USING THE BLOG FOR ENCOURAGING COLLABORATIVE LEARNING: THE CASE OF PRODUCTIVE ARRANGEMENT DISCIPLINE

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Abstract: A biggest challenge in engineering education is the dissociation between knowledge presented in classroom and the concern, value and autonomy, essential components to student motivation (CARVALHO, 2010 e ESTES et al., 2005). This article analysis how these three critical components can be developed through the collaborative learning concept. The information and communication tools represent a big potential to promote this methodology. Inside this group of tools, the blog stands out with its potentiality of socialization and knowledge discussion. This research discusses the Productive Arrangement discipline case in an Industrial Engineering course, for which the blog was created to socialize and to discuss the work prepared by students. This paper corroborates the Habermas' idea: men do not only respond to the environment, but assign a meaning to their actions on it (CARVALHO, 2010). This theory means that students must transpose the concepts learned to professional life. The goal of this paper is understand how learning can be improved when professor uses information and communication technologies at his teaching strategy. The participant observation methodology was used in this research through the following elements: field research, document analysis, interviews, direct observation and introspection. The blog has a great potential to be used in engineering education, but a challenge to be overcome is the establishment of an environment of trust in classroom. The activity performed did not reach all blog potentialities, being only a space to report the work developed with a partial discussion.

Key-words: Collaborative learning, Blog, Wiki, Web 2.0.

1. INTRODUCTION

Several times, online information may be more attractive than the contents presented by the professor. There are two possible reasons for this: monotone pedagogical strategy and the non-applied knowledge. A way to solve these problems is to articulate the contents with the online tools that promote interaction (HOLVIKIVI, 2007). On the other hand, it is important to professors to attempt to understand how students learn. Professors need to observe how their students think and which technological tools they use. Observing these two elements,

professors can propose activities to promote students motivation, the mainspring in learning process (VANASUPA et al., 2009 e ESTES et al., 2005).

There are many tools that are now available with internet widespread use. These tools are focused on collaboration and are examples of the second stage of internet, called Web 2.0. Inside this group, two tools will be discussed in this research: the blog and the wiki.

The blog can be used in education to promote a discussion space and socialize knowledge developed by students, making it available to the society.

The second reason, the "non-application knowledge", makes the classroom a space where the topics are not applied to future professional practice. To solve this problem, active strategies must be proposed to motivate students to the importance of the concepts presented in classroom. It is important to associate technology and the contents application. These two ideas, as connected, can promote a motivational learning atmosphere, a hypotheses defended in this experimental research.

Accordingly, an important question is discussed in this paper: how active and collaborative strategies can be used together to promote students' motivation? Specifically, we want to demonstrate a successful case of the use of the blog and the wiki to improve engineering learning.

2. COLLABORATION AND AUTONOMOUS LEARNING

The traditional teaching methods, based on textbooks, chalkboard, lecture, homework and test, have been pointed out as insufficient for learning (NIRMALAKHANDEN, 2007). A modern concept in education is collaboration and active methods. These ideas put students in a different attitude in the education process, in which they must turn to construct their own ideas. This concept is shared by Hmelo-Silver (2007), who understand that all types of learning involve knowledge construction, like in a constructivist process. To reach this kind of construction, students must be motivated to learn.

To promote motivation, the teaching methodologies must be thought out considering students like active elements in the learning process. This is not easy and cannot be dissociated from environmental, cultural and historical dimensions of the students (VANASUPA et al., 2009). These dimensions are defined as "development domains" and professors must organize their teaching strategies using this concept to motivate their students. These development domains are classified in two groups. In the first group, Cognitive and Psychomotor Domains are considered internal factors and they are related to the information process and abilities acquired with individual practices (VANASUPA et al., 2009). These factors are the focus of the traditional teaching models. In the second group, Social and Affective Domains are considered external factors and they are related to interaction. These two domains are very important to acquire knowledge (VANASUPA et al., 2009 e NUNES e SILVEIRA, 2008). These factors are the focus of the new professional market demand.

These four domains are related to some constructs, the interest (pleasure activity development), the value (understand the importance of the topic in student life) and autonomy (interest evolution, the student goes beyond professors' materials), as Vanasupa et al. (2009) propose.

According to this concept, it is necessary to promote the student's motivation for the learning process gets succeeded. The first idea discussed in this paper is collaboration to promote learning. Collaborative learning is a method that encourages students learning from

each other [4]. The same author confirms that it promotes higher achievement, critical thinking, interpersonal skills and self-confidence.

2.1. Information and communication tools in education

Technology is important to promote a quality teaching process, but it needs to be understood and appropriately used. The use of technology does not guarantee an excellent learning (ESTES et al., 2005).

Web 2.0 tools can promote an active attitude on students. This kind of technology, like the blog or the wiki, can be used in a scaffolding technique. Scaffolding teaching is any form of assistance from an instructor that helps the student's knowledge construction (LABANCHE, 2006). The difference and advantage observed in Web 2.0 tools is that it is not only the instructor who helps this activity, but the other students too.

The use of the Information and Communication Technologies (ICT) tools in classroom needs to be thought in order to define in which cases that it will be used. It is not interesting the use the ICT without a pedagogical strategy defined by the professor. These tools can promote an active position in all kinds of students including the shy ones. In this paper, two Web 2.0 tools were used to promote the students' active strategy development: the blog and the wiki.

The wiki is an online tool and it allows any people collaborate by the collective writing. The users can include, change, correct, complement or exclude texts in a simple way. A well-known example is wikipedia.com. In this site, all changes are saved and all historical changes are memorized. This characteristic allows that changes being undone and the knowledge evolution be accompanied. Because of this characteristic, the wiki can be used associated with the collaboration learning concept and with the constructivism concept as well as being applied in education, how it was used in this research. There are many possibilities to the wiki application on education. Some of these possibilities are proposed by Schwartz et al. (2004):
- Student's dynamics interaction and collaboration;
- Exchange ideas, create applications, propose work planning;
- Create glossary, dictionaries, texts, manuals, etc.;
- See all content changing historically allowing professors to evaluate the knowledge advances;
- Create collaborative knowledge structure, potentiating the learning communities' creation.

The blogs are web pages chronologically organized (CARVALHO, 2010). On this page, it is possible to post images, texts or other files. There are spaces to users' comments and the reader can discuss with the blog's author. This kind of resource promotes interaction and collaboration between users. In this case, the readers are authors too, proposing their ideas and complementing a concept (PRIMO e RECUERO, 2003). This characteristic allows interaction and collaboration, and because of that, blogs are being used in education. The blog can be thought like a pedagogical resource in some situations (GOMES, 2005):
- Space to promote access to a specialized information posted by professors;
- Portfolio of students' experiences in developing their works;
- Space for interchange, collaboration and discussion.

3. METHODOLOGY

This research relates an experience realized in the discipline of Productive Arrangement in the Industrial Engineering course at the Federal University of the Semiarid (UFERSA), in

Brazil. In this case, it was aimed to understand how learning can be improved by using the ICT with pedagogical strategies based on applied knowledge.

It was proposed an active work to students, in which they had to use a system of enterprises' evaluation. The results had to be discussed using the blog and the wiki. Figure 1 suggests the steps followed in this research.
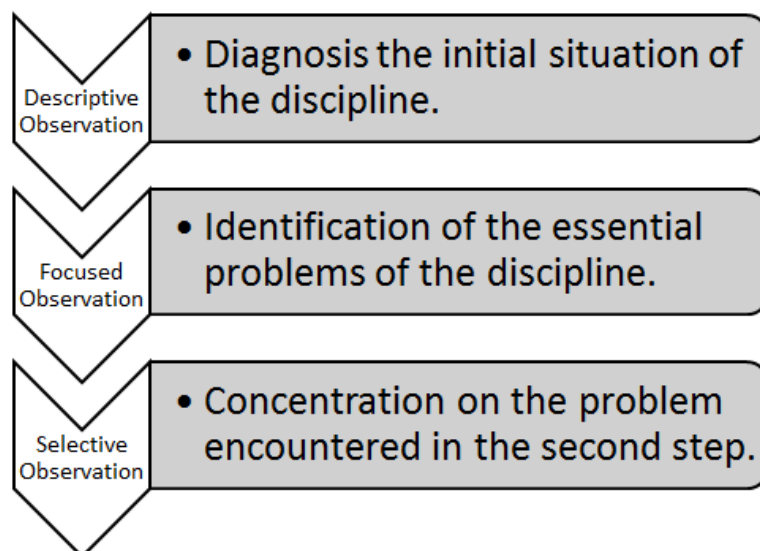

Figure 1 - Research method developed.

In the first step, "descriptive observation", the researcher and the professor prepared an activity for students to be developed in groups. They also began to prepare their field diary, which was produced after the classes.

The second step, "focused observation", it was observed the predisposition to interaction and collaboration of the students. In this case, a questionnaire was developed with specific questions, which was applied with students. The goal was to observe how students see the attitude of the professor in the classroom and their interest to develop the work using the Web 2.0 tools (the blog and the wiki).

The third step, selective observation, a blog was created to post the work and the experiences of the students. In this case, the goal was to make the students to learn each other and observe the difficulties appointed by the groups and promote interaction to solve these problems.

4. THE ACTIVE/COLLABORATIVE MODEL DEVELOPED

This study was performed in the discipline of Productive Arrangement in an Industrial Engineering course. The students did not know any concept about Industrial Engineering and have studied only math, physics and chemistry before this discipline. From this reality, a task was planned to introduce these students more efficiently in the course. Table 1 shows the proposed work.

Table 1 - Step-by-step of the activity proposed.

1. Access the website www.ot.ufc.br and study the SIMAP concepts using the wiki tool (http://www.ot.ufc.br/mediawiki/index.php/Ferramentas_do_SIMAP). Discuss all questions about these concepts to construct a complete idea understood by the students.
2. Students must evaluate a productive arrangement using the Productive Arrangement Monitoring

System – SIMAP. To get this goal, they must follow some steps:

2.1 Choose a Productive Arrangement inside the University action area. For example: Lime industry, Salt industry, Fruit industry, etc.

2.2 Map the chosen productive arrangement and identify the links. A model is available in the website: www.ot.ufc.br. The proposed structure must be posted in a blog to be discussed with the professor, specialists and other students.

2.3 Quantify the productive arrangement by relating enterprises of the productive arrangement in the links identified.

2.4 Contact the enterprises and arrange a visit to get the data. A questionnaire is available in the same website.

2.5 After the data has been collected, upload this information inside the system and generate the graphs.

2.6 The graphs must be analysed and the results presented to the professor and to the other students.

The difficulty in this process is because students do not know the concepts of industrial engineering course. The professor performed a preliminary course program analysis and he could find many complex concepts to be observed in Industrial Engineer professional life.

Despite the SIMAP wiki tool (Figure 2) be available, some concepts were not clarify. The students were stimulated to post their doubts in the wiki. In this point, it can be observed the first aspect of collaboration. When the professor uses the wiki tool, the students can understand the concepts that were posted there. The first concept of the wiki was uploaded by professors and some specialists from laboratory of the Federal University of Ceará. Some concepts are not easy to be understood but the wiki allows students to relate their difficulties about the concepts and their application in the work. These difficulties were answered by the professors or other students. It can be compared to a scaffolding teaching model, but it is better because not only the instructor interacts with students, but other students interact too. It is the first space of interaction inside the discipline, where all participants can help to construct the concepts that will help them in their work.

This activity makes students understand the most important concepts of the discipline. In this case, we can see that the student could get a more active position in the learning process because they have the responsibility to research and discuss the concepts using the Web 2.0 tools. When they have some doubts, they can ask or research and post the answer in the wiki. This answer is available to all students. This collaboration promotes a better interaction among students.

The greatest benefit to the professor is that he/she can observe the knowledge construction in the classroom during the semester. In this step, he/she has a passive attitude and students have the active attitude. It was developed on the students an autonomous learning with a limited interference of the professor´s actions in this process.

Figure 2 - Wiki developed with SIMAP concepts.

After this activity, it was asked how students look at the professor's performance. The students like the teaching strategy used by the professor: 26% classified it as excellent, 48% as good and 26% as regular. It also could be observed that 77% of the students feel motivated with the classes. But, 23% do not get motivated to the discussion. How to motivate this group? To motivate this group, the second step of the activity was proposed.

Each group chose a productive arrangement and started mapping the production process and do the visits to enterprises. The visits were done to help the students to understand the importance of the industrial engineer in productive arrangement and see where they could work when they graduate. These activities were developed according to the concept proposed by the theory of "Four Domain Development Diagram" (VANASUPA et al., 2009), looking to promote the students' motivation by interest, value and autonomy. The first one, the interest, is promoted by the work proposed, in which students have contact with the enterprises. The value is stimulated when students observe how the concepts that will be studied during the course are important to his professional practice. The autonomy is promoted when the students are stimulated to go further to get more information about the concepts before the specific discipline in Industrial Engineering course. To promote the interaction, a space was created to discuss the students' works.

The professor recorded a big problem in his daily-diary: the limited participation of the students in the discussion about their works. The students did not begin any discussion and the professor had to do this. Looking at this point, the professor suggested students to use the blog to promote this interchange. The experiences and the texts of the students were available to the professor and to the other groups. The blog was developed by the professor using "Blogspot" (Google's mechanism to create blogs) and all students' works were uploaded to be discussed. This blog was based on the collaboration concept. The URL to access the blog is: http://apufersa.blogspot.com. Figure 3 shows the blog developed.

The idea was to socialize the discoveries and share experiences of the groups. The visits, works, links with extra material and other information were posted and accessed by students. It was also observed that other universities accessed the blog to see the material developed. In the professors' diary, it could be observed some questions and comments by students, like: "Professor, when will the blog be available? I want read and post comments…"

Figure 3 - Blog Apufersa.

In this blog, all students' works were posted to give a direction for the final works to be presented. An interesting fact is that the accesses were concentrated in the best previous works of the discipline. All the students accessed the blog to get information to do their works' final versions. They could see the good and bad points of each group and the final versions of their works were improved by the information obtained by interaction. It can be observed that the blog helped the development of the students' work, but it was limited. This happened because only one function of the blog worked well: the blog was used like a portfolio for students' experiences and class works, but the interchange, collaboration and discussion were limited. This happened because the classroom was formed by two different students' types, the freshmen and the veterans. It is important to observe that these two groups have different knowledge levels. This caused a fears' atmosphere and it limited students to contribute to the work of the other groups. We only can conclude that the blog promoted the information socialization.

Looking to the blog functionality of collaboration, it could be observed that students did not have an active participation in the other groups' work.

At this point, we can conclude that the diffidence influences the collaboration process, being necessary that students know each other and have a previous contact. The results were confirmed in the professor's diary, when some students said that not feel comfortable to socialize their works and feared criticism.

5. CONCLUSION

We could observe that the tools used did not work as well in their functionalities, being a space to socialize knowledge but limited in discussion. The hypothesis to this result is because the classroom was formed by two different students group, creating a tense atmosphere, intimidating students from contributing to other group's works. It is necessary, in the next experience, to confirm this hypothesis when interviewing students.

Despite this fact, the experiences presented in this paper were successful because we could see that there is students' interest to use these tools and they can learn better when they are motivated, a fact obtained using SIMAP active work strategy allied with collaboration tools, like blog and wiki.

According to the results, it can be concluded that the use of Web 2.0 tools to promote collaboration is influenced by the level of relationship between the students. The problem consists in promoting activities that the students can interact with each other and feel comfortable to available their results, without feeling the fear of criticism. The simple use of this group of tools does not guarantee the interaction, because professors must be prepared to use these tools like pedagogical strategies, beyond to stimulate the creation of the confidence atmosphere.

Even if they do not have all their functionalities explored, we able to motivate students to learn with other groups by reading the work posted in blog. This demonstrates that a blog has a big potentiality to be used in engineering classroom. Wiki can promote a space to help students to learn the initial concepts and improves autonomous learning. The use of the wiki tool facilitated the collaborative learning and promoted the autonomous students' attitude creating discussion spaces. The use of the blog tool placed students as active actors in the learning process because they could post their work and socialize the knowledge developed during the discipline.

REFERENCES

CARVALHO, F. C. A. Tecnologias que educam: ensinar e aprender com as tecnologias de informação e comunicação, Pearson Prentice Hall, São Paulo, 2010.

ESTES, A. C., Welch, R. W. and Ressler, S. J. The ExCEEd Teaching Model. **Journal of Professional Issues in Engineering Education & Practice**, New York, October 2005.

GOMES, M. J. Blogs: um recurso e uma estratégia pedagógica. Anais da International Conf. Informatics in Education, Leiria, Portugal, 2005.

JOHNSON, P. A. Problem-based, cooperative learning in the engineering classroom. **Journal of Professional Issues in Engineering Education & Practice**, January 1999.
HMELO-SILVER, C. E., DUNCAN, R. G. and CHINN, C. A. Scaffolding and Achievement in Problem-Based and Inquiry Learning: A Response to Kirschner, Sweller, and Clark (2006). **Educational Psychologist**, vol. 42, Lawrence Erlbaum Associates, Inc., 2007.

HOLVIKIVI, J. "Learning styles in engineering education: the quest to improve didactic practices. **European Journal of Engineering Education**, Vol. 32, n. 4, August 2007.

LABRANCHE, D. F. Scaffolding - Getting Students Engaged in Learning. **Journal of Professional Issues in Engineering Education and Practice**, April 2006.

NIRMALAKHANDEN, N., C. RICKET, C., MCSHANNON, J. and BARRET, S. Teaching Tools to Promote Active Learning: Case Study. **Journal of Professional Issues in Engineering Education and Practice**, January 2007.

NUNES, A. I. B. L. and SILVEIRA, R. N. Psicologia da Aprendizagem: processos, teorias e contextos, Liber Livro, Fortaleza, 2008.

PRIMO, A. and RECUERO, R. C. Hipertexto Cooperativo: Uma Análise da Escrita Coletiva a partir dos Blogs e da Wikipédia", **Revista FAMECOS**, n. 23, 2003.

SCHWARTZ, L., COSSARIN, M., RUDOLPH, J. and CLARK, S. Educational Wikis: features and selection criteria. **International Journal of Research in Open and Distance Learning**, Vol 5, 2004.

VANASUPA, L., STOLK, J. and HERTER, R. J. The four-domain development diagram: a guide for holistic desing of effective learning experiences for the twenty-first century engineer. **Journal of Engineering Education**. January, 2009.