Introducing assessment into the teaching-learning process of Distance Education using discipline planning.

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Abstract: Despite the increasing importance of learning management systems, current implementations present deficiencies regarding the use of tools dedicated to learning assessment. This paper presents the implementation of Dependence Map and Concept Maps, two educational tools, introduced by the authors, that contribute to the teaching-learning process by providing a new resource that allows teachers to plan the assessment of a discipline, based on educational objectives and not only the discipline subjects.

Keywords: Assessment, Learning Management Systems, Distance Learning

1. Introduction

The changes brought about by technological advances are apparent in all segments of society. According to Coutinho and Bottentuit Junior (2007), the use of the Internet and the development of virtual teaching-learning environments have promoted a veritable revolution in distance education (DE), and an expansion in the teaching-learning process, mainly in the last decade (Comassetto, 2006).

These virtual environments, also known as LMS (Learning Management Systems) or VLE (Virtual Learning Environments), are platforms with a large number of available pedagogic resources which, if properly used, may contribute to the teaching process (Coutinho and Bottentuit, 2007). Examples of these environments are Moodle (Moodle, 2008), TelEduc (Teleduc, 2008), AulaNet (Aulanet, 2007), among others.

A virtual support environment for teaching and learning is composed of different components or tools, such as chatting, e-mail, forums, murals, Newsgroup, virtual classrooms, videoconferences, among others, which are responsible for communication, interaction and availability of contents in text, sound and image formats. According to Liamara, (Comasseto, 2006), the pedagogic and communication practices and approaches found in these platforms
can be either instructionist and interactive (Andrade, 2003) or cooperative (Castorina, 1998).

Although there is this distinction in the pedagogic approach of how to the components of virtual environments, according to Liahara, (Comassetto, 2006), the tools used for communication and interaction in these environments are practically the same, except a few that were developed and applied more recently, such as virtual reality. Originality is also difficult to be found in most virtual environments, which in general have the same components, the differences lying only in spatial disposition and nomenclature.

Among the various studies on the association of cognitive theories and VLE, those related to learning assessment stand out (Cerny and Ern, 2001). In this case, models are identified and tools developed that are directed to the peculiarities of distance education (Otsuka and Rocha, 2002). In addition, traditional assessment systems are adapted to new social realities (Comassetto, 2006).

According to Joice Otsuka (Otsuka and Rocha, 2002), many studies, aimed at decreasing the restrictions imposed by current assessment models and exploiting the advantages offered by DE environments, have been developed to support assessment in distance education. Among these, two main research lines can be identified: assessment based on objective tests and on continuous assessment, also known as formative assessment.

Objective tests have gained considerable popularity in DE systems, owing to the speed and ease of application and to immediate feedback. Studies that support objective testing are concentrated on the study of ways of storing questions, which allows greater flexibility when applying the tests. Following the line that supports continuous assessment, research is concentrated on studying the tools that facilitate the gathering and analysis of a large volume of data generated by the actions of students in the courses.

However, these studies involve assessment tools that facilitate the continuous monitoring and personalized treatment of each student, but are not concerned with their learning when providing them elements that promote their growth within the new context of the market and of society.

To introduce assessment into the teaching-learning process, it must be integrated into the discipline planning process, while using pedagogic theories consolidated and adapted to the characteristics of this teaching mode.

Therefore, the purpose of this article is to present a planning methodology aimed at including assessment in the teaching-learning process as the main element of discipline planning. Developed in Moodle (Moodle, 2008), the methodology inserts assessment into the teaching-learning process by using well-founded pedagogic theories and two new pedagogic tools called Content Map and Dependence Map. These tools enable self-assessment and establish the student as the main element in the teaching-learning process.

The following section presents the theoretical reference that serves as the basis for the methodology and for the pedagogic tools. In the next section an example of their use is presented.
2. Theoretical Reference

Society is currently undergoing a continuous and accelerated process of change, requiring new educational formation for individuals. Thus, it is important to teach and assess not only basic skills, but also more advanced skills for problem solving, critical reasoning and assessment, and mainly provide students the means to control their own learning process.

In addition to these new needs imposed by modern society, distance education has its own peculiar characteristics. The most important of these is spatial distance (Moore, 1993), which exists between the educator and the educatee, and which forces pedagogic actions to aim at decreasing the impacts of this distance.

Assessment should be part of the teaching-learning process, permeating and assisting the entire process, no longer as an activity used during determinate moments. Assessment and teaching must maintain simultaneity and concomitance of action, intervention and effect. Thus, assessment must be formative (Bloom; Hastings and Madaus, 1971).

The planning methodology proposed and the pedagogic tools developed follow the current tendency of educational tools for DE recommended by (Souza, 2000) and (Orey, 2008), conceived and developed according to consolidated pedagogic tools, namely: Bloom’s Taxonomy (Bloom, 1956), Significant Learning (Ausubel, 1976), Conceptual Maps (Novak and Cañas, 2006) and Formative Assessment (Bloom and Hastings and Madaus, 1971).

Bloom’s Taxonomy enables discipline planning to be developed according to educational objectives and not only discipline contents. In addition, taxonomy can determine if students have developed the capacity and skills required by the current social context.

The theories contained in Significant Learning and in Conceptual Maps are used to develop pedagogic tools and aim at making the discipline more meaningful to the student, facilitating the connection between what students already know and the new knowledge presented. Thus, it favors the understanding and facilitation of new learning.

The combined use of pedagogic tools may promote formative assessment, enabling the assessment process to occur during the entire length of the course and contributing as an element that feeds the learning process.

3. A Discipline Planning Methodology and the pedagogic tools for Distance Education

Initially presented by (Lima and Fialho, 2008a), this Planning Methodology aims at enabling the task of planning a discipline or course, within a Virtual Learning Environment, based on educational objectives and thus, promoting the insertion of assessment into the teaching-learning process.
The Planning Methodology favors the activities of professors and students by means of the following objectives:

1. assess not only basic but also more advanced skills;
2. guide the planning of educational objectives and at the same time enable the assessment of these objectives;
3. serve as a learning-strengthening element for the student and as a strengthening element of the professor’s teaching activity;
4. enable the student to pursue educational objectives related to the most basic levels until they reach the level intended by the professor;
5. provide a pleasing visualization of the process;
6. enable self-assessment and,
7. finally, the most important, place the student at the center of the teaching-learning process.

To reach the proposed objectives, the Planning Methodology guides the professor in developing two pedagogic tools: the Content Map and the Dependence Map, tools conceived and developed based on consolidated pedagogic theories mentioned in the previous section.

### 3.1 Content Map

A Content Map (Lima and Fialho, 2008b) is a graphic visualization of the content of a discipline based on the theory of Concept Maps and of Significant Learning. Figure 1 shows an example of a Content Map.

![Figure 1 Example of a Content Map](image-url)
The methodology that guides discipline planning begins with the creation of a Content Map of the course, which is developed in four steps. In the first step, the professor determines the number of contents that will be worked on. In the next step, names are given for each of the contents. The third step determines the existing relationships between identified the contents in other works, it will be determined if each of the contents are dependent or not on the others. Finally, the fourth stage establishes the names that will be used to represent each of the relationships described in the previous phase.

The graphic presentation proposed by the Content Map is based on the theory of Concept Maps, with contents taking the place of concepts and the relationships between the contents taking the place of the propositions. In the Content Map, the relationships existing between the concepts are hierarchical, with the most basic contents located at the top of the graph and the most complex ones at the bottom.

After the development of the Content Map, the planning methodology guides the professor in developing the educational objectives to be worked on in each content and its respective Dependence Map.

3.2 Dependence Map

The educational objective represents the behavior or ability that the professor expects the students to acquire or exhibit in the development of each content. The definition of this educational objective is based on Bloom’s Taxonomy.

The definition of the educational objective for a determinate content is performed in four steps. Initially, the professor must inform which content the educational objective is intended for. Then the expected behavior of the student must be identified, using a set of verbs proposed by the tool. This behavior will be associated to a certain level of Bloom’s Taxonomy according to its complexity. In the third phase, the professor identifies a verb among a set presented by the tool, which will be used in describing the educational objective. Finally, in the last step, the professor describes the educational objective.

The definition of educational objective serves as a guide for professors in developing assessments and obliges them to introduce assessment into the discipline planning process. Thus, rather than thinking of assessment only in terms of discipline contents, professors will develop their activities based on educational objectives.

The use of Bloom’s Taxonomy enables the definition of the educational objectives desired for a determinate unit. However, it only determines if the result was achieved or not. Thus, its exclusive use may present problems when the student does not achieve the proposed objective. In this case, both the professor and the student are unable to identify the flaw in the teaching-learning process.

In order to be able to identify the problem, when the student does not reach an educational objective, (Lima and Fialho, 2008c) propose the Dependence Map. This is a pedagogic tool that enables the building of a graph formed by a set of
educational objectives, related to one another according to the hierarchy defined by Bloom’s Taxonomy.

The Dependence Map, in general, is formed by an educational objective and by a set of behaviors needed to achieve this objective. Both the educational objective and the behaviors needed to achieve it are defined according to the categories of Bloom’s Taxonomy.

The highest level of the Dependence Map represents the educational objective, which belongs to a determinate taxonomy class, defined by the professor to explain what is expected from the students with respect to a particular content. After this first level, the graph presents the dependency relationship between this initial educational objective and any number of behaviors from the lower class that may contribute to the accomplishment of the initial objective.

This Dependency relationship is repeated, in such a way that the Dependence Map can contain as many levels as necessary, until it reaches Bloom’s Taxonomy’s simplest class, or until a behavior that does not need further dependencies is achieved. Figure 2 shows an example of a Dependence Map.

Figure 2 Example of a Dependence Map (de – Distance Education)

Them, after defining the educational objective for a determinate course content, the professor develops the Dependence Map of this educational objective, that is, the previous behaviors of the student that influence the development of the proposed educational objective.

Hence, the first step for the professor is to define the behaviors from the level immediately below, that the student must achieve to develop the proposed objective.

This process is repeated until the expected behaviors reach the lowest taxonomy level or until the professor determines that previous behaviors no longer need to be defined.
4. Conclusion

The Content Map contributes to the teaching-learning process by developing three of the seven objectives proposed, as follows: guiding educational objective planning, serving as a strengthening element for student learning and for the professor’s teaching activity and, finally, providing a pleasing visualization of the process.

The planning methodology that guides the professor in creating the Content Map provides much more than a pleasing way to develop the map. While the professor determines the contents and the relationships existing between them, the methodology offers a mechanism that forces professors to think about their discipline, thereby strengthening course planning. In addition, a better perception of the relationships existing between the contents, provided by the methodology and by the graphic visualization of the relationships, facilitates the task of defining the educational objectives for each subject, thus contributing significantly to the assessment process.

For the student, the exhibition of discipline contents on a graph is a pleasing form of visualization. Furthermore, underlying the development of the Content Map is the Theory of Significant Learning. Thus, the graphic presentation of discipline contents, along with the relationships existing between them, provides previous organizers that act as cognitive bridges between the content to be presented and the cognitive structure of the student, forcing a reflection about that content, and thus strengthening the learning process.

Another positive point provided by the Content Map is that it enables professors of a same discipline to compare their proposal with those of their peers. This new perspective may favor the learning process by perfecting the teaching method.

The use of a Dependence Map enables the development of all seven objectives presented here. The first objective, planning orientation, is developed using a methodology for Dependence Map creation.

The second objective, enabling the assessment of advanced skills, is developed using Bloom’s Taxonomy, which allows the professor to characterize the educational objective within these skills and thereby determines that the student will be assessed at these levels.

The Dependence Map shows that, to reach the objective of a higher category, skills related to behaviors expected in the lower categories are needed. This characteristic enables the third objective to be developed, with the student working on more basic skills until they are able to achieve the objective defined by the professor.

Because it is a tool that produces a graphic representation, the Dependence Map provides a pleasing visualization of the process, thus developing the fifth objective proposed. In addition, this graphic visualization facilitates assessment feedback, for both the professor and the student, thereby developing the fourth objective.
This feedback allows professors to revise their course planning. For example, in cases where professors determine that all or most of the students of a determinate discipline did not reach the proposed objective, they can investigate more thoroughly the reasons for this failure. Among the possible motives may be the fact that the taxonomic level proposed for assessment is not in accordance with the course content or that the students were deficient in previous disciplines. Thus, the professor could use this information to correct the problem by adapting teaching to student needs.

Feedback provides students with information about their learning level, enabling them to compare this level with that expected by the professor. The information that a determinate level was reached is very important in itself, mainly for formative assessment, where students receive these data at each stage of the course and not only at its conclusion. Therefore, the students know that they must devote more effort to the unit in which the deficiency was identified.

The feedback provided by the Dependence Map also enables self-assessment, that is, the development of the sixth object proposed. The Dependence Map shows not only the educational objective, but also the behaviors needed to reach this objective. Thus, when an objective is not attained, students can identify where their deficiencies lie and thereby correct them.

Given that it enables self-assessment and allows students to identify the flaws in their learning, using the assessment process, the Dependence Map can be considered as a tool that promotes formative assessment, since this assessment is developed and planned to influence the student learning process.

Thus, although the tool can be seen as emphasizing discipline planning, favoring the professor, the structuring of this planning, as well as the graphic representations obtained, promote the development of student activities. For example, although the Dependence Map helps professors define the educational objective that they wish to assess, a Dependence Map of the objective, aimed mainly at student development, is needed. Thus, the seventh objective is also reached.

References

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