The use of Mazk intelligent tutor in the process of teaching and learning geography applied in elementary education

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Abstract. The use of Information and Communication Technologies related to sustainability in the educational environment has enabled positive impacts in schools. In this sense, the present article describes an experience with the use of the MAZK Intelligent Tutor System, as it assists in the students 'learning and in the teachers' practice obtaining real-time evaluative results, thus educating for sustainability, since it dispenses the use of paper in the application of the evaluative activities. A pilot test was developed with geography content within the virtual environment containing explanations, examples and exercises was developed to assist in the teaching-learning process and evaluation. Through the analysis of applied questionnaires the reports show that the intelligent tutor obtained positive results with its clarity and practicality being considered simple and dynamic favoring the interpersonal relationship between teachers and students.

Keywords: Intelligent Tutor, Sustainability, Teaching-learning.

1. INTRODUCTION

New Information and Communication Technologies (NICTs) have become indispensable in contemporary society because with their entangled advances in entertainment and fun, children from a very young age have the skills to handle and deal with mobile devices. Thus, it is necessary to use electronic devices to improve education, because according to the authors Coelho et al (2017), through the process of learning in digital environments will be possible for students to use different forms of interaction, overcoming obstacles related to time and space [...] and still valuing the subject as a constructor of their learning.

Starting from this premise, it is relevant to rethink the way of learning and teaching aiming at an innovative posture in face of the new educational challenges. Melo and Bortolozzo (2010) assert that the insertion of new technological resources shortens the distances, promotes new assemblages, brings together within the same curriculum the political-administrative spheres of the classrooms. In order to improve their teaching methodologies, teachers are actively participating in the process of knowledge construction by focusing on their educational practices, thus seeking ways to introduce the technologies in the classroom, thus raising the attention and curiosity of

the student.

In order to improve existing teaching practices, the Laboratory of Computational Technologies (LabTec) of the Federal University of Santa Catarina (UFSC) has developed an Intelligent Tutor System (ITS) called MAZK that allows teaching and learning of several subjects. According to the authors Vidotto et tal (2017), an Intelligent Tutor System can be defined as a computational system that incorporates artificial intelligence techniques to act as tutor of a student in a given field of knowledge. An ITS allows the learner to learn with the help of mobile devices on several topics and assists the teacher in the insertion and teaching of contents, guaranteeing the teaching-learning process.

With MAZK, the identification of user knowledge levels, as well as the difficulty of the exercises, are automatically adjusted according to the interaction between educator and student. According to Bittencourt (2018), the objective of ITS is to provide a pedagogical support tool to improve teacher strategies by bringing teachers closer to educational technologies, in favor of better socialization, contributing to the quality of teaching and sustainability since it does not require the use of roles in their studies.

This article is composed in addition to this introductory part of presentation, by a second section where the fundamentals of MAZK and its purpose for education will be presented. In section 3 we will see the methodology, section 4 presents the results obtained, and the final section describes the final considerations and future works.

2. KNOWING THE MAZK

MAZK is an ITS who presents content developed by teachers, encouraging students in the learning process. The tool was developed in a web platform, mainly using the scripting language called Hypertext Preprocessor (PHP), and can be used both on the desktop, through the browser, and on mobile devices, as long as one has access to the internet. In addition, it can be applied to any level of education, because it has a simple and intuitive interface.

As Frigo (2007) claims, the ITS models student knowledge about a topic and the extent to which it performs certain tasks, the system compares this knowledge with the domain knowledge model. The system can also adapt learning levels and styles to the student and present the information, tests and answers that are most appropriate.

The MAZK system is divided into two types of user (teacher and student) registered according to their purpose of use and with different functionalities. The teacher has the possibility to register questions, explanations and examples. The information registered in the system by teachers is linked to each other through content identifiers, called tags. Once this is done, a material can be assembled, as shown in Figure 1, which, in turn, is the grouping of explanations and questions where each explanation may have one or more examples. From a material, the teacher also has the option of creating a room.
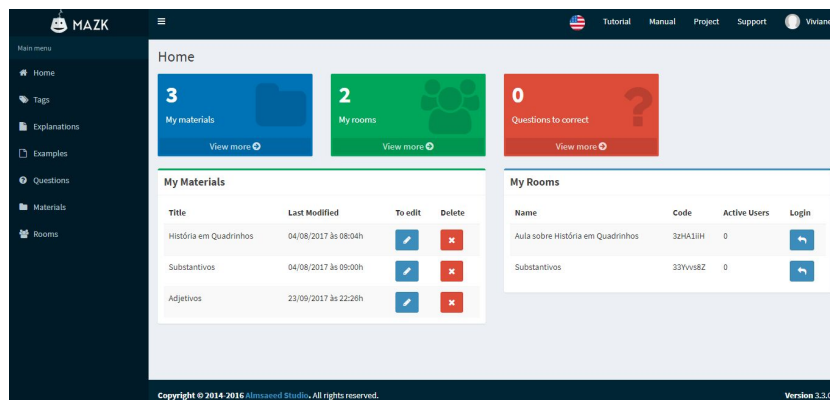
Figure 1. Teacher's home page at Mazk

When a room is created, the system generates an entrance code, so the teacher can select the students who will have access to the room. In addition, the teacher has at his disposal graphs and statistics of the rooms created by him with data of hits and errors of each student. On the other hand, the student enrolled in the system has access to public materials assembled by the teachers (Figure 2), which can be answered at any time, and to private rooms in which they need the access code to read and respond to the material.
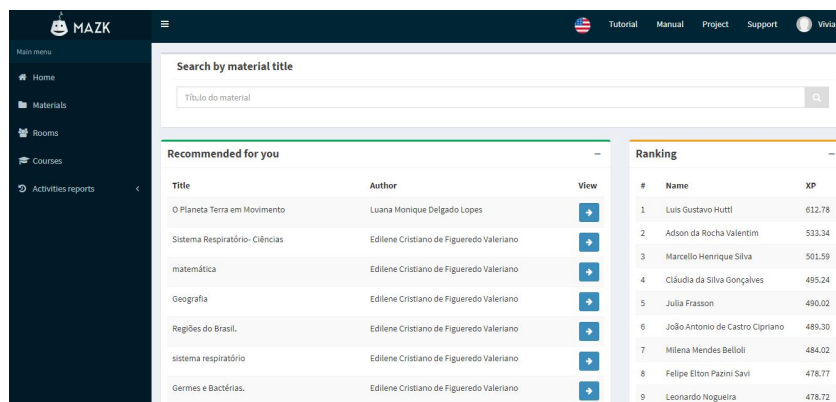

Figure 2. Recommended materials for students

The rooms can only be answered by the students while they are open, however, the teacher can open or close the room at any time. In addition, the student has access to performance charts by area of knowledge, total number of hits and errors and a general ranking of experience, as shown in Figure 3. The system is available at (http://mazk.labtec.ufsc.br/). Students' level of knowledge and questions are automatically adjusted through the number of correct answers and errors of each, suggesting content according to their performance standard. There is also a system of ranking of experience, according to the performance of each student, arising a healthy competition among them, in order to instigate them to the studies.
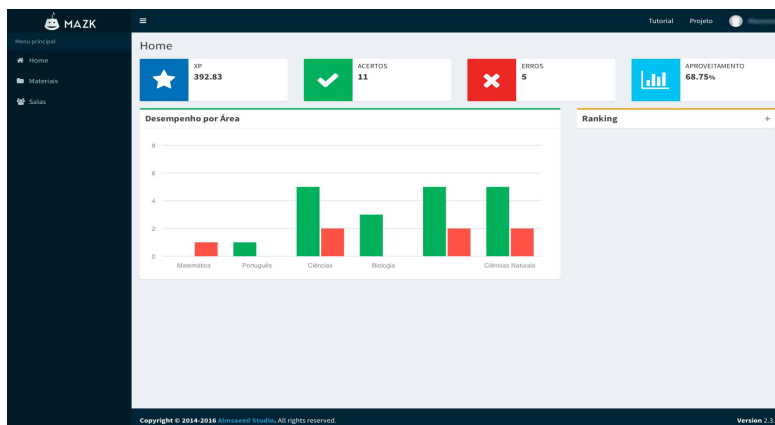
Figure 3. Student Performance

The Intelligent Tutor System used in the practice of the studies and in the application of the evaluations contributes to the educational sustainability, since it diminishes the use of paper in the schools and reduces the expense with school materials for students and teachers. With the use of information technology in favor of nature, they proved that paper use can be drastically reduced (SUSTENTABILIDADE, 2011). For the teacher the decrease of roles in the application of the results represents beyond sustainability, much practicality in his daily work as the time used with planning and correction of the activities, while for the students, the restricted use of paper in his studies reverberates in becoming, be shrewd and critical by transforming them into conscious and responsible adults with the environment.

3. METHODOLOGY

For the composition of this article we used an exploratory research on the concepts addressed, through an article found in the Google Scholar and experimental database, in order to validate the use of the MAZK tool in a classroom as a learning support.

The ITS MAZK has a dynamic virtual environment, allowing the studied subject to be consolidated with greater emphasis and meaning. We enjoy this space to create classes related to the discipline of geography, focusing on the theme that studies about the Brazilian regions. The lesson began with the presentation of the chronogram to the students, then they visualized the location of the Brazilian space in the globe and were taken to research about the regions of our country (South, North, Southeast, Northeast and Central West).

Because they were students of the rural school, children of farmers, and because they were distant from the city center, they did not have an electronic address (email), thus, it was first necessary to create an address and password of email. After some more activities in the classroom, the students were taken to the computer where they accessed

the ITS MAZK with their login and password. By accessing the ITS, the students entered the virtual room with the access code provided at the beginning of the lesson by the teacher, consolidating their knowledge in explanations mode, where they found the image of the map of Brazil divided into regions and later carry out the exercises in the system itself.

The interaction of students with MAZK is shown in Figure 4.
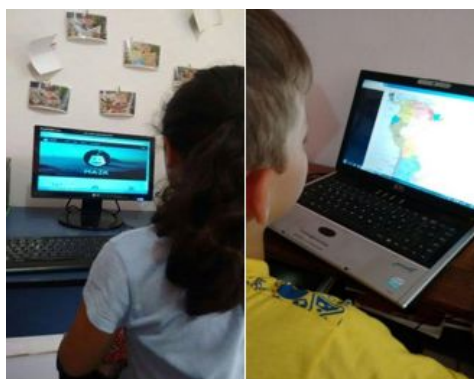
Figure 4. Students connected to MAZK to study Geography

In the page created to realize the exercises the students have the option of reviewing the explanation, example and questions as often as they feel the need, with this they will expand their knowledge about geography. Throughout the process there was support from the developers of the tool that enabled the teacher who applied the MAZK with the class, which made possible a better exploitation of the information made available. In this sense, the desire to learn about technology and persistence on the part of the teacher were key factors for the success of the application of the content. The validation of the data was done through qualitative approaches, because during the whole process of interaction of the students with the tool the behavior of them was observed; and quantitative, since questionnaires were used in order to prove efficiency.

4. RESULTS

At the end of the activities, the students were asked to write what they thought about studying geography with the help of the MAZK tool and the answers were positive. Everyone, without exception wrote to be very good to study in the MAZK, some of the students' answers were:

a.   *It is environmentally friendly and does not pollute the environment because it does not use sheets of paper for evaluations.*

b.   *Wow!! The MAZK is wonderful!! It is very fun and enjoyable to learn in it...*

c.   *At the end of the answers we already know how many questions we hit or miss.*

d.   It helps those who have difficulties, that is, we can go in the explanations as many times as we want and in the end we already see in which we hit or miss.

e.   It would be great if all schools had access to MAZK for students to enjoy studying more.

f.   Fun and dynamic.

As we can see, there were no negative points regarding the use of ITS as a facilitator of learning, then we can perceive the practicality of the same as its use by students of elementary school. In the opinion of the students themselves, it is possible to verify in their affirmations that MAZK contributes to sustainability, since too much use of roles in school units is a worrisome factor that requires more discipline and awareness of the whole school community.

After writing about what they found about ITS, an anonymous questionnaire was still given to the students with questions that contained four options of answers highlighted in Table 1 with the following questions: Does MAZK make it easier to study? With MAZK is it more exciting to conduct research and activities at home? With MAZK is it easier to understand the contents? How much do you enjoy studying at MAZK?:

Table 1. Question answer options on the use of MAZK

| ( ) Very good	( ) Medium	( ) Little	( ) None

In Figures 5 and 6, two graphs are presented which represent the students' answers to two questions, which presented in both cases a great degree of acceptance regarding the Mazk tool, because most of the students scored the questions as medium and very good .

How much does the ITS MAZK facilitate your studies and the understanding of the contents?

4; 20%

16; 80%

■ Much   ■ Regular
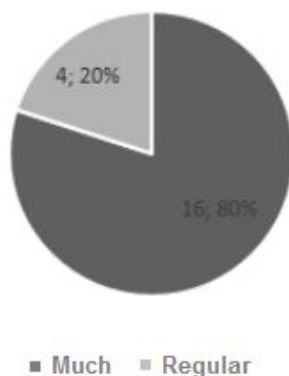
Figure 5. Graph of the questionnaire realized with the students.

In an interview with the 20 students who participated in the studies, the following results were observed in the questioning of how much the ITS MAZK facilitates their studies and helps in understanding the contents: 16 students corresponding to 80% answered that the ITS facilitates and assists understanding of the studies. While 4 students corresponding to 20% responded to be regular the ease of understanding the studies, and there were no negative answers regarding studying using the system. For the students it is very attractive and pleasant to answer the questions in MAZK, because they are attracted by the technologies and can realize the activities when and where they want, therefore, the virtual environment can be accessed from home, at school or anywhere with access to Internet.

How much do you like to study in the MAZK?

4; 20%

16; 80%

■ Much   ■ Regular
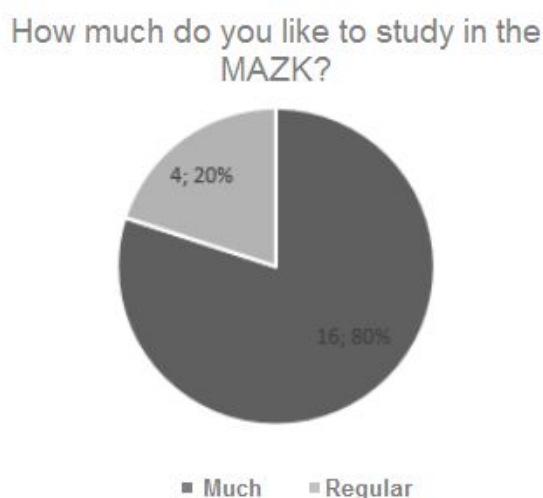
Figure 6. Graph of the questionnaire realized with students

In another questioning about "How much do you enjoy studying at MAZK?", 16 students responded Very Good, corresponding to 80% of the total responses, while 4 students representing 20% of the students surveyed stated that Mazk is Regular for studies and for understanding the contents. It was noticed that there was learning by the students in the course of the activities through participation and evaluations. There was also satisfaction with the ease that it provided to the teacher, because with the help of MAZK, the time of preparation and correction of the assessments is reduced and the students can be guided to the proper use of the technological tools in the classroom.

5. FINAL CONSIDERATIONS

Based on the previous results investigated and considering those resulting from the diagnosis of the questions applied after the application of the activities, the reports show

that it was possible to provide the students a new way of studying and learning the contents taught in the classroom in a pleasant way. This article also aims to describe an experiment carried out through the MAZK Intelligent Tutor System and how it helps in the teaching-learning process collaborating with the interaction between teacher and student. ITS learning has also resulted in a considerable saving of roles in their applicability, thus contributing to sustainability and raising the ecological awareness of learners.

It is also possible to propose and evaluate a new teaching tool through an ITS, where teachers and students could enjoy educational quality for their social and professional growth. What is essential for the education of primary school students is to carry out teaching and learning in a more dynamic and innovative way, thus breaking with the traditional process of teaching and learning, since it ceases to be a passive attitude of the learner and an active attitude only of the teacher, becoming a process in which both participate in the construction of knowledge (BARBOSA, 2005, 92). From this perspective, the tool was applied in the classroom to strengthen the learning about the Brazilian regions in geography content using a practical and intuitive system such as MAZK to facilitate the work of the teacher and to recommend the integration of students with the applied content.

It is perceived the need to continue with the elaboration of future works for improvement in the tool, being they with contributions for the teachers as for the students, or both. In this sense, continuing to apply MAZK in the classroom is also necessary, to discover the advantages of the tool, as well as improvements in development and teaching.

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