

## **PROBLEM-BASED LEARNING: UM MODELO PARA O ENSINO E A APRENDIZAGEM DE TEORIAS ORGANIZACIONAIS**

### ***PROBLEM-BASED LEARNING: A TEACHING AND LEARNING MODEL FOR ORGANIZATION THEORY***

Fabrcio Sobrosa AFFELDT<sup>1</sup>  
Fbio Ferraz FERNANDEZ<sup>2</sup>

**RESUMO:** A construo do conhecimento de um ser humano ocorre atravs de mecanismos de assimilao e acomodao, que se regulam constantemente. Este trabalho se baseou nos conceitos de construtivismo e de student-centered learning como abordagens de ensino. Escolheu-se o problem-based learning para a criao de um modelo de ensino e aprendizagem que foi elaborado, utilizado e avaliado. O estudo pretendeu contribuir de forma inovadora para o ensino na rea, em especial, apresentando um modelo em que o estudante realize atividades reais, resolva problemas, tome deciso e socialize com outros estudantes. Os resultados demonstram que os estudantes perceberam a maior parte dos elementos construtivistas que se buscou implementar no modelo de aprendizagem em Administrao.

**PALAVRAS-CHAVE:** Construtivismo. Aprendizagem baseada em problemas. Administrao.

**ABSTRACT:** *The knowledge construction of a human being occurs by means of assimilation and accommodation mechanisms, which are constantly regulated. This research was based on the concepts of constructivism and student-centered learning as teaching methods. Problem-based learning was chosen for the creation of a teaching and learning model that was proposed, applied and evaluated in the Business Administration area. The study aimed to contribute in an innovative way to teaching Business Administration, presenting a model in which students perform authentic activities, solve problems, make decisions and socialize with other students. Results show that the students perceived some of the elements from the constructivist theory that we have been trying to use as part of the innovative model.*

**KEYWORDS:** *Constructivism. Problem-based learning. Management.*

## **Introduction**

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<sup>1</sup> Instituto Federal de Educao, Cincia e Tecnologia do Rio Grande do Sul (IFRS). RS – Brasil. Professor EBTT. E-mail: fabricio.sobrosa@poa.ifrs.edu.br

<sup>2</sup> Instituto Federal de Educao, Cincia e Tecnologia de Braslia (IFB) – DF - Brasil. Professor EBTT.

The construction of knowledge in a human being occurs through a mechanism that regulates itself according to the person's experience and tends to reach a level of possibilities called hypothetic-deductive by means of a progressive specialization of its functions. The process of building human knowledge can be understood by the concept of constructivism, which proposes that assimilation, accommodation and balancing processes play a central role in students' learning and their actions on the themes and contexts to be learned are fundamental for knowledge construction (PIAGET, 1978).

Based on these concepts, environments that use the constructivist theory for application in education should present some of the following elements: action; significance; cognitive conflicts; use of prior knowledge; socialization; evaluation; autonomy and interdisciplinarity (HARDLESS et al, 2005). This concept centralizes the processes of learning in the student, namely student-centered learning.

The present study intends to contribute to an innovative form of teaching in the Administration area, especially in an area that is essentially theoretical: Organizational Theories. The research was based on the perspective proposed by the Genetic Epistemology (PIAGET, 1978) and concepts such as: constructivism; assimilation; accommodation; and equilibration. A practical perspective was adopted, with the creation and the use of a Model for the Business Administration Teaching, from the concepts of student-centered learning and use of the problem-based learning method. The context of Administration was used because it is an area in which the need of innovation in teaching practices is debated, in order to improve student motivation and bring students closer to authentic situations related to business problems (ACHTENHAGEN, 2001; WINN, 2002; PELLEGRINO, 2004; MONDADORI; SANTOS, 2006). In this paper, a method where the student is at the center of the learning process and constructivist theories are considered in the process is called Problem-Based Learning (PBL).

Based on the arguments presented above, the formulated research problem was as follows: **how can the Problem-Based Learning (PBL) method support the teaching and learning of organizational theories, taking into account the student's knowledge construction?**

The general objective of this study was: to propose a Model for Teaching Management, using Problem-Based Learning (PBL), composed by a Teaching Method and a Learning Environment, with a set of features and an application spectrum that favors the student's knowledge construction.

The report of this study is structured as follows: justifications, the research problem and its objectives. Then, some of the differences between traditional and constructivist teaching models are highlighted, focusing on the concepts of student-centered learning and problem-based learning. The research methodology regarding the development of activities and its inherent aspects is afterwards presented, followed by the model for the Administration Teaching on PBL, as well as its application and its evaluation, grounded on students' perceptions. Finally, the last considerations of the study, its limitations and references are considered.

### **Theoretical background**

Brazilian Education must be improved at all levels, based on models that may favor students' deep learning. There are arguments and initiatives that propose the use of active teaching methods, teaching materials and technology in school educational context, colleges and universities. From this perspective, the construction of lifelong knowledge must follow an educational approach, placing the student in the center of the learning process. It is understood that the theoretical aspects presented here deal with the subjects above, setting up the theoretical choices, in search of understanding the aspects that would be fundamental for a teaching model. They are supported by the constructivist conception.

### **Constructivism**

Constructivism is a term of broad meaning, used to conceptualize some theories regarding the process of knowledge development. The constructivist approach presupposes that the person's action towards what one aims to learn (object) constitutes the necessary core for the creation of cognitive structures. The person has, in this theory, an active role. This is a common principle of the constructivist theories, even for authors who have differences in their premises, there is an emphasis on the construction of meaning by the individuals themselves from their **action** on the objects or their relations with the environment. From here also comes the need of placing the student in the center of the learning process, making him/her active, approached by the Genetic Epistemology of Piaget (1978). Becker (2016, p. 88) highlights: "Constructivism means this: the idea that nothing, strictly speaking, is finished, and that, specifically, knowledge is not considered, at any instance, as something finished."

The central concepts in the theory of Genetic Epistemology are: equilibration, assimilation and accommodation of the objects with which human beings interact in their processes of being aware of them. According to Piaget (1987), the relations between person and environment constitute a radical interaction, in such a way that consciousness does not begin with the knowledge of the objects, neither does the subject's activity, but by an undifferentiated state; and it is from this state that two complementary movements derive: **assimilation**, which can be understood by the incorporation of an external element (object to be known) into an individual's sensory-motor or conceptual scheme; **accommodation**, which is the modification of the subject 's schemes, receiving the influences from the environment - exterior- where they are exposed to (Piaget, 1987). The **equilibration** process deals with the dynamic balance between assimilations and accommodations, consisting of a mechanism of self-regulation. This element gives the subject the ability to interact efficiently with the environment.

Macedo (1994) points out that the formation of knowledge - in a constructed way - in the intellect of the individual is related to the biological structures that enable human beings and develop, in cognitive terms, in continuous processes of assimilation and accommodation. As a theory, the objectives of the Genetic Epistemology would be to identify the roots of the several ways human beings develop their knowledge, from the most basic ways, going through the levels of its development, to the identification of how scientific knowledge occurs (PIAGET, 1978). According to Macedo (1994), constructivism and non-constructivist theories may correspond to opposite views regarding how knowledge occurs. The change that constructivism represents in relation to non-constructivist theories is that knowledge occurs as a result of the inseparable, irreducible and complementary interaction between the subject who is learning and the object (MACEDO, 1994). This variation of understanding highlights the exchange from a simple information delivery through language to the need of an **activity of the student**, so that he/she can learn.

### Student-centered Learning

The student-centered learning concept, as an application of the constructivist concepts, requires that learning processes, activities, development and use of pedagogical material should place student in the center. This student-centered learning, in which the student is in the center of the knowledge process, is still a challenge for education in

Administration and in other areas of knowledge, regarding either comprehensive education, vocational education or tertiary education (GIJBELS et al, 2006; LOYENS, GIJBELS, 2008).

Macedo (1994, p. 50) warns about the differences between the constructivist theory and the application of constructivism in models and suggests that "the pedagogical application of Piaget's work requires care, often ignored by us." This is because the application of this theory, is so complex, not direct and implies a change of referential, transformations and the continuity necessary for it to be applied.

The study by Oliveira et al (2005), analyzed the Administration undergraduate students' preference concerning teaching methods, and their results indicated that there are different preferences among students. For instance, extroverted students find their learning more effective in active methods, such as discussions and seminars. The lectures, with multimedia presentations, were one of the best evaluated methods by the students, showing, perhaps, the consolidation of traditional practices.

The work of Mondadori (2006) and Mondadori and Santos (2006) present the application of complex learning environments, based on student-centered learning. The authors developed a framework, with principles for the elaboration of constructivist learning environments in Administration: a) organization through significant problems; b) authentic study contexts for solving problems, with activities; c) linking activities to a central problem; d) offering support for problem solving and access to specialists; e) offering different views on the same problem; f) developing accessible and open learning objects for student experimentation; g) using prior knowledge; h) voluntary participation in the student's motivation. The application of Mondadori (2006) and Mondadori and Santos (2006) was simulated by means of a framework and a prototype of a learning environment evaluated by experts in Administration. The elements are useful as reference for new research, suggesting the development of the constructivist perspective together with the learning environment, since the whole set would favor learning.

### **Problem-based Learning**

Problem-based Learning (PBL) assumes that everyday problems are of a holistic nature and require a practical approach regarding problem solving such as teaching activities (BARROWS, 1986). The PBL has, among its characteristics, the following (WOODS,

1996): a) student action must be present in the teaching and learning processes; b) students should not be passive learners; c) students should cooperate in the learning processes; d) it is not necessary for all students to learn in the same way; e) activities should take into account student's individual style; f) students should be told about the objectives and criteria used to evaluate the objectives; g) students should receive feedback on their performance; h) self-assessment should be used; i) students' motivation and expectations must be considered; j) interaction among students should be explored.

PBL is a pedagogical method of student-centered learning. Aiming at lifelong learning, there is the application of problem-solving situations similar to those in real life and in different areas of knowledge. It starts from a problematic situation, that can be defined as the one in which: "the subject is offered a task that he/she cannot accomplish without precise learning. This learning, which is the real objective of the problem situation, occurs when the obstacle is overcome "(MEIRIEU, 1998, p. 92).

It is understood that a pedagogical situation, according to the PBL approach, such as the application of a problem to be solved by the students, should be based on the assessment. Generally, in contexts of problems, it is usual to speak of student-centered teaching as well as of the constructivist theory. This emphasizes the active character of the student in the learning activities. Teacher and students are collaborators in the process, and there are certain situations in which the teacher becomes a student and the student becomes a teacher.

An application of the PBL model in the educational context of Administration was presented by Arts et al (2002), using a learning environment. It regarded the application of PBL in Marketing in a Dutch university. The authors emphasize that motivation is important for student engagement, and it is important that learning environments include the possibility of observing the specialists' performance, choosing roles in simulations and group learning.

Another paper, in the area of companies, was presented by Hardless et al (2005), in which PBL was applied in Sweden, aiming at improving project management practices. Using an interactive multimedia scenario, the approach was applied in the following stages: a) application of an interactive multimedia scenario, in which students should make decisions and discuss problems faced in the professional daily life; b) individual reflection on the problems faced; c) a three-hour seminar to discuss the experiences and; d) a set of continuous activities with seminars, lectures and change of scenarios with applications that lasted around 12 months. Baturay and Bay's study (2010) looked into the analysis of the effects in a blended learning course, based on the students' perception of an Administration

course. Among the results, the authors emphasize that students who study in a problem-solving and project approach feel more connected to the learning processes. The intervention, proposing problems and projects to stimulate the focus of study, supported by the teacher and researchers, besides providing discussions and seminars on the problems and emphasis on collaborative and autonomous learning.

## Method

The nature of this study can be characterized as qualitative. The objective was to apply the PBL method in practical teaching situations in an authentic context of the Administration area. The research presents what Denzin and Lincoln (2006) assume: situated activity that locates the observer and the object being observed. One of the researcher is a teacher in the Administration area and both authors had a training period on the methods of knowledge construction in Finland. As for the object of the research, students' learning and their perceptions were analyzed by means of semi-structured interviews.

The research was carried out as follows: the teaching and learning environment of the vocational and undergraduate courses in the Administration area. The "action research" method was used (THIOLENT, 2009). First, it was necessary to change the learning environment and then the application of the PBL model. The authentic teaching situations were assessed by the students and by the researcher, analyzing the theoretical aspects of constructivism that support their construction. The following phases were performed, according to action research assumptions: **1) exploratory stage** - analysis of the model prior to the application of the PBL method, in order to assess how the construction of the student's knowledge occurred. Elements from the constructivist theory were identified, and a diagnostic questionnaire was applied; **2) main stage**- planning the actions, after the diagnosis is completed. In the second semester of 2015, the research elements (disciplines, actors and institution), the model by which the PBL was applied, the basic requirements of the learning environment and the schedule of activities were defined. The pedagogical materials were also prepared, through learning situations based on business problems; **3) action-application stage** of the PBL in two courses. The PBL method was used as a pilot study, identifying perceptions of students about the learning environment and modifying the traditional way of teaching. In the second semester of 2015, the use of the PBL model in teaching situations was performed totally based on the model, in two groups of different

subjects. The researcher made the changes in the teaching process, adjusting, as predicted by the action research; **4) evaluation stage** – made by means of an analysis of student perception, the evaluation of the consequences of the action, the observation and direction of new actions, and the knowledge produced during the process. The data was collected by using semi-structured interviews, analysis of self-assessment documents, written by the students, and observation of the researcher.

### **PBL Model for Teaching Management**

The intention of creating a model was to innovate the teaching practices, avoiding a simple transmission of contents. The aim was to modify the interaction among the students, the pedagogical material and the teacher's role. Theoretical elements of knowledge construction made a reference board to be included in the application of PBL: action, meaning, cognitive conflicts, previous knowledge, socialization, evaluation, autonomy and interdisciplinarity.

The modification in the learning environment was accomplished so that better possibilities of interaction and a deeper understanding of the context that was being studied could be provided. The layout was modified and the work groups organized to favor the interaction among the students. The students worked in groups, with "islands", in consultancies, in a layout similar to that of a company.

The workspace was called the Management Lab and had the Moodle system (Modular Object-Oriented Dynamic Learning Environment), to allow the creation of communities, communication and to post the solved problems. The complexity of the business problems was included in the problems of the model, organized to represent the complexity of the Administration area. The organization of contents was made from what was called Learning Contexts and Learning Situations.

### **Learning Contexts**

A Learning Context comprised a set of knowledge that would be needed so that the student could understand the basic concepts related to an area. For this purpose, different contexts were established: Organizational Theories and Strategic Planning. The study of the use in Organizational Theories is presented.



The learning contexts were formed by groups of problems, called Learning Situations (LS). The context was resolved in a gradual manner, without initially explaining the concepts. The organization of the Contexts and the Learning Situations was a relatively long stage, which took approximately eight months, due to the amount of materials. It was necessary to do a research regarding the disciplines, so that problems related to the contexts experienced by the students could be established.

### **Learning Situations (LS)**

Learning Situations (LS) recognize problems connected to the contexts in which they are inserted. The LS were based on detailed theoretical research, always aiming at putting student to confront theoretical aspects with practical aspects, to seek solution for problems in the Administration area. There was an initial LS, which dealt with the presentation of the course teaching method, the type of assessment and the organization of working groups that would solve the problems. From the second LS, there were specific problems and a resolution process, as follows:

a) presentation of the LS, so that students could have a sense of the target problems. No concept was exposed in advance. Students should try to understand the context in which the situation occurred;

b) access to teaching materials in Moodle, in a non-linear way, according to their own learning needs and pace. Interaction with materials, other students and the teacher, in order to initiate the problem solving process;

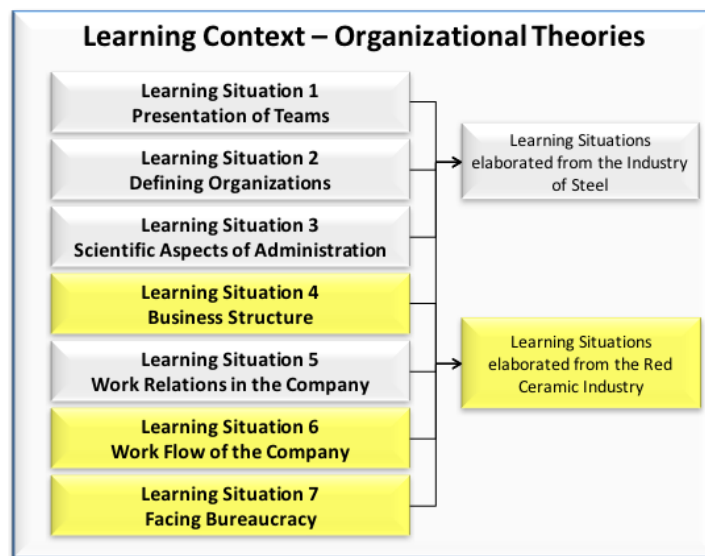
c) problem solving in groups, and the groups prepared a report to present the solution. In addition, the teacher interacted with each group, for guidance and questions that could cause the cognitive conflicts;

d) feedback seminar so that students could be familiarized with the other groups' resolution regarding a LS. The concepts and issues related to other areas of the Administration were discussed. The seminars allowed questioning, provoking cognitive conflicts and encouraging discussion. Students were placed at the center of the learning process.

### **Learning Context in Organizational Theory**

This context was elaborated aiming at making students coexist with the questions and problems that motivated the first administrators to study them. It was believed that it would be difficult to get students to experience the same problems that authors such as Taylor, Fayol and Ford, for instance, experienced because they were in different times and contexts. However, we attempted to bring students closer to the economic and business problems, simulating problems from that time. The organization of the LS areas of the Context of Organizational Theories is presented in Figure 1.

**Figure 1:** Learning Situations of the Context of Organizational Theories.



Source: Authors.

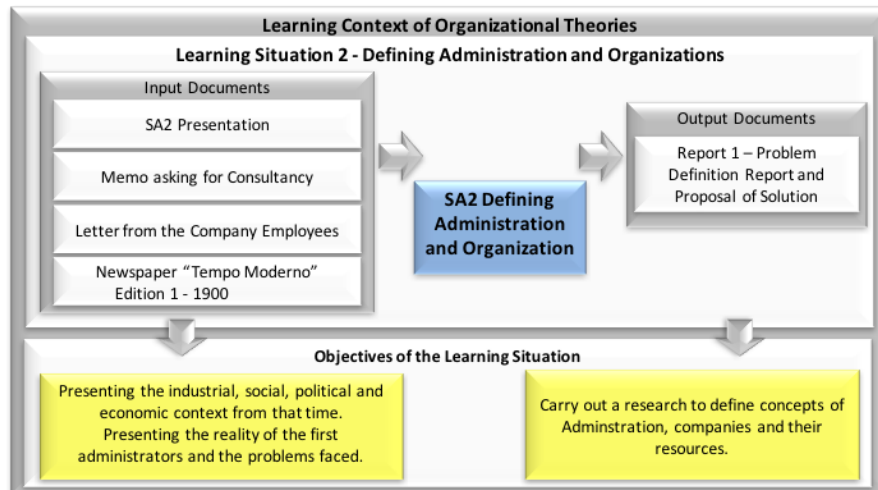
The active role of the student was assumed from the organization of a team of consultants who would work in the LS. Each team accessed the materials and should help companies to solve problems. The LS of the Context of Organizational Theories was composed of problems related to two types of industries, which were chosen as illustration and to provide the model with an industrial context, allowing students to "take part" of the problematic situations and having the possibility of positioning.

The steel industry was used in the first three LS, since it was one of those which more quickly developed in Taylor’s first ideas, in the Scientific Administration. The others were related to the red ceramic industry, an area that has a relatively simple production process and would be within students’ geographical context.

In the LS, students would have to put themselves in the context of companies, understanding the problems and working in an attempt of identifying them, from

unstructured information (letters, e-mail, memos, etc.). The structure of a LS is shown in Figure 2.

**Figure 2:** Learning Situations in the Context of Organizational Theories.



Source: Authors.

From there, they wrote reports proposing solutions, which would be sent to the companies and presented, showing the solutions and discussing the concepts. The LS were formed by pedagogical materials specifically designed to understand each Learning Context. Text, newspapers, magazines, letters, e-mail, as well as the use of videos, photos and other pedagogical materials were made available to students in a learning environment. Theoretical research was suggested in all LS, although there was no specific requirement for a particular book. Bibliographies were recommended and in each presentation of the LS, there was an indication of one or more specific books for that activity.

### Perception about the PBL Model for Administration Education

After defining the model, PBL was used in situations and learning contexts in two vocational courses in Administration, one from technical (training) level and the other graduation level. The number of students was 47 and the two courses were taught at night-time. The majority of the students were workers, with about 85% working during the day and studying at night. After being asked about the practices executed in the LS, the students reported mainly: reading, activities, problem solving, group discussions and reporting, referring to the problems proposed and actions taken in the LS.

Regarding the understanding of concepts, the students reported that they were made easier because of the realistic contexts. This was planned in the model construction; in which it was sought to use practical situations from companies associated to the region the students were in. Another item cited was the possibility of revision, through the correction of proposal reports and the seminars. It is believed, therefore, that the cognitive conflicts provoked in the learning situations, in the specific orientations and in the seminars facilitated the presence of cognitive conflicts. The following is a summary of the students' assessment:

1) **action** - students perceived the accomplishment of activities, access to teaching materials, problem-solving activities in groups, decision-making and the need to conduct research in order to obtain results. The students were a bit confused at first, expecting a "one-size-fits-all" answer to the problems. According to them, the LS presented authentic examples, favoring the relation between theory and practice. They also reported that they were worried about the mistakes, since from one LS to another few revisions were made;

2) **significance** - the need of reflection and relationship with practice to solve problems, the need of thinking practically and relating situations to business day-to-day factors was perceived. The pedagogical materials favored contextualization and confrontation with problems. The possibility of relation with the reality of the companies was reported, but in some situations the complex problems caused confusion;

3) **cognitive conflicts** - perception that learning situations were linked, requiring revision. It was reported to be necessary to review and reflect on the results achieved and that the seminars required the revision, by questioning and debating, with the use of review of answers and concepts;

4) **previous knowledge** - the previous knowledge assessment was perceived in the diagnostic evaluation. Some have reported being able to use their background knowledge while solving problems and peer knowledge sharing could also be important;

5) **socialization** - discussions were productive, despite occasional disagreements, according to the students. Discussion and debate were essential, as the tasks were performed in a working group and discussions were important because the activities required different experiences and knowledge from other areas;

6) **evaluation** - the report evaluations were more evident to the students, despite the assessment of the process and also the seminar presentations. Some did not realize the completion of previous assessment. However, all students perceived the formal evaluations, such as improvement of reports and evaluation of seminars. In all activities, assessments

were carried out by means of reports produced by the teams and their presentations, characterized as continuous and more subjective;

7) **autonomy** - the presence of rules to be followed and freedom of access to materials was reported, and that students needed to go in search for answers. Likewise, students reported that activities generally followed the whole class pace and not an individual pace; this individual pace was only observed during the reading order of the documents;

8) **interdisciplinarity** - it was noticed the need of researching to solve problems and relate this to the business context; the problems demanded research, directed to the problems and practice; there was no encouragement to research in other areas.

### **Final remarks**

The development of new teaching methods and innovative learning environments goes beyond conventional methods of transmitting contents. When attempting to innovate, it was necessary to adopt a method that would allow students to obtain in-depth knowledge regarding the business reality. Thus, the PBL-based model pursued to offer: a) contexts and real situations, exposing students to experiences and confronting previous conceptions with situations close to the business reality; b) exposing students to decision-making and problem solving; c) technology and teaching materials to facilitate the learning process.

The general objective was to propose a Teaching and Learning Model for Organizational Theories, composed by contexts and learning situations, through the teaching method and learning environment, based on PBL, with a set of features that favor students' learning. The Learning Context was composed by several Learning Situations, organized in a time sequence, so that, with each new situation, the students could revise the previous reports and their knowledge about what would be approached next.

The research was developed from the action research methodology, which involves diagnosis, planning, execution of the planned actions together with the group of people that participated in the research and the assessment, performed by the group, of the actions that are executed. The research was performed with students from the Vocational Education Courses, one from technical level and the other from technological graduation level, both in the Administration field. Several aspects of knowledge construction were perceived, such as student action, interdisciplinarity, real or authentic contexts, and socialization and autonomy.

The study does not allow the generalization of results, which is one of its limitations. The model needs to be expanded, with application in different contexts, since the application was carried out in only two courses from the Administration field. In addition, it is important to conduct a more in-depth analysis of the students' perceptions with data collection and statistical analysis.

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