBIE) do II Congresso Brasileiro de Informática na Educação(CBIE), XXIV Brazilian Symposium on Informatics in Education of the II Brazilian Congress of Informatics in Education (CBIE). Anais do XXIV Simpósio Brasileiro de Informática na Educação



- (SBIE2013), Annals of XXIV Brazilian Symposium on Informatics in Education. Porto Alegre - RS: Sociedade Brasileira de Computação(SBC), Brazilian Society of computing, 2013. v. 1. p. 154-163.
- Bacich, Lilian.; Tanzi Neto, Adolfo.; and Trevisani, Fernando de Mello (Org.) 2015. Ensino híbrido: personalização e tecnologia na educação. Porto Alegre: Penso.
- Bradley, L.; Bryant, P. E. 1983. Categorizing sounds and learning to read – a causal connection. *Nature*, v. 301, p. 419-421.
- Benjamim, Djane do Socorro Pereira, and Gilcéia Amaral Mendes. 2014. Problemas de Alfabetização Observados no 6.º ano. In: Anais do VI Simpósio Internacional de Ensino da Língua Portuguesa(SIELP), Annals of the VI International Symposium on Teaching the Portuguese Language. Cazella, S. C. ; Silva, K. K. A. ; Behar, P. ; Schneider, D. ; Freitas, R. 2012. Recomendando objetos de aprendizagem baseado em competências em EAD. *Revista Novas Tecnologias na Educação, New Technologies Magazine in Education*, v. 9, p. 1-10.
- Farias, E. B.; Cunha, M. X. C.; Souza, J. W. S. 2015 ABC Autismo Uma Aplicação Mobile para Auxiliar no Processo Alfabetizador de Crianças com Autismo. In: IV Congresso Brasileiro de Informática em Educação ,IV Brazilian Congress of Informatics in Education, 2015, Maceió. Anais dos Workshops do IV Congresso Brasileiro de Informática em Educação(CBIE 2015), Annals of the Workshops of the IV Brazilian Congress of Informatics in Education.
- Fayyad, U; Piatetsky-shapiro, G; and Smyth, P. , 1996. From Data Mining to Knowledge Discovery in Databases. American Association for Artificial Intelligence.
- Foulin, J. N.; and Mouchon, S. 2000. Psicologia da Educação. Porto Alegre: Artes Médicas Sul.
- Frade, I. C. A. S. 2007. Métodos de alfabetização, métodos de ensino e conteúdos da alfabetização: perspectivas históricas e desafios atuais. *Educação (UFSM)*, v. 32, p. 21-40.
- ICAE. 2003. Agenda for the Future: Six Years Later. Montreal: Faculty of Education, UQAM.
- Instituto Brasileiro De Geografia e Estatística (IBGE). 2014. Pesquisa Nacional por Amostra de Domicílios (Pnad): séries históricas e estatísticas.
- Kaloo, V.; and Mohan, P. 2012. MobileMath: an innovative solution to the problem of poor Mathematics performance in: the Caribbean. *Caribbean Teaching Scholar*. v. 2, n. 1, p.5- 18.
- McGreal, R.. 2005. Mobile devices and the future of free education. *Proceedings of ICDE World Conference, International Council for Distance Education*.
- Moran, José Manuel. 2004. Ensino e aprendizagem inovadores com tecnologias audiovisuais e telemáticas. IN: Moran, José Manuel, Masetto, Marcos T., Behrens, Marilda Aparecida. *Novas tecnologias e mediação pedagógica, New technologies and pedagogical mediation*. Campinas, SP: Papirus.
- Mortatti, Maria do Rosário Longo. 2006. História dos métodos de alfabetização no Brasil (conferência de abertura -Seminário Alfabetização e Letramento em Debate - MEC/SEB). In: Seminário Alfabetização e Letramento em Debate - MEC/SEB, Brasília-DF. Seminário Alfabetização e Letramento em Debate - MEC/SEB. Brasília-DF: MEC/SEB, 2006. v. 1. p. 1-14.
- Ndafenongo, G. 2011. An investigation into how cell phones can be used in the teaching of Mathematics using Vital maths video clips: a case study of 2 schools in Grahamstown, South Africa. Thesis (degree of Master of Education). Grahamstown, South Africa, Rhodes University (Faculty of Education).
- Nogueira, D. N. ; Coscarelli, C. ; Chaimowicz, L. ; and Prates, R. 2010. Papa Letras: Um Jogo de Auxílio à Alfabetização Infantil. In: SBGAMES, 2010, Florianópolis. *Proceedings do SBGames 2010 - Trilha de*



Games & Cultura - Full Papers,, p. 170-174.

Rodrigues, Luciene Cavalcanti. 2014. Desenvolvimento de jogo para auxílio da alfabetização de jovens e adultos. Sinergia (IFSP. Online) , v. 15, p. 207-214.

Santos, M. J.; Rosa, M. N. S. D.; Nicolau, A. P. (2009). Ortografia: Aprendizagem Ensino, Poiésis Pedagógica - v. 7 - p. 109-129 - jan./dez.

Soares, Magda B. 2010. Por uma alfabetização até os oito anos de idade. educação, Todos pela. De olho nas metas: 35-38. Teleco. 2017. Estatísticas de Celulares no Brasil São Paulo, set.