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eBook: a pedagogical device in teaching and learning of biology and geology – a case study with students of the 11th grade

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Abstract: This work, framed in a study written to obtain the PhD degree, presents the crossing of the results obtained in a search which involved the conception, construction and evaluation of an eBook, developed with 11th grade students. The eBook appeared in the context of the curricular subunit: "Important geological processes and materials in terrestrial environments – Main sedimentary rock formation steps; The sedimentary rocks, historical archives of the Earth". The aims of this investigation were to conceptualize, organize, implement and evaluate an *eBook* built in a teaching perspective oriented to the teaching and learning of Biology and Geology and, simultaneously, to find out at which point a pedagogical tool could be made. To the data gathering, we used the active observation, the students' questionnaires appliance, worked on SPSS, the production of a classroom diary treated through the analysis of its content and the documental analysis of the eBook content.

Keywords: Teaching and Learning, eBook, Geology, Pedagogical Device, Investigation-Action

1. Introduction

The main purpose of this work is to conceptualize, organize, implement and evaluate an eBook, built up in a perspective of teaching, oriented for teaching and learning and, simultaneously, inquiring whether this virtual tool – eBook – could be considered a pedagogical device.

This tool was developed in the scope of Biology and Geology classes of the 11th grade, most properly in the context of Geology, unit 2 – Important processes and geological materials in terrestrial environments, curricular subunit: Important processes and geological materials in terrestrial environments – sedimentary rocks, which integrate some Geology contents of this level of education.

In this study, students from a class of the 11th grade, which attend the Biology and Geology classes in the Primary and Secondary School of Cerco, were involved.

The results of crossing two of our techniques for collecting and processing data will be presented, as well as the statistical analysis of the questionnaires, and content analysis of the daily lesson and eBook, which enables to address, for now, two of the initial questions of our research work:

- What is the contribution of the use of an integrated eBook to the Biology and Geology 11th grade program?
- To what extent to can the virtual tool – eBook - constitute itself as a pedagogical device?

In the presented work, a research-action methodology was followed, as the study case occurred inside the classroom, involving students and their teacher, who assumes the double role of teacher and researcher.

2. Case Study Framework

The Primary and Secondary School of Cerco is an Educational Territory of Priority Intervention (ETPI) School, where it is not easy to teach and encourage students in the study of the different program contents. Our school presents a large number of students who are at risk of school and social exclusion, so we intend to promote the educational success of these students who belong to such a poor environment. The school is integrated in a particularly defying context in which the aims are the decreasing of the

indiscipline and of the absence, in order to promote the school success through the implementation of projects strongly built in evidences and in the knowledge of the local reality. In order to motivate and involve our students, we decided to explore a different and innovative way in the course subunit approach: Important processes and geological materials in terrestrial environments – Major stages of formation of sedimentary rocks; Sedimentary rocks, historical archives of Earth. We invested in the planning and implementation of a virtual tool, an eBook, establishing itself as a pedagogical device, and not as a mere and simple creation of didactic material.

The pedagogical device concept was created by Bernstein (1990) and it is connected with the "*aim of analysing the "pedagogical speech grammar", that is, the way through which school education transmits, reproduces and transforms culture.*"(Leite, 2005, p. 6). The pedagogical device allows "*a communication analysis inherent to the curricula development processes and it gives clues to the configuration of an intercultural education*." (Leite, 2002, p. 106).

The pedagogical devices correspond to educational proposals which tend to be a "*good bridge*" in the necessary link between the school culture and the culture of the surrounding community, being the community represented by the presence of students at school (Cortesão & Stoer, 1996, p 41). The pedagogical devices constitute, as well as an amplification point, a way of generating knowledge and, at the same time, a learning resource, a means of giving voice and enhance the specificities and cultural exchanges, in a process of knowledge construction/production, arising from an effective participation of different social agents (Leite & Pacheco, 2008).

The pedagogical device is not just a material resource "*used to convey information and acquire knowledge*". It corresponds to a process in which teachers and students are actively involved and that, in all, promotes reflection and develops opportunities for participation and training. As it is dynamic, it is subject and promotes ceaselessly processes of recontextualization. Therein lies the value of the pedagogical device in curriculum development and in the context of intercultural education (Leite, 2002, p. 114).

The present study is innovative, we did not find, in our bibliographical research, any other similar study like this one. We point, however, some studies who have been done and, consequently, supported and influenced our work. Among them, we point out: Lima (2007), in terms of using WebQuests as pedagogical device, Silva (2013), who used the practical work as a pedagogical device in the teaching and learning of Biology and Geology, Bottentuit Junior, *et al* (2006), Bottentuit (2010) and Neves (2006) in the WebQuests domain, as well as in another very interesting project about the potentialities of a social network service, Facebook, in the development of the competences previewed in the program of the Biology subject for the 12th grade (Minhoto & Mourinho, 2011).

3. Methodological Lines of Research

As already mentioned, in this research work, a working methodology of the research-action type was conducted, since we took our teaching practice as the research object, trying, this way, to combine theory with practice.

The investigation-action, besides building itself as an investigating methodology, full of methods, criteria and from which arises theories about the educational activity, it also gains consistency and distinct marks when compared to other methodologies, since it appears as an action project, having, to do so, to carry within acting strategies which teachers can use accordingly to their needs, so that they can face educational situations in real context (Coutinho, 2009).

The research-action aims to investigate while a didactic action is performed, allows investigating rigorously that same action, its results and implications, making it, thus, possible to learn from the experience. Therefore, teaching and research "*are assumed to be able to coexist, interpenetrate and integrate into themselves*" (Moreira, 2001 p.71).

Our daily work in the classroom was the focus of our own research. Therefore, we have a double role of teacher/researcher, and, as we have assumed this dual role, it was essential to be aware of the specificities concerning education, on one hand, and research, on the other, in order to make very clear the contours and limits of each one (Moreira, 2001).

According to Moreira (2001), this type of teacher involvement, which focuses its action as an object of research, to promote self-reflection and self-criticism of the teaching practice, contributes to improving the quality of the teaching-learning process.

The investigation-action methodology develops itself, in a continuous way, in four fundamental stages: planning; action; observation (evaluation); reflection (theorizing). This set of procedures, which works in a circular movement, starts a new cycle that, on its hand, sets in motion new spirals of reflective action (Coutinho, 2008, 2009).

According to Blández Angel (1986), the investigation-action is an ecological methodology, in the sense that it is developed in the classroom's natural scene and in touch with the educational reality, therefore involving people who are directly connected to the educational process. And it is, simultaneously, flexible, since, during the investigation construction the options are selected bearing in mind the results we are obtaining. Because of this, and still according to the author's opinion, it is dynamic, once it is connected to the teaching practice, so it necessarily implicates us with time, and it is formative, since it leads us to the deepening of the teaching process, forcing us to an awareness, transformation and formation process of capital interest to the professional development.

3.1. Characterization of Class 11A

The Class 11A was assigned to us during the distribution process of academic service (2011/2012) accomplished by

the director.

At the end of the school year, the class comprised eighteen students – all participants in the research study – whose ages were between 16 years (44,4%) and 17 years old (44,4%). Merely 11,1% of students are 18 years old (Figure 1). The class was consisted mostly by girls (55,6%) – Figure 2.

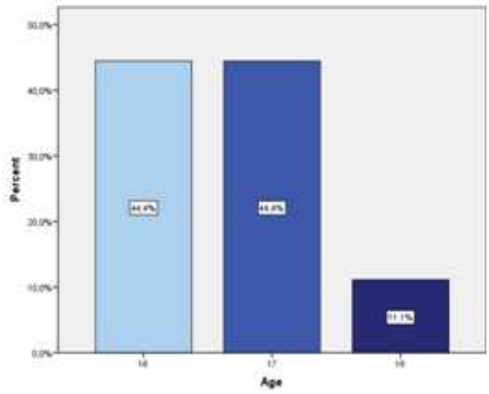

Figure 1. *Distribution of interviewed by age*

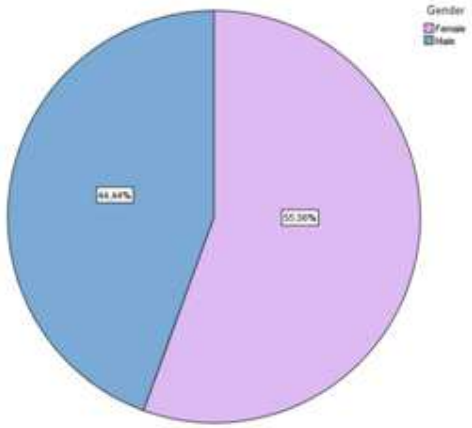

Figure 2. *Distribution of interviewed by gender*

Only 16,67% of the students were repeating the Biology and Geology subject (Figure 3).

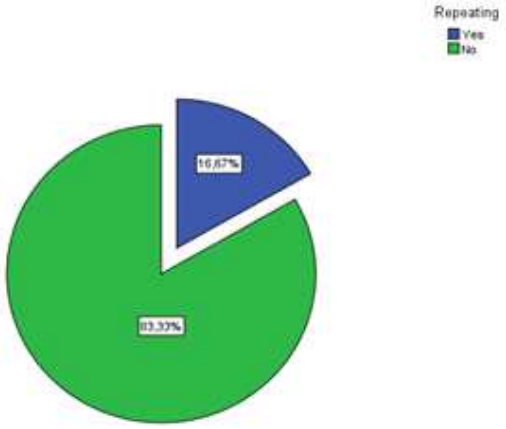

Figure 3. *Distribution of students who were repeating the Biology and Geology subject*

Regarding the final classification achieved in the Biology and Geology subject in the 10th grade, it was verified that there were not lower scores than 10 values and these are concentrated among 10 values (33,3%) and 12 values (33,3%), being the maximum score of 20 values(Figure 4).

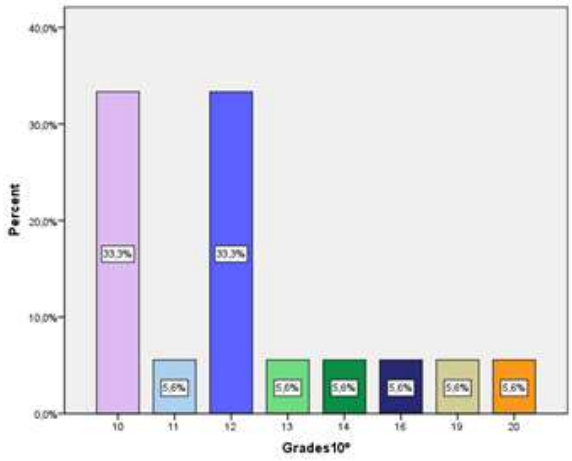

Figure 4. *Grades distribution obtained in 10th grade in the subject of Biology and Geology*

Concerning the 11th grade of Biology and Geology subject, 1st term, the obtained grades were between 8 and 20 values (Figure 5).

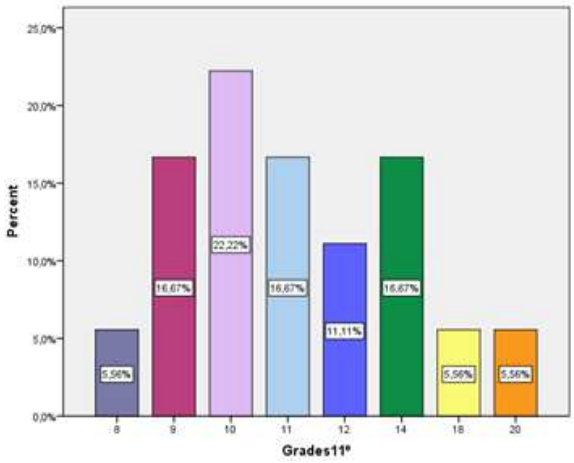

Figure 5. *Grades distribution obtained in 11th grade in the subject of Biology and Geology – 1st term*

3.2. Tools for Data Collection

For data collection, we used the active observation, questionnaires to our students, properly treated in Statistical Package for Social Science (SPSS), the implementation of a classroom diary to be studied through the content analysis and documental analysis of the eBook content.

4. Analysis and Results Discussion

We will just denote the intersection of some data statistics with the content analysis of the classroom diary and the

eBook. The triangulation of other obtained data, due to their extension, will be discussed in a future opportunity.

The questionnaires (Annex A) applied to students have been processed, as already pointed out, in SPSS, nowadays called PASW. This tool is a statistical package used for data analysis in order to manipulate, transform, and create tables and graphics that summarize the information obtained from the database.

Nevertheless, its potentialities go beyond the simple descriptive analysis of a data set. It is also possible to achieve, with this software, more advanced procedures which go from the Statistical Inference, hypothesis tests and multiple statistics to quality and quantity data. However, this is no longer the object of the present study.

Regarding the choice of the analysis techniques for the database, multiple choices may be made to provide a more comprehensive and appropriate approach to the subject to be studied. The obtained data, from our classroom diary and from the eBook built by our students, was treated through the content analysis technique.

Generally, all the collected data in qualitative research is subjected to a content analysis. The choice of the most appropriate technique to analyze all the collected data clearly depends on the objectives and status of the research and the epistemological paradigm of the researcher (Guerra, 2006).

The content analysis, according to Bardin (2011, p. 11) corresponds "*to a set of methodological instruments, each time more subtle, in constant improvement, which are applied to an extremely range of speeches (contents and containers). The content analysis, while interpretation effort, will balance between the two poles, the one which intends the rigour of objectivity and the one that intends the fertility of the subjectivity*."

The content analysis corresponds to a "*set of communication analysis techniques that use systematic and objective procedures in the description of the messages content*." (Bardin, 2011, p. 33)

Concerning the analysis of the questionnaire survey results, we found that, to achieve the eBook, our students, in its vast majority (72,22%), to accomplish the literature search used the School Library (Figure 6) and 55,56% used the internet (Figure 7).

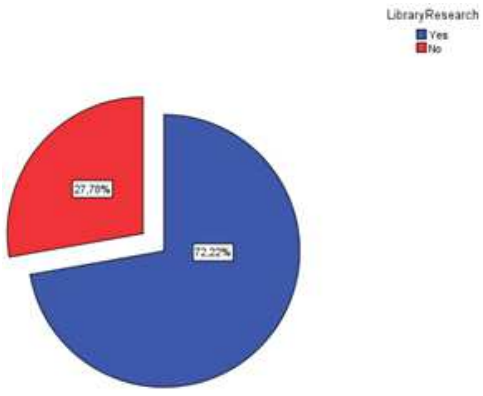

Figure 6. *Distribution of interviewed by the variable "library research"*

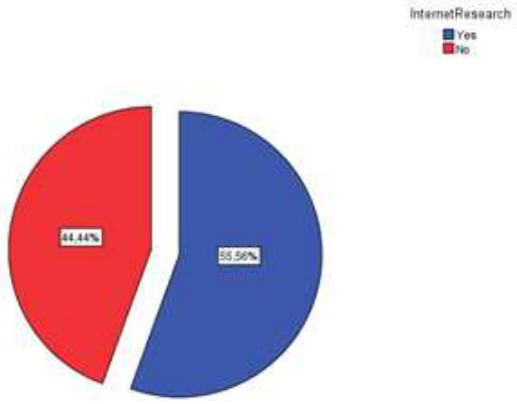

Figure 7. *Distribution of bibliographical research on the Internet*

Analyzing the eBook contents, we find that, effectively, an extensive literature search was conducted, as the information that the students presented reveals to be diversified and very concise in line with the 11th grade program of the Biology and Geology subject, organized under Amador (2003) coordination.

We believe that the eBook presents itself as well structured and organized, addressing all the contained contents, as already mentioned, in the national program of the course.

During the task of drafting the texts presented on the eBook, we found that students do not acquire enough knowledge about the authors, they quote, in the body text, those authors.

The students researched and organized the bibliography, which has suffered a long and rigorous selection during the lessons. They also looked for a standard normalization to do a proper reference of the authors who were used in their work. Obviously, this part was a drama, writing the bibliography was confusing, since there were many ways of doing it. After a brainstorm, some reflection and also some research on the internet, the students chose the APA style, withdrawn from the Polytechnic Institute of Portalegre – Superior School of Health of the Polytechnic Institute of Portalegre (Standards for the preparation and submission of written works).

We realized that all our students enjoyed the Biology and Geology subject and they all admitted having a positive relationship with the teacher/researcher.

Both factors were crucial for the full involvement of the students in this project. They easily got involved in the planning and implementation of the eBook, feeling entirely motivated to work on it. Moreover, the physical space of the classroom has always been a favorable factor to undertake the project, since the working environment was of mutual trust.

Starting from the analysis of certain details of the eBook content, such as the presentation of practical work illustrated with photographs and the implementation of creative schemes, we are led to infer that the students liked the course and were very involved during the proposed work. Throughout the text, laboratory work performed in class is

presented, with a suggestive title: "Hands On". There were also used photographs captured during these activities in order to illustrate them. A scale of Mohs was built from the existing samples in the Geology Lab and its schemes were designed in order to enrich the various contents, supported by Paint software to become more appealing.

Our students tried to express the contents learned during Biology and Geology lessons and implemented in the eBook, according to the various points of view and joint reflections, i.e., what could be done in a classroom from the national course program.

Typically, the students felt almost always comfortable (72,2%) to express their doubts/difficulties and to submit their opinions/suggestions for carrying out their work. During its implementation, they were mostly (77,8%), encouraged by the teacher to participate, discuss and express their ideas (Figures 8 and 9). Moreover, the majority has agreed (88,9%) that the teacher was always available to answer questions and/or to help in difficulties. Great part of the students felt stimulated and encouraged to have a critical spirit (55,6%) – Figures 10 and 11.

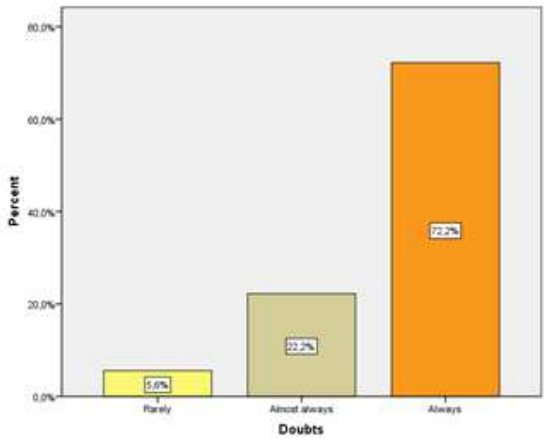

Figure 8. *Distribution of the situation: "The student feels comfortable expressing doubts/difficulties and presenting opinions/suggestions"*

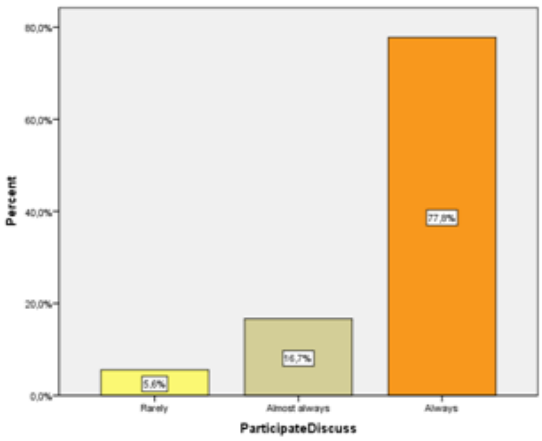

Figure 9. *Distribution of the situation: "The student was encouraged to participate, discuss and express ideas"*

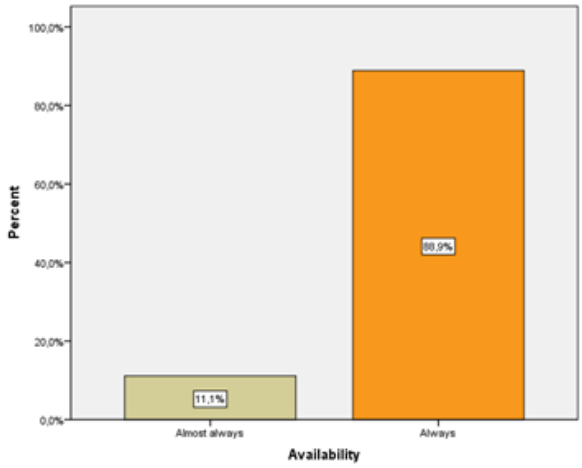

Figure 10. *Distribution of the situation: "Availability to answer questions and/or difficulties"*

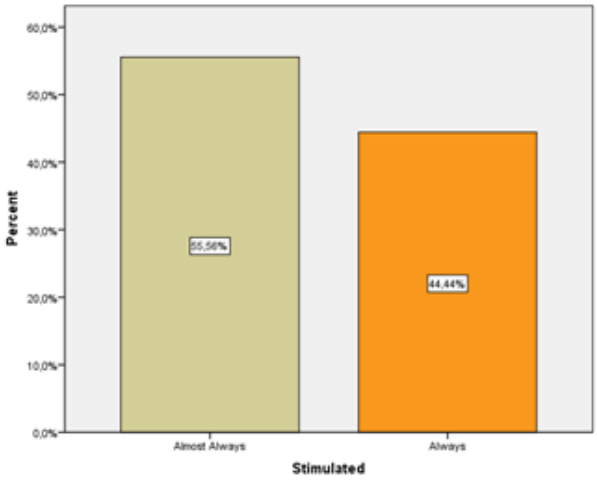

Figure 11. *Distribution of the situation: "The student was to be critical in the discussed situations"*

The large majority of students (94,4%) considered that the teacher heard their suggestions/opinions/strategies (Figure 12). And, at large, they have also felt (83,3%) that the teacher has recognized and praised the work done (Figure 13).

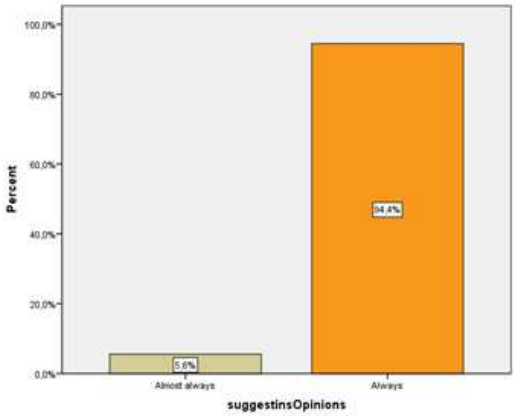

Figure 12. *Distribution of the situation: "The teacher heard the suggestions / opinions / students' strategies"*

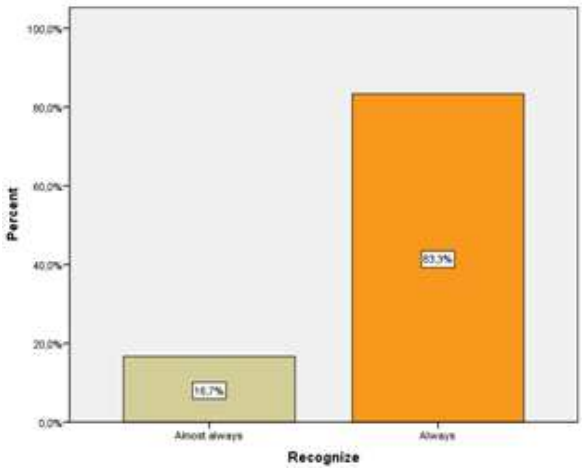

Figure 13. *Distribution of the situation: "The teacher has recognized and praised the work developed by the students"*

In general, the students assumed that their colleagues heard their suggestions. They affirmed that listening others is part of the teamwork. Some identified themselves as leaders by stating that their ideas/suggestions were almost always accepted (Figure 14).

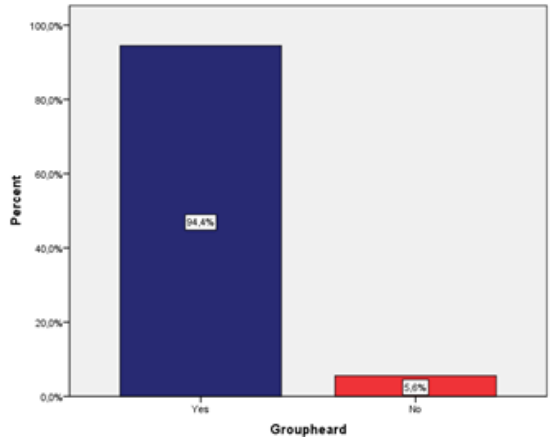

Figure 14. *Distribution of the situation: "The group heard the suggestions of each student"*

And how did these variables materialized in implementing an eBook?

In many ways, during the work, the students asked some questions and one of the big ones was "what do to with the Pre-Cambrian?". They knew that it corresponded to a large unit of time and that did not fit the description of Age. In fact, they had the notion that it was much more extensive. They discussed the topic with the teacher/researcher, reflected, brainstormed facing new information, and solved the question very gracefully, at least from our point of view. The students chose to build a sentence, which transmitted their joint reflection "The Pre-Cambrian is the division that includes most of the geological time". And, indeed, their knowledge couldn't allow them to go much further. In multiple researches they have found a correlation to an Era, or an Éon, concluding, after reflection that these designations represent a scientific error, and they were able to identify that the Pre-Cambrian period included the largest share in Earth's History, which was beyond an Era or an Éon.

A group of students expressed their intention to build its own scale of geological time and, after a period of discussion, they implemented its construction according to their vision, since the idea was accepted by all. The class heard the suggestion as well as the arguments of the colleagues involved in this work. Evidently, this scale is subject to criticism for its simplicity and for presenting some inaccuracies from the scientific point of view. However, it is a students' product, implemented accordingly to the literature search and presenting the aspects that they considered relevant in Earth History.

Due to the students' scarce knowledge of students on Portugal's Geology and the difficulty of dealing, at this point of their education level, with the Geological Map of Portugal, they used contents that were taught in the Natural Sciences classes of the 7th grade, about the distribution of the different lithologies in the country. Recognizing the poor knowledge of the students in this field of study, which is not attributable to them, they have found, however, in Portuguese literature, references concerning sedimentary rocks. From the "Poema da Pedra Lioz" ("Poem of the Lioz Stone") by António Gedeão and the Geological Map of Portugal, the students have managed to formulate a simple and assertive message about the distribution of sedimentary rocks in Portugal.

In fact, the title given to this chapter reveals discussion, a strong argumentative power, critical spirit and creativity: "Portugal, a Sedimentary Reserve".

A large majority of students (94,4%) claimed to have skills in programs like Word, PowerPoint and MovieMaker (Figure 15).

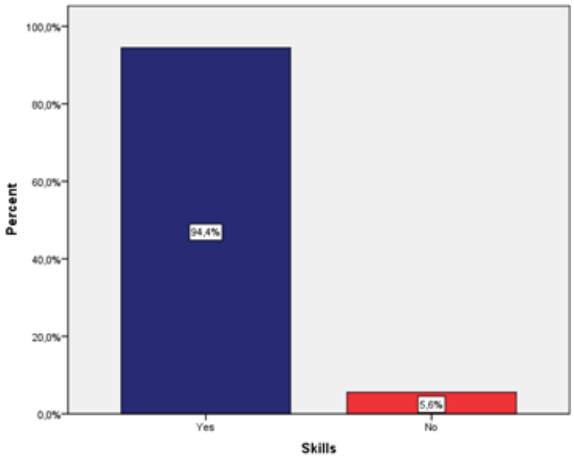

Figure 15. *Distribution of the situation: "Skills on Word, PowerPoint and MovieMaker"*

It seems to be clear that this factor is decisive to achieving the eBook. In this work, softwares', such as Word, PowerPoint and MovieMaker, were used. The final result revealed to be extremely grateful, wherein the chosen colors, according to R and D students, are related to the Earth and Geology. The students presented a paper properly illustrated

with photographs and schemes chosen by them, supported by PowerPoint and Movie Maker, taking into consideration their personal point of view and resulting from the discussion that they had about the topic.

We realized that all the students really enjoyed the work that was done. Some reasons why students liked the work can be addressed:

"It was very rewarding for us to build an eBook, to see how much we enjoyed and became involved in this course.";

"The development of this work was the active collaboration of students, allowed us to express our knowledge, and has been useful to learn how to deal with new situations.";

"It was a positive way to study, helpful to gain responsibility in achieving an eBook. It was fun.";

"Yes, it was very important to learn the topics regarding sedimentary rocks, sedimentary environments and Earth History. In addition, all groups worked in a positive way, achieving the main goal initially established.";

"The final work has condensed all the topics of a subject unit, resulting in more detailed information than the textbook. It is an excellent study tool."

The eBook was materialized in a study tool for our students, in an autonomy way, and also in a different learning way from the typical learning approach. They developed the entire work, where they carried out "their own culture" into school, how to "see" Geology inserted in their everyday reality, the "attitude" of being in a classroom situation, the way they "look" and "feel" the course, and could transmit all these attributes beyond the boundaries of the classroom, school and community, to the virtual universe.

Undoubtedly, the poem, "Segredos que Guardas" ("Secrets that you keep"), written by Rita, expresses the students' enthusiasm to leave "their influence" in the virtual world, to prove that they are able to handle, in an autonomic way, with the topics of the Geology subject.

However, for most students (72,2%), the implementation of the eBook was not an easy process (Figure 16).

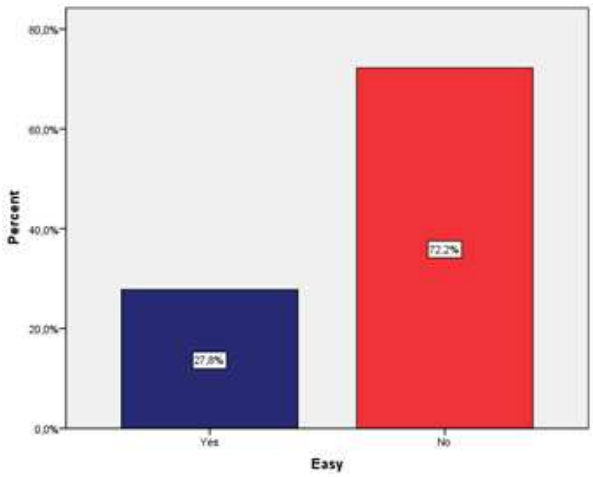

Figure 16. *Distribution of the situation: "Was the eBook implementation an easy process?"*

Amongst the reasons noted were the bibliographic research, the simple organization of information, the time spent with several used software programs and the dedication to work.

A question hovered in our minds: After all that hard work, would they like to repeat this challenge?

To our satisfaction, the large majority (88,9%) would like to repeat this challenge (Figure 17).

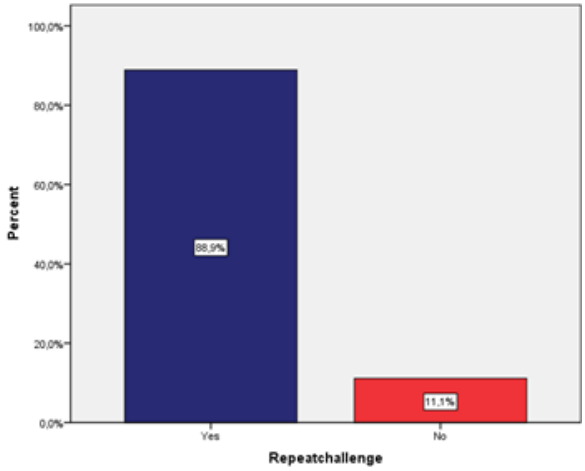

Figure 17. *Distribution of the situation: "Would you like to repeat this challenge?"*

Some of the presented reasons that justify their answer are related to consider that the eBook implementation motivates the students to learn the different subject contents and that the final work is transformed as a truly study tool, and, also, because it is a different way of learning in comparison to the classical one.

"*Because I feel that it is a different way to encourage "indirectly" the students to" study*", *in order to learn as much as possible. Thus, this "way" of studying is much more fun than using only a notebook and individual guides*";

"*A repetition of this "challenge" in another unit will promote the learning of the subject's contents and will motivate progress in its study*".

After the students have finished the study, all the information was published on-line. It has been created an educational site – Pedagogical Device – to host the pedagogical device (*eBook* – Sedimentary Rocks: Secrets of the past) –http://dispositivopedagogico.com/

Joomla (version 2.5) allowed us to create an attractive and simple website, without taking too much time and costs to creat and maintain it.

The following question was also formulated to students: "What do you feel when you access to the website where there is all the work done by you and your colleagues and that is available to any student and any school?". They feel pride, satisfaction, gratitude and happiness.

"*I feel that the class struggled to accomplish a good job, which is now available to all who are interested*.";

"*I feel pride and happiness to know that our work will be available to more people beyond the classroom*.";

"*The accomplishment of this project arises feelings of joy,*

merit and, above all, pride in the final results.".

The work exceeded the physical boundaries of the Biology and Geology classroom and it was shown on-line, so, it can be said that jumped the "Cerco".

In this project we felt that our students were really involved, their way of working, their way of living, their interests and habits, the playfulness and the particularities of each one. The eBook is the face of a class, the reflections of a group, characterizing these students that are part of an ETPI school.

One of the weaknesses that is fully assumed in this type of work, and that was observed by the students, is that the majority (55,56%) considers that they don't dominate any knowledge concerning the theme "Important processes and geological materials in terrestrial environments - Major stages of formation of sedimentary rocks; Sedimentary rocks, historical archives of Earth". The reasons are justified by the fact that some students consider that, as the contents were distributed by groups, they only know the topics that they were involved in.

However, a student emphasizes that "*After reviewing the entire eBook, I consider that I really know the course contents presented in the book, complementing and filling "gaps" in the schoolbook*".

Effectively, after they have read and have acquainted with all the work, they completed the initial gaps, as referred by this last student.

Our virtual tool materialized in a pedagogical device. Considering the relationship between technology and culture, and assuming that this relationship depends on the interaction degree and communication between subjects, it was realized that this integration was, in fact, verified among students and we consider the possibility to assign the eBook as a really pedagogical device, responsible for the production, reproduction and transformation of the culture (Monteiro, *et al*., 2012).

Following the line of reasoning of Monteiro *et al.* (2012) to our virtual tool, and as a means of communication, it worked as a powerful tool for discussion and sharing of power, giving voice to all students in the class. We consider to have worked as a pedagogical device, promoting and developing the education learning, rooted in principles of democratic communication.

We believe that this work helped to create and develop a learning environment where the students could feel accepted, as well as represented, and where can be "*provided conditions to organize the knowledge arising from their life experience and at same time acquire knowledge related to the experience of others*" (Leite 1999, p.6; Lima, 2007).

When we started the planning, implementation and use of an eBook, it was not our intention to limit ourselves to reproduce a content, but rather to use the tool as a working construction. This knowledge refers both to the acquisition of knowledge in the context of Geology, as well as to the acquisition of knowledge that enhances the personal and social dimensions (Lima, 2007).

Through planning, construction and implementation of our online tool, we sought an active learning carried out by our students and we aimed a link with their experiences and everyday reality.

5. Final Remarks

The eBook is a pedagogical strategy of Web resources for educational use and can be developed and implemented in the classroom environment.

In terms of classroom, this work has allowed a cooperative learning environment, aspects like motivation, involvement in learning and the development of the critical thinking were brought to daylight and hardly worked. It was even more positive in the consolidation of the learning built by our students in the curricular subunit: Important geological processes and materials in terrestrial environments – sedimentary rocks.

It allowed a student-centred learning – a constructionist conception of the learning, where there is a desire to innovate, to create new methodologies.

Our role was to guide the students, so we assumed the task of being a teacher-tutor, in terms of the bibliographical research, of the practical work, of the experimental activities, in collecting photographs, in the different informatics applications and in the different options taken by the students, as well as in the enlightenment of doubts.

Our study reinforces the conviction that the eBook, as a pedagogical device, may be used successfully in different levels of teaching, in order to help students to expand their learning beyond the immediate boundaries of the curricular learning, as well as it can promote the learning of new concepts.

The results we obtained reveal a favourable attitude towards the planning, construction and implementation of the eBook, recognizing it utility and interest.

However, this data is only an indicator of the success in the application of this project, whose aim was to promote the learning of our students.

Supported by the planning and construction of the eBook, a learning environment was implemented where each of our students could feel accepted and represented. The cross-checking data that was done demonstrated that the implemented eBook, proposed on our research work, constituted, in fact, a pedagogical device.

We also sought to provide good conditions for our students to organize the knowledge arising from their life experiences and to acquire knowledge related to the experience of others.

Our students were active participants in their own learning, expressing more easily their opinions, beliefs, attitudes and values.

A planned, structured and developed eBook in the classroom context created a new pedagogical speech and transformed the school culture, also creating opportunities for the existing classroom cultural diversity to take place.

As it appears referred in Cortesão & Stoer (1996, p. 41), the pedagogical tools are educational proposals which intend

to build a "*good bridge*" in the necessary connection between the school and the surrounding community cultures, being the community represented through the presence of the students in school. The construction of pedagogical tools allow students to develop a work "*which contributes to stimulate a reflexive self-knowledge, which also includes the knowledge of the group to which they belong, an appreciation, a respect for their own cultural roots, and, at the same time, that curricula contents considered as important are acquired in an easier way, and most specially, with more pleasure.*" (Stoer & Cortesão, 1999, p. 61).

We believe that our results may contribute to another way of thinking and acting in the teaching and learning process. Being so, we consider the investment in this innovative work very interesting, relevant, pertinent and unexploited, which means that there is some potential for further future investigation.

Either way, we would like to safeguard that this work is no more than a suggestion, a starting point to any teacher who will have to rebuild it and apply it to the different classes with which he/she works with.

Enquiry

How do I evaluate the construction of the eBook?

With this enquiry it is intended to accomplish a students' opinion study about the construction of an eBook in the curricular subunit: "Important geological processes and materials in terrestrial environments – Main stages in sedimentary rocks' formation; The sedimentary rocks, historical archives of the Earth".

This study is conducted in the scope of the PhD in Education of UPT.

Your contribution is very important and we thank your cooperation and your availability.

The anonymity is assured.

1. PERSONAL DATA

1.1. Gender:

Female ☐ Male ☐

1.2. Age: _____ years old

1.3. Mother's Job:

_____

1.4. Father's Job:

_____

1.5. Mother's academic studies:

1st Cycle of Basic Teaching	☐
2nd Cycle of Basic Teaching	☐
3rd Cycle of Basic Teaching	☐
Secondary School	☐
Attended University	☐
Bachelor	☐
Master	☐
PhD	☐
Doesn't know how to read or write	☐

1.6. Father's academic studies:

1st Cycle of Basic Teaching	☐
2nd Cycle of Basic Teaching	☐
3rd Cycle of Basic Teaching	☐
Secondary School	☐
Attended University	☐
Bachelor	☐
Master	☐
PhD	☐
Doesn't know how to read or write	☐

1.7. To accomplish your research according to the theme, did you use the School Library or books which are available in the Biology and Geology Laboratories?

Yes ☐ No ☐

1.8. To do your bibliographical research, did you use the *Internet*?

Yes ☐ No ☐

1.9. What was your mark in the subject of Biology and Geology on the 10th grade? _____

1.10. What was your mark in the subject of Biology and Geology in the 1st term? ____. And in the 2nd term? ____.

1.11. Are you repeating the subject?

Yes ☐ No ☐

Read the questions attentively and mark with a cross (X) the situation that better translates your opinion about the construction of the eBook.

2. Do you like the Biology and Geology subject?

Yes ☐ No ☐

3. How would you evaluate your relationship with the teacher?

Positive ☐ Negative ☐

4. During the development of this work, did you feel at ease to express your doubts/difficulties and to present your opinions/suggestions?

Never ☐ Seldom ☐ Almost ever ☐ Always ☐

5. During the development of this work, were you encouraged, by the teacher, to participate, discuss and express your own ideas?

Never ☐ Seldom ☐ Almost ever ☐ Always ☐

6. Whenever you had doubts and/or difficulties in the execution of your work, was the teacher available to enlighten you?

Never ☐ Seldom ☐ Almost ever ☐ Always ☐

7. Were you stimulated to be critical before the situations developed along your work?

Never ☐ Seldom ☐ Almost ever ☐ Always ☐

8. Did the teacher encourage the students to study and to investigate in order to improve their competences?

Never ☐ Seldom ☐ Almost ever ☐ Always ☐

9. Did the teacher listen to the students' suggestions/opinions/strategies?

Never ☐ Seldom ☐ Almost ever ☐ Always ☐

10. Did the teacher notice and commend positively the work done by the students?

Never ☐ Seldom ☐ Almost ever ☐ Always ☐

11. Did the group listen to and accept your suggestions/strategies?

Yes ☐ No ☐

Why? _____

12. Do you have any knowledge about programs like the text processor *Word*, *Power Point*, *Excel* and *MovieMaker*?

Yes ☐ No ☐

13. Did you like the work which was developed (the construction of the *eBook*)?

Yes ☐ No ☐

Why?_____

14. Was the construction of the *eBook* an easy process?

Yes ☐ No ☐

Why? _____

15. Would you like to see this "challenge" repeated in another subunit of the Biology and Geology course?

Yes ☐ No ☐

Why? _____

16. Do you consider that, after the conclusion of the *eBook* and its availability *on-line,* you dominate all the contents related to the subunit: *"Important geological processes and materials in terrestrial environments – Main stages in sedimentary rock formation; The sedimentary rocks, historical archives of the Earth"*?

Yes ☐ No ☐

Why? _____

17. How do you feel when you access the *site* where the work developed by you and your classmates is, and which is also available to any other student of any other school?

_____

18. Would you like to leave any suggestion/recommendation/critic?

_____

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