Digital objects for the learning of reading: An active teaching methodology[1]

Objetos digitais para a aprendizagem da leitura: uma metodologia ativa de ensino

Silvana Neumann Martins[2]
smartins@univates.br
Univates

Kári Lúcia Forneck[2]
kari@univates.br
Univates

Aline Diesel[2]
aline.diesel@hotmail.com
Univates

Grasiela Kieling Bublitz[2]
gkib@univates.br
Univates

ABSTRACT – We started this study from the assumption that the use of digital learning objects to improve reading comprehension at a metacognitive level can be considered an active teaching methodology. To test the validity of this hypothesis, we selected 42 Brazilian students of the 8th grade of elementary school, to whom a pre-test with the cloze method was applied, followed by two sessions of interaction with digital objects and, finally, a cloze post-test designed to ascertain the evolution of the levels of understanding. The results demonstrated the improvement of the reading comprehension of the subjects investigated, supporting the research hypothesis assumed in this study.

Keywords: reading comprehension, digital learning objects, metacognition.

RESUMO – Neste estudo, partiu-se do pressuposto de que o uso de objetos digitais de aprendizagem para o aprimoramento da compreensão leitora em nível metacognitivo pode ser considerado uma metodologia ativa de ensino. Para testar a validade dessa hipótese, foram selecionados 42 estudantes brasileiros do 8º ano do Ensino Fundamental, com os quais se aplicou uma pré-testagem com método cloze, seguida de duas sessões de interação com os objetos digitais e, por fim, uma pós-testagem cloze para averiguar a evolução dos níveis de compreensão. Os resultados evidenciaram o aprimoramento da compreensão leitora dos sujeitos investigados, corroborando as hipóteses de pesquisa pressupostas neste estudo.

Palavras-chave: compreensão leitora, objetos digitais de aprendizagem, metacognição.

Introduction

The work at school is often focused on a study centered on grammatical rules, putting reading into the background, as if the fact that the student is able to decode were enough. Generally, the starting point is the principle that, if the student has gone through the literacy process, reading, as a source of learning, is a skill that is automatically built. Proof of this mistake is the low performance of Brazilian students in the PISA test and Brazil Test, both of which focus on reading comprehension, an essential skill for the insertion of the individual in the literate world.

To improve these rates, it is believed that the teacher should create, develop and implement innova-

tive educational practices focused on the development of reading comprehension. Active teaching methodologies contribute to this perspective, for they provide learning spaces where students can build their reading autonomy through the development of inferentiation skills.

With that in mind, digital learning objects (DLOs) were developed over the year 2014 as one of the actions of an extension project developed by the Language Program of Univates (Forneck *et al.*, 2015a). The learning objects, whose production is described and explained in Forneck *et al.* (2015b), were designed to focus on the learning of metacognitive reading strategies, which contribute to the formation of an autonomous reader who is conscious of the comprehension processes that they must manage as a proficient reader.

In order to verify the efficacy of such learning objects as active methodologies for the teaching of reading, over the year 2015 educational interventions were developed so as to demonstrate the effective contribution of digital objects in the processes of learning and inferentiation and in the structuring of an active methodology for the teaching of reading. It is assumed, therefore, that these objects can be understood as active teaching methodologies, since they require an active attitude from the students towards their learning, favoring the promotion of their autonomy.

This study, based on a quantitative approach, intends to present the results of the educational interventions. Therefore, we develop theoretical considerations about the active teaching methodologies based on Berbel (2011), Gaeta and Masetto (2010) and Morán (2015), about digital learning objects and their relationship to the active methodologies and the improvement of reading. After that, we describe the methodological procedures of this study, followed by the presentation and analysis of the data collected. At the end, we make some final considerations.

Active teaching methodologies

There is a consensus among scholars that the structure of schools in Brazil needs urgent change, as it is still guided by traditional methods of transmitting information (Morán, 2015; Canário, 2007; Sibilia, 2012). The classroom routine consists, generally, of a repetitive cycle which begins with the transmission of the content by the teacher, followed by exercises in a textbook or photocopied text and, finally, ends with an evaluation work to verify the learning of the contents. Then the cycle restarts with the next contents of the syllabus.

Occasionally, students are provided with moments of more interaction with the content through group work and technical visits, among others. Given this exhausting routine, the students express themselves in their own way. Thus, the wish to do other activities or to be elsewhere

arises. Parallel conversations among colleagues and the desire to access social networks are inevitable, which is precisely what the teacher fears so much.

For this reason, it is clear that there is a need for evolution in the school structure. Morán (2015) thinks that educational institutions attentive to changes may choose between two paths, viz. a wider one, with profound alterations of structure, and a softer one, promoting progressive changes. In the latter, schools maintain the disciplinary model of curriculum, but prioritize a routine with greater involvement of the students in their own learning.

Upon considering the perspective of the student as the center of the process, one finds active teaching methodologies that promote a more meaningful learning. Pedagogical practices guided by the active method presuppose learning situations planned by the teacher together with the students, in which they can be provoked and encouraged to take an active and critical attitude toward learning (Gaeta and Masetto, 2010). The teacher continues to have an essential role in learning; however, instead of being a keeper and transmitter of knowledge, they become an enabler of knowledge.

Morán (2015) brings new lights to the functions usually assigned to the teacher. For the author, the teacher must take over the role of curator and advisor. The curator is both the one who helps students cope with the infinity of information available and the one who "takes care of each one, supports, welcomes, encourages, values, guides and inspires" (Morán, 2015, p. 24). In addition, the teacher has the role of guiding the class of students, the working groups and each one, individually. Therefore, they need to "be intellectually, emotionally and managerially competent, taking over the function of a manager of multiple and complex learning" (Morán, 2015, p. 24).

This process brings significant contributions to the construction of the student's citizenship, since teachers and students are challenged to question their own practice, "bringing to the community in which they live the ethical, social and political issues of the school system" (Richartz, 2015, p. 298). Thus, a critical attitude is activated in students, who are invited to experience countless new possibilities.

As a consequence, upon taking an active role in learning, by being led to reflect and decide on what and how to achieve the stated objectives, the student exercises autonomy. According to Berbel (2011, p. 29),

> The engagement of the student in relation to new learning, through understanding, choice and interest, is essential to broaden their possibilities to exercise freedom and autonomy in decision-making at different moments of the process they experience, preparing them for future professional practice.

The dictionary links the term "autonomy" to the individual who is autonomous, independent, and who makes their own decisions (Ferreira, 2010). It means, in

this perspective, "the ability to set their own rules and limits, without the need for these to be imposed by another: it means that this agent is able to regulate themselves" (Mogilka, 1999, p. 59).

Hence, it is understood that teaching practices guided by active methods can develop the analytical skill of students, since the new knowledge is built autonomously and actively by them and is not learned mechanically (Jófili, 2002). Still in the same line, we follow John Dewey's (1978) idea of pragmatic instrumentalism, according to which the school should combine knowledge with the realization of practical experiences, which broadens the knowledge and enrich the spirit, giving deeper meaning to life. According to Piletti and Piletti (2012, p. 130), "Dewey insists on the importance of experience, continuously rebuilt, as an engine of human development and, in the case of education, as a means of learning."

According to Dewey's pedagogy (1978), education is a constant reconstruction of experience, in which students must be exposed to real-life situations: "[...] the school should not be the isolated workshop where the individual is prepared, but a place where, in a real-life situation, the individual and society constitute an organic unity" (Dewey, 1978, p. 28). In this context, the teacher is a key factor in the learning of the student, having the function of directing, guiding and stimulating activities, taking advantage of their experience as an adult to that end.

So, returning to Morán (2015), the use of active methodologies of teaching and learning allows students to experience real problems and situations that relate to their existence and their experiences as individuals inserted in a society that increasingly requires from them the development of autonomy both in terms of learning and in of entering the job market.

In addition to teaching strategies commonly associated with active methodologies, such as drama, brainstorming, portfolio, concept map, seminar, symposium, forum, workshop, among others (Anastasiou and Alves, 2004), there are also strategies that are not yet so widespread in the Brazilian school environment, such as peer instruction (Pinto *et al.*, 2012), methodology of problematization (Colombo and Berbel, 2007) and problem-based learning – BPL (Enermark and Kjaersdam, 2009).

In the study presented here, it is believed that digital learning objects follow the assumptions of active methodologies, since they require an active role of students and develop their autonomy in the knowledge that surrounds them, although they do not fit any classification commonly adopted in frameworks that address these issues. We assume, therefore, the insertion of DLOs at a metacognitive level as a new perspective of active methodology. Later, we will explain the reasons for their inclusion.

Digital objects for the learning of reading

There is no doubt that digital technology brings significant contributions to the processes of teaching and learning, as it allows the amplification of the classroom space to an unlimited extension. According to Morán (2015), formal education should happen in a hybrid form, that is, by mixing the physical space of the classroom with multiple everyday spaces, including digital ones.

According to Coll *et al.* (2010), the use of digital information and communication technologies (DICTs) in teaching and learning processes contributes to enhancing skills of mediation between students, teachers and content. This mediation, or curatorship, in the words of Morán (2015), is accomplished by the important role played by the teacher in the selection and provision of learning materials, elaboration of study scripts and in proposing and creating new digital materials. From this perspective, the digital learning objects constitute potential means to reach these goals.

The concept of digital learning objects, originally coined by Wiley (2000), relates to the possibility of organizing educational content in different formats, such as games, videos, animations, and virtual environments, "into small segments combined to form results gradually more complex" (Tarouco, 2012, p. 83). Moreover, the DLOs are currently associated with the production of teaching materials with interactive technological resources, contributing to a significant learning.

Still according to the author, two important characteristics of the objects are the possibility of reutilization and the promotion of autonomy. Reutilization presupposes the variety of people who can use the object. The promotion of autonomy, in turn, when these individuals are allowed to conduct studies without being entirely dependent on the teacher, turning them into protagonists of their own learning.

However, for an effective building of knowledge to exist, learning objects need to be dynamic, flexible, interactive, customized and easy to upgrade, involving students in learning, so that they can produce their knowledge and recognize the effects of their own interaction (Tarouco, 2012).

In this respect, the self-monitoring of one's own learning, the interface with active teaching methodologies, intended in this study, is constituted.

Forneck *et al*. (2015a) consider that digital objects can be teaching tools that allow students to interact in order to build and expand their knowledge in several areas, including reading comprehension.

From this perspective, over 2014 a collection of ten digital objects was developed as one of the goals of the extension project *The teaching of reading strategies: intervention proposals through virtual learning objects*, organized by the Language Program in partnership with

the Learning Laboratory of Univates (UNIAPREN). During the duration of the project, the main objective that guided the production of the material was to improve reading comprehension. Therefore, we attended to the following aspects:

> to diversify text genres, types and formats, to explore multiple inference production strategies, to avoid long explanations of content, to mobilize pre-existing knowledge, to ensure immediate assessment through instructive feedback, and to enable the use of objects, individually, in differentiated contexts (Forneck *et al.*, 2015a, p. 20).

An important feature of digital learning objects is the possibility of giving feedback to the student, helping them, through linguistic clues, to become aware of cognitive processes used and the possible strategy of inference adopted for the performance of the activity (Forneck *et al.*, 2015a, 2015b). This feedback also ensures greater autonomy in the construction of knowledge.

For the conceptual grounding of the production of the objects, we assumed that the inferentiation skill is a complex cognitive ability, resulting from the association of linguistic text data, the communicative situation and the reader's prior knowledge (Dehaene, 2011; Ferstl, 2012). We also assumed that the inference happens when the reader is able to build the situation model of the text (Kintsch and Rawson, 2013), which corresponds to what is expressed by the surface structure, the textual basis, and by the meanings inferred from what is stated in the text. I.e., the situation model is built when there is integration between the information provided by the text, prior knowledge and the reader's comprehension goals. Finally, we assumed that inferentiation skills can be taught and, thus, learned consciously and autonomously (Smith, 1991; Goodman, 1991; Coscarelli, 2002; Pereira, 2009; Morais, 2013).

But the aspect that shows a possible insertion of digital objects for the learning of reading as an active teaching methodology model lies in the fact that all objects were developed with the purpose of deautomatizing the process of understanding, which renders the reader effectively responsible for their own process of meaning production. That is, all the objects produced developed metacognitive reading strategies (Kato, 2007; Gombert, 2003).

In order to give an idea of how the feedback is explored in the digital objects developed, one of the ten activities is detailed below. This is the activity entitled "Advertising: get smart" involving the textual genre of advertisement, as illustrated in Figure 1[3].

Figure 1. Homepage of the object "Advertisement: get smart".

Source: www.univates.br/roau

---

[3] Translation of Figure 1: Observe the advertisement's text and answer:
"Book _____ to get smarter. No contraindication. Consume several times a day."
Click on the image to expand.
In the utterance present in this advertisement's text there is a gap. Taking into account the basic textual elements (text, image, color, shapes…) what is the word that fills the gap? Write here:

The object shows part of an advertising campaign, from which a term was deleted, which is essential to understand the advertisement, and replaced by a gap. The question asks the student to fill this gap, taking into account the contextual elements, such as text, image, colors and shapes.

Thus, to be able to accomplish the activity, the student develops hypotheses to fill the gap, as they confront their prior knowledge and language clues left by the author (Pereira, 2009). In making these assumptions, the reader does a new general reading in order to test them and, realizing that they make sense, they complete it in the field provided.

If they do not get it right, a message of feedback appears on the screen, as shown in Figure 2[4].

The feedback draws the student's attention to a few key terms to understand this text, such as "no contraindications," "consume several times a day" and "free consumption." It also suggests that the student should pay attention to the book format, on which there is a red stripe. And it proposes that they try again.

With this information, the feedback leads the student to reflect on a number of elements that must be taken into account to arrive at the text's meaning. Subsequently, the reader in training does a new reading, considering the issues raised, and formulates new hypotheses.

Likewise, if the students get the answer right, the feedback indicates linguistic features that may have been considered by the students to form a text understanding strategy[5] (Figure 3).

According to Forneck et al. (2015b, p. 220), the feedback of objects constructed "[...] were thought to lead the reader metacognitively on their process of understanding, enabling them to use the strategies learned in other reading experiences that they may have." We highlight, once again, that the great advantage of this material is the feedbacks that go far beyond saying "Try again." They teach readers to consider the elements that are essential to understand a certain text.

In order to verify the impact of the interaction with digital objects in the qualification of inferentiation processes, learning situations were provided in which students could handle the objects and check their progress in terms of reading comprehension skills. The methodology of this approach is described below.

Methodological procedures

Considering the objective proposed for this study, which is to verify the contributions of digital learning objects developed at Univates to reading comprehension, a research using a quantitative approach was carried out.

The digital objects used in this research are available on the Learning Object Repository of Univates – ROAU (www.univates.br/roau) in "Textual comprehension – Complete collection". This is a compilation of ten objects, developed with support from the *Hot Potatoes* software. The uniqueness of this proposal is that, when the student interacts with the objects, feedbacks are generated and help the student become aware of the strategies used to understand the text, thereby promoting the development of their reading competence (Forneck et al., 2015a). For this reason, the preparation of feedbacks demands time and care. A feedback of error should not only present the incorrectness of the answer; it should mainly provide a linguistic clue that challenges the user to explore, con-
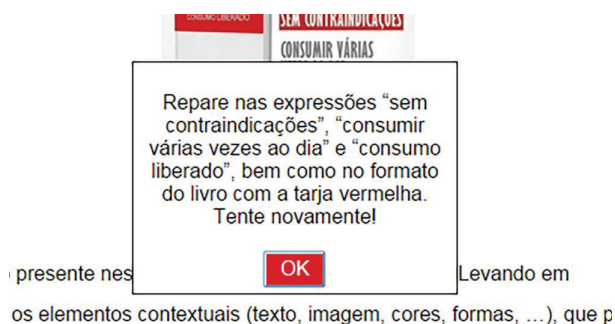
Figure 2. Feedback screen of the object "Advertisement: get smart".

Source: www.univatse.br/roau
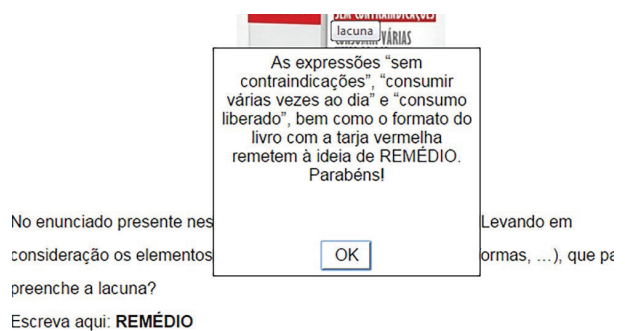
Figure 3. Final feedback screen of the object "Advertisement: get smart".

Source: www.univates.br/roau

---

[4] Translation of Figure 2: Pay attention to the expressions "no contraindications", "consume several times a day" and "free consumption", as well as to the shape of the book with the red stripe. Try again!"
[5] Translation of Figure 3: The expressions "no contraindications," "consume several times a day" and "free consumption" as well as the shape of the book with the red stripe refers to the idea of MEDICATION. Congratulations!

sciously, a possible reading strategy to be used in that context. The feedback of correct answer, in turn, should go beyond the simple congratulation; it should indicate the possible cognitive path followed by the reader. Both the feedback[6] of error and the one of correct answer aim to deautomatize the process of production of inferences.

Therefore, in addition to providing contexts of interaction with reading, as the digital learning objects put the student in touch with various textual genres, they can also be recognized as an active teaching method because, through feedbacks, they guarantee the learning of the deautomatization of inferentiation processes. Thus, the student can self-monitor themselvesf and become aware of the process of reading comprehension.

In order to verify the effectiveness of this methodology, at first a pilot intervention with students of the 6th grade of elementary school was conducted at the same school where the official test would take place. In this activity, the researchers asked students to interact with the objects in the order in which they were presented. It was observed that, in a period of 45 minutes, most students were able to develop up to six or seven of the ten objects that make up the collection. As a result, we decided to organize two moments of interaction of the students who were the research subjects with the objects, with 45 minutes each.

The subjects of this study were students of two classes of the 8th grade in a private school of Lajeado/RS, totaling 42 students. These groups were chosen because the teacher is a graduate of the Language Program of Univates, which includes the goal of the research project to which this study is linked, besides the fact that the learning objects include textual genres appropriate to that age group.

It is noteworthy that the people responsible for the students participating in this work filled out the Free and Informed Consent Form (FICF), in which they became aware of the study's objectives and procedures and authorized the participation of the students in the processes. It should be also noted that the students will be identified as A1, A2 and so forth, in order to preserve their identity.

Data were collected from the manipulation of digital objects by the researched subjects, according to the following configuration: pre-testing, interaction with objects, post-testing, as described below.

Before providing interaction with the material, a reading test was applied with the cloze method, which is validated by Pereira (2008) as a suitable method for assessing reading comprehension. The text that served as a support in the test – *Comparing to grow* – deals with an everyday issue for students and its vocabulary

was considered appropriate to the schooling level of the subjects (Pereira, 2005). The text in question had 50 gaps, set at every five words. The student should fill the gaps with the best word that fits the context, according to their perception.

According to Pereira (2005) and Leffa (1996), cloze is a technique of text gapping so that the meaning must be recovered by the reader, and it has been used worldwide as a way to assess proficiency in reading. In this technique, it is recommended to start the gaps on the third or fourth line and then erase one word for every five words of text (Leffa, 1996). In order not to influence the reader as to the length of the deleted word, Pereira (2005) recommends that the gap should have an empty space with a standard extension. As to the test tabulation, what is considered correct is "the word that is in the original text and words with an approximate meaning that are acceptable within the context" (Pereira, 2008, p. 5).

Secondly, two sessions of interaction with digital objects were organized in the School Computer Lab. These interaction sessions lasted 45 minutes each, totaling 90 minutes of interaction. In each session, the students, each with their computer, could choose the process for the development of the activities, following the order in which objects are available in ROAU, or following a random order according to their interests. There was no intervention by teachers or researchers during the interaction with the objects. Finally, a new cloze testing was applied in order to determine the evolution of the learning of reading.

After the collection, the data were tabulated in an Excel spreadsheet, assigning the following scores: filling in accordance with the original word: 2 points; filling with synonyms of the term: 1 point; mistake or blank: 0 points. It is noteworthy that those words were considered synonymous that appeared as such in two dictionaries, a printed version of Ferreira (2010) and the online Michaelis dictionary (2015), so that the data were examined with greater transparency, turning them into important elements to confirm the hypothesis raised (Barros and Lehfeld, 2010). As the text contained 50 gaps, the highest score that could be achieved by the student was 100 points.

Finally, we also emphasize that the Portuguese teacher of the students involved in this work received a report indicating the scores of the students in each test. In addition, each student also received, individually, their respective results in the pre and post-test, their average grade in the tests and the class average. Giving this feedback to the school and the subjects involved was considered important, so that, based on the results, teaching practices could be planed so as to value active teaching methodologies and digital learning objects.

---

[6] According to Leffa (2003), we could classify the proposed feedbacks as strategic because they lead the student to reflect on their learning process, so that they can accomplish the task successfully. We agree with Leffa and Castro (2008) that feedback is a tool that enables interactivity between the user and the machine, causing the reader to stop reading only to start doing something.

Presentation and analysis of collected data

From the application of the cloze test before and after the interaction with the digital objects data emerged, which allow a series of analyses. Graphs 1 and 2 show the scores of the students of the two classes in the pre and post-test.

Upon assessing the overall performance of the two groups, the data showed that group 81 performed better. The sum of the scores of the students was 932 points in the pre-test and 999 in the post-test, with an evolution of 67 points. Class 82, in turn, which had two additional students, reached 1,062 points in the pre-test and 1,080 in the post-test.

Considering the two groups together, the initial performance in terms of the reading level was 1,994 points and the final one 2,079 points, which represents an increase of 85 points. In a superficial assessment, one can consider this evolution very low. However, considering that there were only two interventions with objects, one can consider this a very significant number. It can be deduced that, if they were provided with more moments of interaction with the material, the result would be better.

In Table 1 there are some measures of the main trend, which allow a more detailed assessment of the tests performed.

Considering the total of the two classes, the mean was 47.5 in the pre-test and 49.5 in the post-test. This data show that the overall average of students' grades in the post-test was higher than in the pre-test, which means that after the interaction with digital objects there was an improvement of reading comprehension rates at 4.2%. This is a significant finding in relation to the short time of interaction.
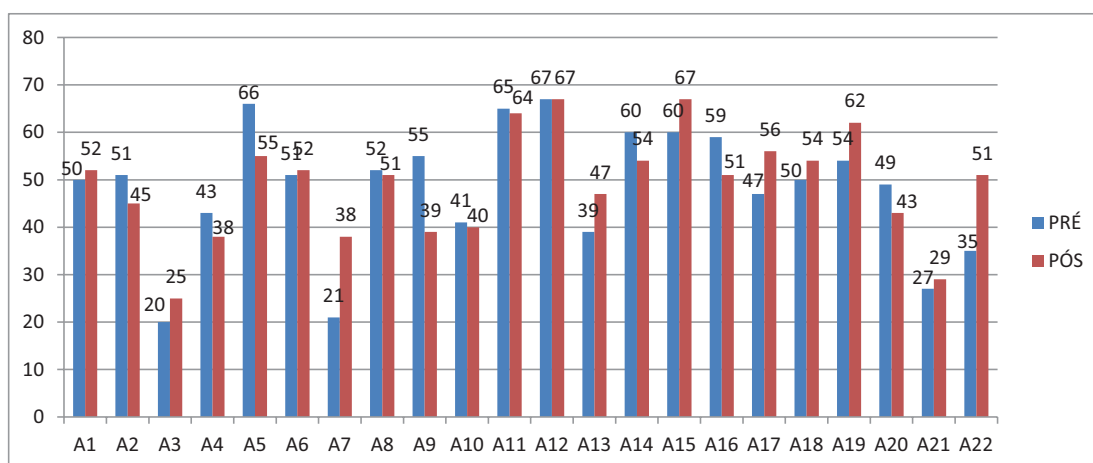
Graph 1. Results of the Pre and Post Test – Class 81.
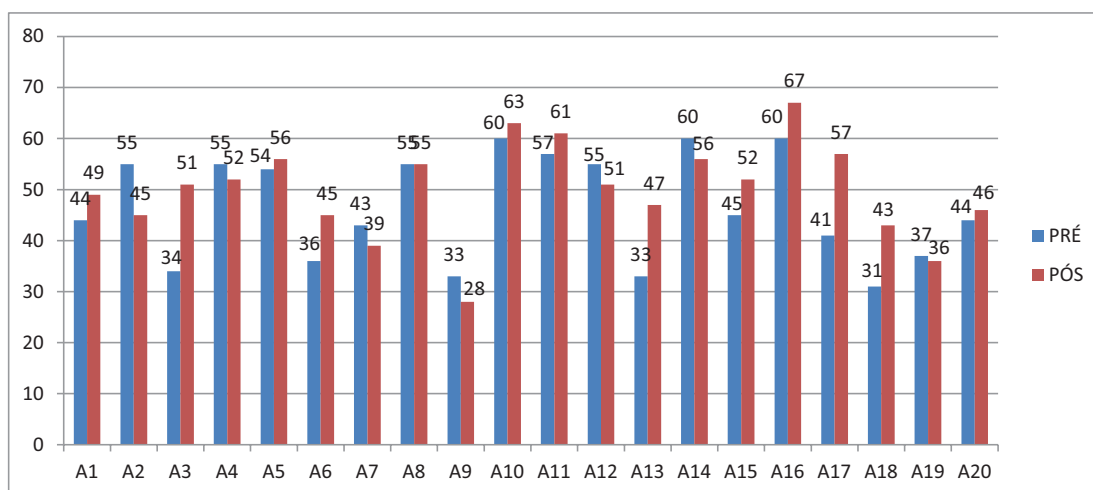
Graph 2. Results of the Pre and Post Test – Class 82.

Table 1. Variables considered in the analysis of the scores of the pre and the post-test.

	Pre-test	Post-test
Mean	47.5	49.5
Median	50.5	51
Amplitude	47	42
Standard deviation	11.93	10.28
Coefficient of variation	25.11	20.7
Correlation coefficient	0.75	

Another interesting data is that the median was 50.5 in the pre-test and 51 in the post-test. Although a low median was observed, there was an evolution from the pre to the post-test. Moreover, comparing these results to those obtained by Pereira (2008) and Menegat (2007), we note that the subjects of this study reached a mean suitable to the standards of the cloze testing method. But we believe that if they have more contact with the digital learning objects, they may achieve the mean score presented by Pereira (2008), which is 6.0.

Another aspect that draws our attention is the fact that both the mean and the median represent low grades, in absolute terms, which points, in an extensive analysis, to a deficiency in reading comprehension and a fragility of the work with reading. But it indicates mainly the long way to go when it comes to the teaching and learning of reading. From this standpoint, the use of active teaching methodologies can be instrumental in this process.

Another relevant data is the amplitude, which shows the difference between the highest and lowest variable. In the pre-test, it was 47 and in the post-test 42, which shows that in the post-test there was a smaller difference between the student who had the lowest score and the one who had the highest score, i.e., there was less disparity between students in the post-tests.

The standard deviation, which was 11.93 in the pre-test and 10.28 in the post-test, had a modest reduction, showing that, in relation to the mean, there was less variation in scores. This finding is consistent with the coefficient of variation, which was 25.11 in the pre-test and 20.7 in the post-test. This confirms the reduction in the variability of the grades. In the assessment performed, this data is considered positive; however, we point out that the results emerged from this specific intervention and that, with the research subjects, the interaction with the objects brought contributions to the reading comprehension.

It is also noteworthy that in this study the correlation coefficient was 0.75. This shows the proximity of the grades of a student in the pre and post-test. For example,

student A9 of class 81 was one of the students who had the lowest score in the pre-test and in the post-test as well. On the other hand, students A10 and A16 of class 81 were those who had the best score both in the pre-test and the post-test. This reveals the safety of the test applied.

All these positive data reveal that digital learning objects, seen from the perspective of active teaching methodologies, can make significant contributions to the deautomatization of the reading comprehension process and, above all, to the improvement of the ability of inferentiation, and they also qualify the methodological processes of the teaching of reading. This is due to the fact that the objects give simultaneous feedback to students, which gives them a reflection on their reading procedures, bringing the route of the reading comprehension to the level of consciousness. Thus, the students begin to pay attention to the understanding route and to how they cognitively build the text's meaning.

It is precisely in this aspect that the confirmation of the hypothesis that was anticipated in this study lies: it was assumed, as a premise, that the deautomatization of the inferentiation process ensures the formation of an autonomous subject, who knows how to deal consciously with the knowledge and the information available for the exercise of their citizenship, because they know how to understand and interact with the world through language. We also took as a premise that active teaching methodologies contribute to the formation of an autonomous subject in relation to learning processes. So, in view of the results obtained from the tests and the sessions of interaction with digital objects, it can be said that metacognitive reading strategies, developed through the interaction with digital learning objects that explore the feedback of the activities, indicating linguistic clues to the cognitive reading route to be developed, can be understood as an active teaching methodology for the learning of reading.

The positive data from this study with regard to reading comprehension were, as in Dewey's conception (1978), due to the fact that the students experienced situations offered by DLOs that gave those involved an opportunity to gain new knowledge.

In this sense, as we have already stated in the introduction of this text, we defend the inclusion of this methodology – use of digital learning objects at the metacognitive level – in the current classification.

Final considerations

This paper offered a dialogue between active teaching methodologies, among which are the digital learning objects, and the teaching of reading comprehension. The study aimed to investigate the contribution of DLOs, developed in an extension project of Univates, to the improvement of reading comprehension. To this end, students of the 8th grade were given time to interact with the objects.

The cloze testing, used before and after the interaction with the material as an instrument of data collection, showed that these objects can contribute to the recognition of clues in the text and to the making of inferences, since there was a better performance in testing after the interaction with the objects.

Thus, it is believed that the inclusion of active teaching methodologies in Basic Education can contribute to the formation of a more critical and autonomous citizen, since the student, in this methodology, is the center of the learning process. It is proposed here that this type of work, if done in the classroom, helps to motivate professionals to assume the role of learning managers, following the tenets of Moran (2015).

This study also showed that digital learning objects, such as those that can be freely accessed on the website www.univates.br/roau, can form more autonomous readers, capable of producing more meaningful inferences from the interaction with a great variety of textual genres. Therefore, this material should be used by teachers in their Portuguese classes in Basic Education. Moreover, it can also serve as an inspiration for the construction of other digital objects and for the planning of innovative teaching practices.

Given the above, we reaffirm the integration of digital learning objects at the metacognitive level as a new perspective of active methodology, which should, in our view, be developed in schools, as this study showed their contribution to the improvement of the reading comprehension of students.

References

ANASTASIOU, L.G.C.; ALVES, L.P. 2004. Estratégias de ensinagem. *In:* L.G.C. ANASTASIOU; L.P. ALVES (orgs.), *Processos de ensinagem na universidade: Pressupostos para as estratégias de trabalho em aula.* Joinville, Univille, p. 67-100.

BARROS, A.J. da S.; LEHFELD, N.A. de S. 2010. *Fundamentos de metodologia científica.* 3ª ed., São Paulo, Pearson, 176 p.

BERBEL, N.A.N. 2011. As metodologias ativas e a promoção da autonomia de estudantes. *Semina: Ciências Sociais e Humanas*, **32**(1):25-40. https://doi.org/10.5433/1679-0383.2011v32n1p25

CANÁRIO, R. 2007. *A escola tem futuro?* Das promessas às incertezas. Porto Alegre, Artmed, 160 p.

COLL, C.; MAURI, T.; ONRUBIA, J. 2010. A incorporação das tecnologias da informação e da comunicação na educação: do projeto técnico-pedagógico às práticas de uso. *In:* C. COLL; C. MONEREO, *Psicologia da Educação Virtual*: aprender e ensinar com as tecnologias da informação e da comunicação. Porto Alegre, Artmed, p. 66-93.

COLOMBO, A.A.; BERBEL, N.A.N. 2007. A Metodologia da Problematização com o Arco de Maguerez e sua relação com os saberes de professores. *Semina*: *Ciências Sociais e Humanas*, **28**(2):121-146. https://doi.org/10.5433/1679-0383.2007v28n2p121

COSCARELLI, C.V. 2002. Reflexões sobre as inferências. *In:* CBLA – Congresso Brasileiro de Linguística Aplicada, VI, 2002, Minas Gerais. *Anais...* Belo Horizonte, Faculdade de Letras da UFMG. [CD-Rom].

DEHAENE, S. 2011. *Os neurônios da leitura.* Porto Alegre, Artmed, 372 p.

DEWEY, J. 1978. *Vida e educação*. 10ª ed., São Paulo, Melhoramentos, 45 p.

DICIONÁRIO ONLINE MICHAELIS. 2015. São Paulo, Editora Melhoramentos. Disponível em: http://michaelis.uol.com.br/. Acesso em: 20/08/2015.

ENERMARK, S.; KJAERSDAM, F. 2009. A ABP na teoria e na prática: a experiência de AALBORG na inovação do projeto no ensino universitário. *In:* U.F. ARAÚJO; G. SASTRE (org.), *Aprendizagem baseada em problemas no ensino superior.* São Paulo, Summus, p. 17-41.

FERREIRA, A.B. de H. 2010. *Dicionário Aurélio da língua portuguesa.* 5ª ed., Curitiba, Positivo, 2222 p.

FERSTL, E.C. 2012. The functional neuroanatomy of text comprehension: What's the story so far? *In:* F. SCHMALHOFER; C.A. PERFETTI (eds.), *Higher Level Language in the Brain*: Inference and Comprehension Processes. Ahwah, Psychology Press, p. 53-102.

FORNECK, K.L; FUCHS, J.T.; BERSCH, M.E.; COSTA, M.C.B.; SILVA, M.T.; FISCHER, M. 2015a. *Um click na leitura:* objetos virtuais de compreensão textual. Lajeado, Ed. da Univates, e-book.

FORNECK, K.L.; FUCHS, J.T.; BERCH, M. 2015b. Objetos digitais de aprendizagem para o ensino e a aprendizagem da leitura. *Revista LinguiStica*, **11**(2):208-228.

GAETA, C.; MASETTO, M. 2010. *Metodologias Ativas e o Processo de Aprendizagem na Perspectiva da Inovação.* São Paulo, Congresso Internacional PBL. Disponível em: http://each.uspnet.usp.br/pbl2010/trabs/trabalhos/TC0287-1.pdf. Acesso em: 27/08/2015.

GOMBERT, J.E. 2003. Atividades metalinguísticas e aquisição da leitura. *In:* M.R. MALUF (org.), *Metalinguagem e aquisição da escrita*. São Paulo, Casa do Psicólogo, p. 19-64.

GOODMAN, K.S. 1991. Unidade na leitura – um modelo psicolinguístico transacional. *Letras de Hoje*, **86**(1):9-43.

JÓFILI, Z. 2002. Piaget, Vygotsky, Freire e a construção do conhecimento na escola. *Educação: Teorias e Práticas*, **2**(2):191-208. Disponível em: http://www.maxwell.vrac.puc-rio.br/7560/7560.PDF. Acesso em: 20/05/2015.

KATO, M.A. 2007. *O aprendizado da leitura.* 6ª ed., São Paulo, Martins Fontes, 121 p.

KINTSCH, W.; RAWSON, K. 2013. Compreensão. *In:* M. SNOWLING; C. HULME (org.), *A ciência da leitura.* Porto Alegre, Penso, p. 227-244.

LEFFA, V.J. 2003. Análise automática da resposta do aluno em ambiente virtual. *Revista Brasileira de Linguística Aplicada*, Belo Horizonte, **3**(2):25-40. https://doi.org/10.1590/S1984-63982003000200002

LEFFA, V.J.; CASTRO, R.V. 2008. Texto, hipertexto e interatividade. *Revista de Estudos da Linguagem*, **16**(2):166-192. https://doi.org/10.17851/2237-2083.16.2.165-192

LEFFA, V.J. 1996. *Aspectos da leitura.* Porto Alegre, Sagra-DC Luzzatto, 98 p.

MENEGAT, L.A. 2007. *Relação entre Compreensão Leitora e Aprendizagem Matemática:* uma investigação com licenciandos em matemática. Porto Alegre, RS. Dissertação de Mestrado. Pontifícia Universidade Católica do Rio Grande do Sul. Disponível em: http://tede.pucrs.br/tde_busca/arquivo.php?codArquivo=493. Acesso em: 11/01/2016.

MOGILKA, M. 1999. Autonomia e formação humana em situações pedagógicas: um difícil percurso. *Educação e Pesquisa*, São Paulo, **25**(2):57-68. Disponível em: http://www.scielo.br/pdf/ep/v25n2/v25n2a05.pdf. Acesso em: 22/12/2015.

MORAIS, J. 2013. *Criar leitores para professores e educadores.* Barueri, Manole, 155 p.

MORÁN, J.M. 2015. Mudando a educação com metodologias ativas. *In:* C.A. de SOUZA; O.E.T. MORALES (orgs.), *Coleção Mídias Contemporâneas: Convergências Midiáticas, Educação e Cidadania:* aproximações jovens. Vol. II. Disponível em: http://www2.eca.usp.br/moran/wp-content/uploads/2013/12/mudando_moran.Acesso em: 27/08/2015.

PEREIRA, V.W.P. (coord.). 2005. *Relatório do Projeto*: Avaliação da Compreensão Leitora de Alunos do Ensino Médio: Escores em Correlação – ACOL. Porto Alegre, PUCRS, 33 p.

PEREIRA, V.W. 2008. Compreensão leitora de alunos do ensino médio. *ReVEL*, **6**(11):1-15.

PEREIRA, V.W. 2009. Predição e inferência leitora. *In:* J. CAMPOS (org.), *Inferências linguísticas nas interfaces*. Porto Alegre, Edipucrs, p. 10-22.

PILETTI, C.; PILETTI, N. 2012. *História da educação*: de Confúcio a Paulo Freire. São Paulo, Contexto, 270 p.

PINTO, A.S.S.; BUENO, M.R.P.; SILVA, M.A.F.A; SELLMANN, M.Z.; KOHLER, S.M.F. 2012. Inovação Didática - Projeto de Reflexão e Aplicação de Metodologias Ativas de Aprendizagem no Ensino Superior: uma experiência com "peer instruction". *Janus*, **9**(15):74-86.

RICHARTZ, T. 2015. Metodologia ativa: a importância da pesquisa na formação de professores. *Revista da Universidade Vale do Rio Verde*, **13**(1):296-304. https://doi.org/10.5892/ruvrd.v13i1.2422

SIBILIA, P. 2012. *Redes ou paredes*: a escola em tempos de dispersão. Rio de Janeiro, Contraponto, 222 p.

SMITH, F. 1991. *Compreendendo a leitura.* 3ª ed., Porto Alegre, Artes Médicas, 860 p.

TAROUCO, L.M.R. 2012. Objetos de aprendizagem e a EAD. *In:* F.M. LITTO; M. FORMIGA (orgs.), *Educação a distância: o estado da arte.* São Paulo, Pearson Education do Brasil, p. 83-92.

WILEY, D.A. 2000. *Learning object design and sequencing theory.* Provo, UT, EUA. Tese de Doutorado. Brigham Young University. Disponível em: http://davidwiley.com/papers/dissertation/dissertation.pdf. Acesso em: 20/02/2015.