ColabSaber: A pedagogical support framework in the collaborative construction of knowledge

ColabSaber: Uma estrutura pedagógica de apoio na construção colaborativa do conhecimento

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ABSTRACT

This paper proposes the ColabSaber Framework, which aims to change the traditional format of lecture-based classes with the use of the learning principles defended by Vygotsky, such as language, culture and social interaction. ColabSaber uses the fundamentals of Group Storytelling as educational support for elementary school students. This paper points out the importance of the collaborative construction of comic books as an intermediate support in the traditional teaching-learning process, also considering the technological advances and the ease of students in handling new technologies. As a result, the article concludes a significant improvement in the academic performance of the participating students and a motivational element of the academic engagement of the participating students.

Keywords: Collaborative work, teaching method, Storytelling, framework.

RESUMO

Este artigo propõe o ColabSaber Framework, que visa mudar o formato tradicional das aulas baseadas em palestras com o uso dos princípios de aprendizagem defendidos por Vygotsky, tais como língua, cultura e interação social. O ColabSaber utiliza os fundamentos do Group Storytelling como suporte educacional para estudantes do ensino fundamental. Este artigo aponta a importância da construção colaborativa de quadrinhos como um suporte intermediário no processo tradicional de ensino-aprendizagem, considerando também os avanços tecnológicos e a facilidade dos alunos em lidar com as novas tecnologias. Como resultado, o artigo conclui uma melhoria significativa no desempenho acadêmico dos estudantes participantes e um elemento motivacional do engajamento acadêmico dos estudantes participantes.

Palavras-chave: Trabalho colaborativo, método de ensino, narração de histórias, estrutura.

1 INTRODUCTION

In recent years, schools have faced difficulties in implementing technologies as tools to support and stimulate learning both outside and inside the classroom. There are several factors that can make this learning difficult. According to Martin et al. (1996) these difficulties encountered would be related to the difficulty of students in putting into practice the routines, planning and control of cognitive processes involved in carrying out a given activity.

The use of stories as a didactic tool has been a way to minimize these difficulties [Gouvêa, et al., 2016]. Students spend hours focused on cinema and social media, but are unable to focus their attention for forty minutes in class. This happens because the stories, in the movies and social media, are told in more interesting ways. Therefore, the storytelling technique can be a solution for this learning in the classroom.

According to Mcsill et al. (2013), storytelling is defined as the old habit of telling stories. Since our ancestors, the act of gathering around a campfire to share what was experienced during the day has been the most effective way to perpetuate culture; cultural practices and knowledge so important for

the survival of groups. That is, storytelling is the art of telling a story through the written word, music, mimicry, images, sound or digital media as Borges (2011) states.

This research proposes the Framework for Pedagogical Support in the Collaborative Construction of Knowledge (ColabSaber). This method aims to unite traditional learning actions together with initiatives that defend the principles of learning advocated by Vygotsky - language, culture and social interaction. The essence of ColabSaber is in the consolidation and construction of new knowledge from collaborative practices of building and telling Comic Stories (HQ) on the subject of school discipline.

The main objective of this research is to propose an alternative pedagogical support, which collaborates with the student's learning process through stimuli, and improves his/her academic performance. For this investigation, two classes from an elementary school and a private Brazilian school were submitted to an experiment with the consent of the school and their parents.

The comics, presented and discussed in this article, were created by students participating in the experiment conducted using the Pixton technology tool.

This article is organized into sections. In section 1, we consider the introduction and motivation of this research, exploring the concepts of Storytelling and Group StoryTelling (GST). In section 2, we explore the theoretical foundations of collaborative work in the classroom and the work related to the theme. In section 3, we explain the methodological structure and the method adopted for this research. In section 4, we present the framework developed as a proposal for collaborative work. In section 5, we discuss the steps for the development of the experiment. In section 6, we present the results obtained, and in section 7 we make our final considerations.

2 STORYTELLING AND GROUP STORYTELLING

Storytelling is the act of telling stories. Silva et al. (2018) says that storytelling was initially done to transmit and share knowledge among primitive men. In the school context storytelling has been applied to investigate teaching methods [Salim et al., 2016] and [Lage et al., 2017], and also to stimulate the creativity and curiosity of students in class so that they can participate more and become more interested [Robin, 2019]. A story can be told by a person or a group (Group Storytelling), as Borges (2011) shows.

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[1] https://www.pixton.com/br/ - Link accessed on 01/07/2020.

2.1 RELATED WORKS

Comics have been a strong resource to support education. This tool has been applied in storytelling and therefore a direct reference with storytelling theory is clearly observed. The literature highlights some research that advocates the use of comics for educational support, as tools for inclusion and facilitation of learning.

For Silvério (2006), comics are understood as educators and helpers in working with reading.

Costa (2011) defends comics applied in the classroom. According to him, this resource has allowed teachers to join text, grammar and literature in a pleasant way, fostering the engagement of students in learning the Portuguese language.

Severo and Severo (2015) follow the same line of research of Costa (2011) discussing the use of comics as a didactic resource in the improvement of the teaching-learning process. For them, the comics not only stimulate the exchange of knowledge between students, but also promote the habit of reading, developing the creativity, autonomy and criticality of students.

According to [Kotujansky, 2009], comics can be a resource to contribute to the initial education of teachers who will work in the initial years of elementary school in the context of science through the production of digital educational materials (MED) with support from the ToonDoo Maker tool.

Piconi and Tanaka (2003) discuss the use of comics in education as a strategy for student inclusion. This research uses the HagáQuê software in an attempt to assist the development of autistic students in their process of interaction and communication with society. In [Campos et al., 2004] the inclusion of deaf pupils during the learning process is discussed through the SIGNHQ system which has been developed for the creation and reading of comics with sign language support.

These researchers foresee the introduction of comics in the educational process, either in the construction of didactic resources or in the learning process of the student. Some of them still discuss aspects of inclusion for students. In this article, we intend to discuss the application of comics mediated by technological resources in order to stimulate the learning process of the student and improve performance in tests.

This research seeks to apply comics as reinforcement of the content of a school subject that has been passed in an expositive way.

In the next section, the methodological structure of this article, the type of research applied and the ColabSaber Framework will be presented and discussed.

3 METHODOLOGICAL STRUCTURE AND METHOD

The essence of this research is qualitative and quantitative research.

When returning to the main objective of this article, we have the Construction of the ColabSaber Framework.

Figure 1: Methodological structure.

As for the specific objectives, the stimulus of the student's learning process and the improvement of the performance in tests are highlighted. In this way, the ColabSaber Framework was built (subsection below); it is an experiment planned and executed with classes of basic education of a private school in order to verify if the objectives of the research were achieved.

As a method of data collection, observation and interviews were applied. The data collection tools were: stories produced by the participating children, notes on observations and interviews, and test notes on the content taught. Details about the experiment will be presented later in this article. Figure 1 presents the schematic design of the scientific methodology applied in the article.

4 PEDAGOGICAL SUPPORT FRAMEWORK IN CONSTRUCTION

The ColabSaber Framework (Figure 02) is the result of phase 3 of the methodological structure of the research (Figure 01). The focus of this method to consolidate collaborative learning strategies with the traditional expository classes in order to stimulate the engagement of the students in class and improve the learning of each one of them.

Figure 2: Structure of the ColabSaber Framework
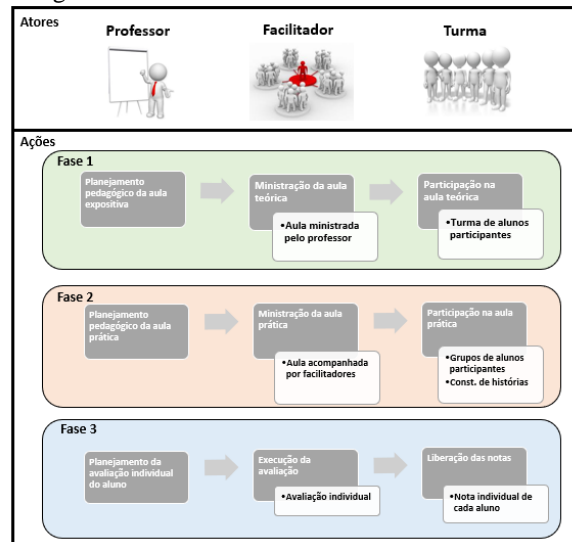
ColabSaber is based on the principles of collaborative learning. According to Castro and Menezes (2011), the main principles for structuring collaborative learning are: students work together seeking to learn and their responsibility not only for their own learning, but also for that of others. These principles imply collective goals and enhance the learning possibilities of students as they are assisted.

ColabSaber's principle is to extend the traditional teaching method with the proposal of integrating constructivist learning actions in this initiative. For this, practical classes with technological resources and comic book building actions.

The ColabSaber is structured in three phases and its actions are executed by the subject teacher, facilitator, and classes of students. The first phase is composed by three general activities. The pedagogical planning of the expositive lesson is carried through by the teacher of the subject according to the menu and planning of the course. In addition, this needs to be orchestrated with the second phase of ColabSaber so that the practical class, through the collaborative construction of stories (with the use of the Group Storytelling technique), can be carried out by the students. The teaching of the theory class is an activity performed by the same teacher who planned it.

Phase 2 dedicates efforts to the planning, execution and participation of the practical class. In this planning, it is expected that the teacher with or without the facilitator prepares the environment, be it technological or not. The conduction of the classes will be accompanied by the facilitator who may or may not be the teacher of the subject. In this class, students are expected to be able to construct and tell stories whose plot is the theoretical class they have previously participated in. For the conduction of these lessons, the form should be organized in working groups. The formation of the groups can follow the best criteria in the facilitator's view. An example of a method for the formation of working groups is in (Tardelli et al., 2019).

In this proposal, it is expected that the practical class will act as a reinforcement to the content presented in the expository class. In addition, it is expected that the group will build knowledge together and that deficiencies of some members can be remedied by others. The facilitator's role is to guide the construction of the comics through textual narratives and drawings, to solve eventual doubts, but without actively interfering with the content built by the students. With this practical principle, we present ColabSaber based on the following educational concepts defended by Vygotsky 2016: Social interaction of language and culture in learning. In other words, learning is an adaptive result that has social, historical and cultural nature.

ColabSaber defends that the construction of knowledge from comics is a way for the student to internalize new knowledge from cultural references of his group that were shared in the session of the practical class. In addition, the comics are structured in a language suitable for elementary school students. Finally, Phase 3 provides results for conducting evaluations in order to investigate the individual performance of students who participated in the ColabSaber instance.

5 CONTEXTUALIZATION OF RESEARCH AND PREPARATION OF THE EXPERIMENT

Following the performance of seventh and eighth grade students (Elementary II) at a Brazilian private school, located in Lorena - SP, it was found that 50% of seventh grade students and 65% of eighth grade students performed below the expected average in Science subjects. The use of comics for Elementary School II is justified because the National Curricular Parameters - PCNs - foresee its use as a didactic-pedagogical resource. In view of this reality, ColabSaber was applied with the participation of 38 students in an experiment.

The experiment was structured considering the participation of two classes. Each one participated in two phases: an expository lesson on the content of Science "Environmental Disaster" and a tutoring lesson. Half of each class participated in a traditional and expository classroom reinforcement, while the other half of the classes were directed to the Computer Laboratory in order to work on the concept of the expository class with the construction of collaborative stories under the supervision of the teacher. In this study the Pixton tool for building HQ was applied. In it are available scenarios, characters and types of pictures that can be changed with a few mouse clicks.

5.1 PLANNING

Based on the PCN, two grades from elementary school were chosen for the Group Storytelling application supported by the Pixton comic book tool.

The first contact with the board of directors of the College took place on May 2, 2019. After the director's approval, the researchers, along with the pedagogical coordination and science and

informatics teachers, began the detailed organization of how the application would be made and the number of classes they would need to have available. The lecture on "Environmental Disaster" followed the normal content schedule provided by the school.

Also, as an activity of preparation for the experiment, the lecture was prepared by the Science teacher in advance and presented previously to the researchers. Based on the prepared class the researchers divided the content in five parts. Each group of students would be responsible for reporting, through the group storytelling technique represented in comics, an excerpt of the class. After the experiment, some participants were interviewed in order to collect their impressions about the reinforcement practices on the "Environmental Disaster" content. The experiment conducted in this research occurred on May 30, 2009 and May 31, 2009 and was organized according to the activities presented below:

Preparation activities: Collect the grades of these students in the subject in the previous quarter; organize the experiment together with direction and teachers of Science and Informatics; divide the students of 7th and 8th grades in two classes randomly.

Execution activities: day 1 - Collective class for both classes with the science teacher; day 1 - Introductory class to Pixton in the laboratory for T2; day 2 - Tutoring in the laboratory using Pixton with T2; day 2 - Tutoring about the content for T1 and T2 classes; day 2 - Correction of the tests by the science teacher; day 2 - Interview with students from T2 and teachers about the experience with Pixton.

5.2 RESEARCH EXECUTION

The first day of the experiment took place from 7:40 a.m. to 8:40 a.m. with the collective class in the auditorium of the College with the presence of both classes. In the auditorium, the Science teacher presented the previously programmed content, with the help of the projector, and cleared up any doubts about the content. After the explanation, he was asked to divide the groups and send some to the computer room and direct the others to the art class.

The groups were divided in a random way, so the seventh year was divided into two groups, the first with the respective odd call numbers (1, 3, 5, 7, 9, 11, 13, 15, 17) and the second with even call numbers (2, 4, 6, 8, 10, 12, 14, 16, 18), so we got two equal groups with nine students each. The division of the eighth grade groups followed the same criteria and generated two groups, one of odd-numbered students (1, 3, 5, 7, 9, 11, 13, 15, 17, 19) with 10 students and the other with even-numbered students (2, 4, 6, 8, 10, 12, 14, 16, 18, 20) with 10 students also. Thus, we decided that groups of odd-numbered students would take the traditional class while groups of even-numbered students would participate in the Pixton experiment in the laboratory.

After the separation of the groups, the even-numbered students went to the Informatics Laboratory where they were subdivided into their respective groups: 7th grade students {2, 4, 6} group 1; {8, 10, 12} group 2 and {14, 16 and 18} group 3. Students of the 8th grade {2, 4, 6, 8, 10} group 4 and {12, 14, 16, 18, 20} group 5.

The class clippings for the collaborative construction of comics were organized by the subject teacher. However, the teacher did not know which groups would make each cutout. The organization of the groups is presented below: Group 1 - Ecological balance and imbalance; Group 2 - Mariana Dam; Group 3 - Pollution; Group 4 - Renewable and non-renewable resources and Group 5 - Sustainability.

Figure 3: HQ - group 4.

Figure 4: HQ - group 5.

Still on the first day, without the students knowing their groups and their fragments, the IT teacher started at 9am a class to introduce Pixton; he did an explanation using the projector to demonstrate how to make the comics for all groups of even numbers and then allowed everyone to use the software and clear their doubts. The software presentation class took place without any setback, and everyone was able to use it with peace of mind.

On the second day the experiment followed its application from 7:50 am when the tutoring class in the auditorium for the students of the odd-numbered groups and the tutoring class with the software in the Computer Lab for the students of the even-numbered groups started. The traditional tutoring class ran smoothly until 8h50 when it finished and the evaluation started. Already in the class in the laboratory there was a setback with the internet network, but soon it was corrected so the experiment could continue. At 10:40am the evaluation of this group started. The evaluation that all the students

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were submitted was identical and elaborated by the same teacher of the subject. It contained ten dissertation questions, worth one point each.

6 RESULTS OBTAINED

To evaluate the results, quantitative and qualitative analyses were carried out, considering all the information collected in the previous survey and the opinion of the students, teachers and those responsible for the school.

The quantitative analyses were conducted with the groups that generated Figures 3 and 4, especially with the comparison of each student's grades (traditional reinforcement and reinforcement through the comic strips). The preparation of the experiment started with the collection of the grading history of the students who participated and with this a table was elaborated for the two classes so that, after the application of the traditional evaluation and storytelling, we could make the comparison of the data. After this collection, the students were selected and distributed in two groups - as explained previously. After the preparation, the instructions and the traditional science class, the groups were divided and while one did the traditional reinforcement class, the other did the reinforcement class with the help of the storytelling.

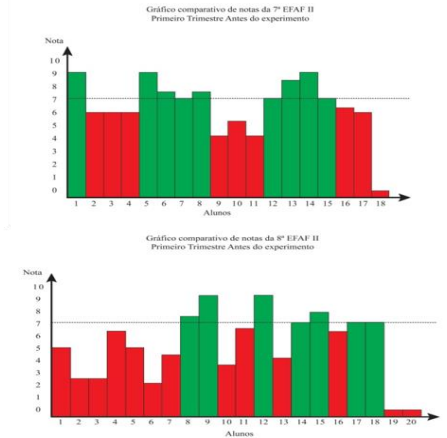Figure 5: Science notes before the experiment.
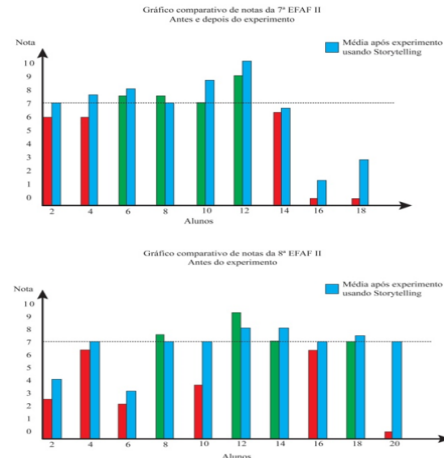

Figure 6: Comparative notes.

Figure 5 presents the results obtained by the science classes in tests before the execution of the experiment. In them it is possible to observe less than 50% of students' performance. The bars presented in red reveal students that did not reach the average grade in the subject. The graphs of Figure 6 present the results of the same classes for the 7th and 8th grades after the participation in the experiment proposed by this research. The graphs of Figure 6 show a significant improvement of the students participating in the experiment in laboratory (use of Pixton and Group Storytelling application). In the 8th grade, only two students did not reach the average, while in the 7th grade only three students did not

reach the average seven. The qualitative analysis aimed to confirm the results achieved in the quantitative analysis. As a conclusion obtained by the perception of the students who were submitted to the reinforcement class with the narratives, it is possible to affirm that all of them manifested satisfaction when working with the tool and liked the class method used. The following passages confirm this conclusion: *"It was nice, it was very interesting, it showed what the teacher was talking about. Using the computer and memorizing the content helped a lot. And it helped us to try harder"*.

The teachers involved with the experiment, as well as those responsible for the administration of the College were very satisfied with the performance of the activity. According to them: *"It was a rewarding experience, this kind of activity is always enriching for both sides, but especially for the students..."; "I thought it was very special. These activities cause a good movement in the College, they win and so do we..."*

7 FINAL CONSIDERATIONS AND FUTURE WORKS

In this article, the ColabSaber Framework was proposed, which unites traditional classroom actions with the principles of collaborative learning based on the three pillars of Vygotsky's learning: language, culture and social interaction in learning.

The ColabSaber was evaluated through an experiment in order to observe if its structure, once implemented in the classroom, is able to stimulate students academically and improve school performance of participating students. For this, the experiment considered two classes where one of them had only expository classes and the second one also participated in a practical class of collaborative construction of comics.

For analysis of this investigation, a comparative analysis of data relating the grades and means of the students in relation to the performance in the evaluation of the subject after the experiment was carried out. In this analysis, the evidence presented in the notes shows that the collaborative construction of comics on the subject of the class collaborates with the process of knowledge construction, because both classes, traditional and application of ColabSaber, had an improvement in performance of the experiment.

The average of the evaluations of the students who participated in the experiment performing the method was 8.8 while the average of the evaluations of the students who participated in the traditional classes was 5.7. Thus, this study shows signs of improvement in learning fostered by the application of the technique of narrative construction in the classroom.

It was observed in this research that the construction of comics by students favors the absorption of knowledge for traditional academic evaluations.

In the qualitative analysis in this study, it was observed that the students felt satisfied with the activity of comic book construction, where the narratives that compose Group Storytelling were produced. They felt motivated to work in the computer lab creating their stories based on the science program content presented in class. It was also observed that the collaborative story building activity using Pixton supported the students in consolidating the concepts of the previous class.

As future work, we will do the same experiment with other classes in order to confirm the results achieved, and also new experiments with the aim of investigating the application of interaction techniques focusing on collective knowledge.

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