

Categorization of learning design courses in virtual environments

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Abstract

This paper proposes a categorization of learning design developed within the framework of virtual educational environments. It is aimed at the identification of categories and the construction of learning design patterns for courses listed in the Moodle platform of the Universidad de la República de Uruguay.

Keywords

Learning design in virtual educational environments, elaboration of course categories, statistical analysis in Moodle.

1. Introduction

The demands of the university in its quest for improving the quality of teaching and of the educational system as a whole make it necessary to introduce alternatives that promote more flexible learning systems and better communication with students. Presently, Virtual Learning Environments (EVA in Spanish) are integrated into the basic infrastructure of educational institutions and, together with the effective use of teaching and learning technologies, have become a key factor in matters of higher learning.

The integration of technologies in learning systems is a complex process. Thoughtful planning, steady implementation, and continued support is needed to develop the potential and secure an effective implementation.

This paper describes the initial actions of the Project: “Learning Quality in the Use of TIC for Higher Education” (8). It aims to identify categories of learning design of courses listed in the EVA (1) of the Universidad de la República de Uruguay (UR), developed using Moodle, with the objective of building patterns based on evidence derived from a contextualized analysis for various fields of knowledge.

The paper is organized as follows: Section one covers elements pertaining to the learning design of virtual environments. Section two is a proposal for the construction of learning design categories, specific for the Moodle environment. Section three describes the results of the application of the categorization to the analysis of learning design of courses in Moodle (in the case of the EVA/UR). Finally, in the conclusions, some research advances linked to case analysis and future work are included.

2. Learning Design of Virtual Environments

Virtual design is defined as the application of a given pedagogical model for a learning objective, target group, context or knowledge domain. A good design specifies teaching and learning processes, together with the conditions under which these are possible, including the activities carried out by professors and students with

certain results in mind within a specific framework. This framework is made out of learning items and services used during the performance of activities [5].

Also, as stated by Salinas [13], the core of the pedagogical system is the context, the specific situation, the scene where learning takes place, and it is here where the teaching methodologies are developed. This shows the importance of constructing educational design models that take into account the specific characteristics of each context. Contextual variables may be areas of knowledge, students' characteristics, teaching and learning goals, institutional, cultural and geographic variables, etc.

This educational design activity carried out by the educator can be performed within previously established environments such as the virtual environments [4]. The educator is the one who chooses the teaching devices to be used, the content and resources as well as interactions that are meaningful for participants in this setting. In the last ten years, educators have had access to a series of studies about teaching modalities in virtual learning environments that have resulted in various taxonomies. Salinas [13] offers a good summary of all of these studies.

There has also been a standardization of international specifications for e-learning, such as IMS Learning Design, a proposal of modeling standards for learning environments; and LAMS (Learning Activity Management System), a set of standards and tools for the design, management, and access of on-line activities of collaborative learning [6].

Brouns et al. [3] presents three types of development of learning design, the first two are widely used, and the third one represents a new tendency in learning design: 1. Theory based designs; 2. Best practice based designs; 3. Pattern based designs. Here the designer takes patterns of courses that can be used for the development of new courses, where these patterns become a generalization of a series of best practices of educational design.

3. Construction of educational design categories for courses

There are references for the construction of educational design categories based on the didactic use of resources and technological tools. Salinas [13], starting with prior proposals [9, 12], develops a taxonomy based on the use given by professors to the virtual environment. He identifies five categories linked to degrees of utilization, seen as increasing levels of utilization of activities and collaborative work, with this becoming the more relevant indicator:

Type 1: use of platforms for distribution of materials, management of class content, either through the use of calendar, boards, forums, etc.

Type 2: use of platforms for distribution of materials, as well as a means to present mandatory individual activities.

Type 3: use of platforms for distribution of materials, as well as a means to present mandatory individual and group activities.

Type 4: use of platforms for distribution of materials, as well as a means to present mandatory individual and group activities in a collaborative model.

Type 5: use of platforms for distribution of materials, either individual, collective collaboratively, without assigning any type of material.

Berggren et al. [2] make a comparison with the terminology used in the IMS LD and the Moodle terminology, shown in Table 1, taken from the study mentioned before. This compares learning design components and tools and resources available in Moodle, allowing the application of IMS LD specifications to the design of patterns based on categorizations of the use of Moodle:

Table 1. Differences in terminology for IMS Learning Design and Moodle LMS (Berggren et al., 2005)

Terminology in IMS LD	Terminology in Moodle
Run of a Unit of Learning	Course
Unit of Learning	Course export/import file (without runtime data)
Activity-structure of type selection	Topics in a course
Learning activity with one single environment with one tool (depends on the activity)	Activity Module, Activity
Conference of type 'announcement'	Forum Announcement
Conference of type 'asynchronous'	Forum
Conference of type 'synchronous'	Chat
Learning Object of type 'tool'	Wiki
Learning Object of type 'test'	Assessment
Learning Object of type 'tool'	Glossary
Learning Object of type 'tool'	Journal
Learning Object of type 'test'	Quiz

For this study, we devised a categorization of degrees of utilization of the EVA for the definition of elements of learning design. It combines typologies described in Salinas [13] and terminology used in Moodle. It was built based on increasing and cumulative degrees for the classification of virtual resources. Using this category, we classified the resources based on type and amount of activities, tools and resources used:

1. Courses defined as repository are those that have resources that can be materials in various formats such as text, images, videos, as well as labels, directories, web pages. They have a forum for updates that comes built in when you develop a new course in Moodle. This category includes all courses with at least 4 resources.
2. Courses that are defined as self-evaluations are those that are repository and are centered in the use of self-administered tools (i.e.: questionnaires, HotPotatoes, or consults). Courses with less than 2 activities fall in this category.
3. Participative courses are those that are repositories, with self-administered evaluation and have discussion forums and/or have tasks. In this category a greater level of interaction is required on behalf of the student. This category consists of courses that have at least 4 of these activities.
4. Collaborative courses are those that are repositories, with self-administered evaluation and have discussion forums and/or have tasks, have activities such as wiki or glossaries, and are used with webconference and/or chat resources. This category consists of courses that have at least 4 of these activities.

Courses were labeled according to a binary and incremental code. Therefore, a course classified as Repository is labeled 0001 and has a considerable amount of resources, but not forums, nor self-evaluation tools, or collaboration. A Participative course is labeled 0111 due to its considerable number of resources, forums, self-evaluation activities and tasks, but excluding collaboration activities and/or synchronous communication tools. As it is a cumulative classification, each category has a greater degree of demand than the previous one.

3. Applying categories to the analysis of learning design courses in Moodle

To evaluate the learning design components of the Virtual Learning Environment (EVA in Spanish) of the Universidad de la República (UR, Uruguay), we improved the module Statistics in Moodle [1] to gather data on different types of resources and activities proposed in the courses, and their frequency of use. In contrast to the original module, Statistics in Moodle, the modified module shows detailed information generating data from all courses of one category (including all subcategories). This was translated into Spanish and is available for free download [1].

The classification process using the modified statistics module allowed us to gather data for a categorization of courses according to degree of use based on types of available elements in the learning design of the courses

(categorization is shown in Section 2). Available courses were classified using this criteria in the main server of the EVA at UR1. Work was performed on a total of 492 courses in all areas of knowledge. These courses represent 25,945 student registrations.

Following is a distribution of courses according to classification already mentioned in Annex 2. Figure 2 shows results for four initial categories (that we shall classify as “pure”, 0001, 0011, 0111 and 1111). Also, combinations of categories showing significant values, we shall classify as: Social Forum, Participative Forum, Collaborative Repository, Participative Collaborative.

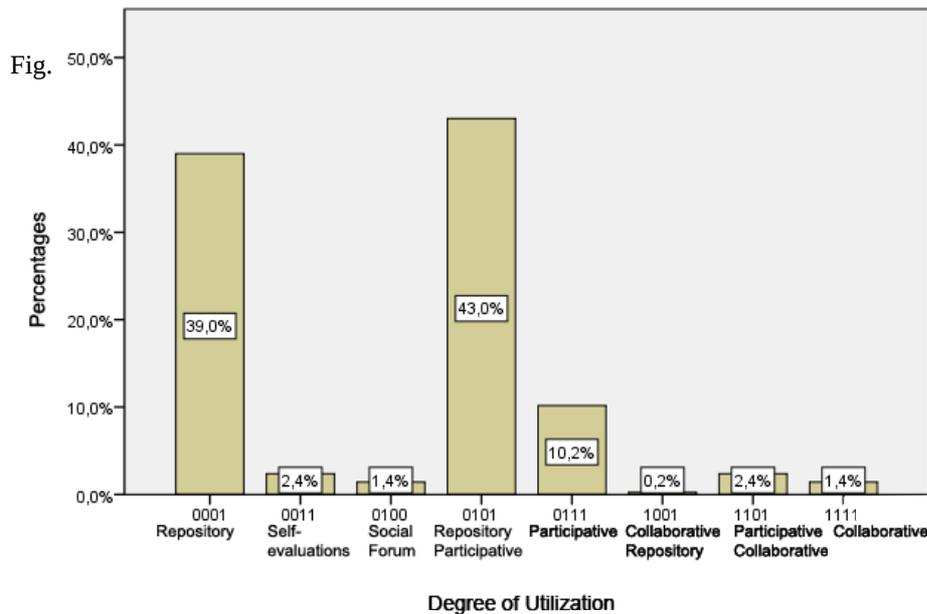


Figure 1. Course classification according to type and quantity of activities, tools and resources used

Results shows a strong concentration in the initial stages of the categorization inclusion models. Within the “pure” categories of the classification model, the model of repository of materials courses (39%) is strongly evidenced.

However, the great discovery of the categorization is the one identified as participative repositories. An almost absolute majority of courses (43%) are classified in this new category, characterized by a deficit of self-evaluation tools. As soon as these courses begin to include these evaluation tools, they will change to “pure” participative courses that now represent slightly more than 10% of total.

Results show proof of a reduced percentage of collaborative type courses, especially if we consider all courses that include some type of collaborative activity. Here we see a future intervention action from several perspectives (training educators, sharing experiences, institutional level evaluation, etc).

Figure 3 shows the way that degrees of utilization are distributed according to areas of knowledge where each course belongs to, allowing us to move towards a categorization of learning design according to each specific domain area.

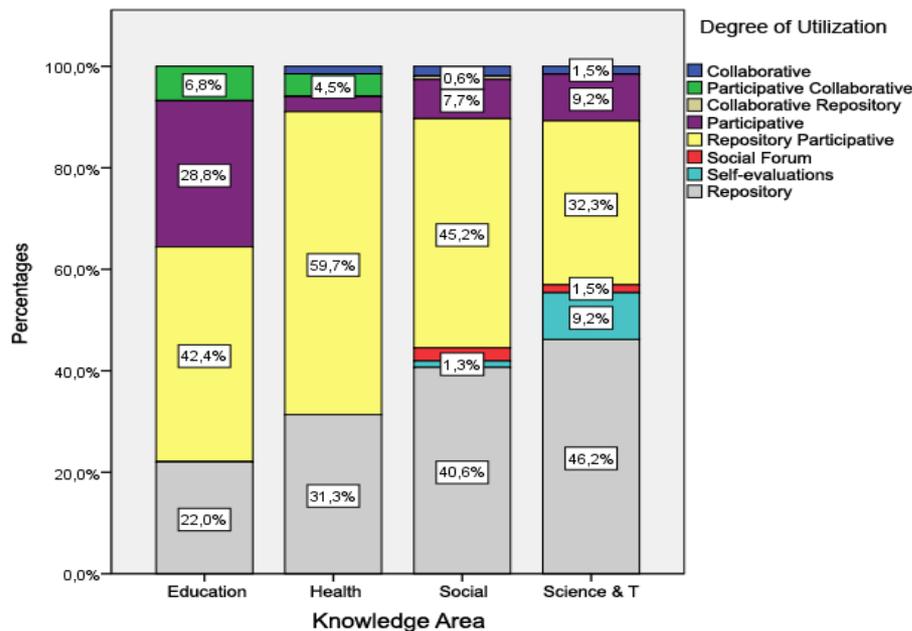


Figure 2. Resource utilization profiles, according to knowledge areas. (Percentages for each area of knowledge)

Generally, resource utilization profiles are relatively similar among the various areas of knowledge. A frequent use of Discussion Forums is found in the four areas. The area that uses more extensively the EVA as an interactive space is Education (almost 70% of courses). The case of Health Sciences also deserves to be mentioned due to the relevance of the participative repository model in 60% of the courses. The weakness in the development of courses in these areas is in the inclusion of Evaluation and Self-Evaluation tools.

The Scientific Technologic area stands out for the use of the EVA as a repository (46%), as well as for being the area that uses more tools for self-evaluation (9%).

Figure 4 shows the distribution of courses according to the level of utilization of the EVA and the amount of students registered in the course. As we can see, the profiles of tool utilization of the EVA are less dependent on the amount of registered students than what could be expected.

From the data shown in the figure it could be said that the utilization of available tools in the EVA is more dependent on the teaching content than on the amount of students per course.

To summarize, it is clearly shown that courses that make more use of participative tools are those with students ranging from 25 to 60, and those that make more use of self-evaluation tools are the courses with more students, 60 and above.

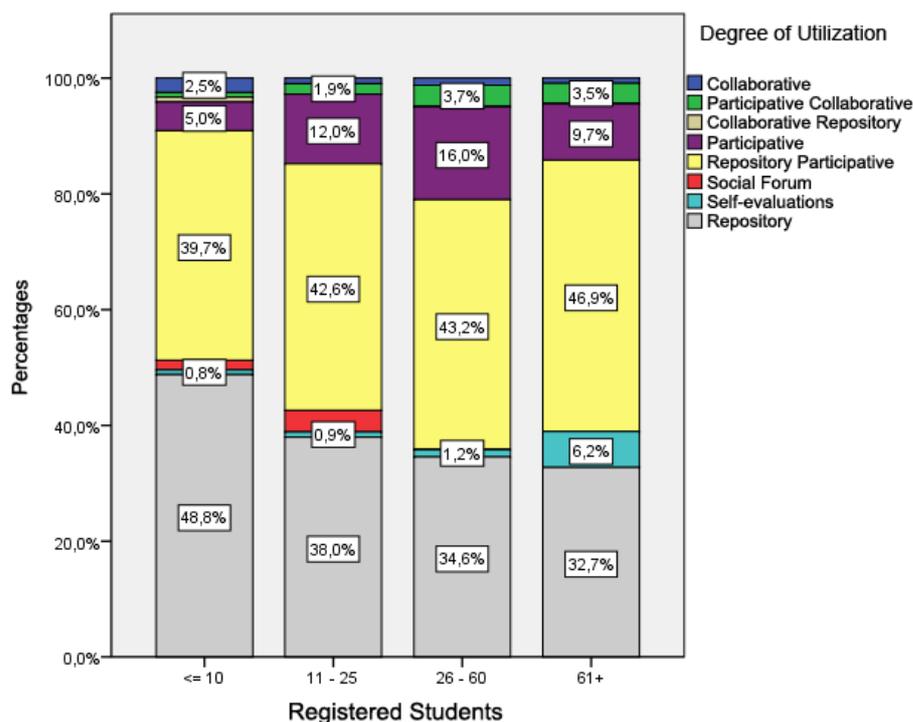


Figure 3. Classification according to degree of utilization of the EVA and number of registered students.

The results previously shown indicate the value of the categorization developed and of its utility for the evaluation, monitoring and planning of strategies for the improvement and further use of the EVA tools.

This methodology, supplemented by qualitative type studies based on the analysis of case studies, will allow us to move towards the development of a contextualized model, multidimensional and dynamic, previously defined from the comparison among: 1. categories found in the practices of learning designs in virtual learning environments (contextual and specific categorization); 2. Categorizations found in literature, developed by educational experts, defined for all cases as “good practices of learning design” (prescriptive type typology).

From this model it would be possible to establish automatic relations between the established model and specific learning design practices developed for a particular course, based on the elaboration of patterns as was mentioned on Section 1.

4. Conclusions and Future Work

In the present stage, we are developing an analysis of study cases that include grade courses residing in the EVA, based on the classification shown in Section 3. It is a descriptive type study that allows us to identify various elements included in each learning design, while also trying to identify patterns that result in the construction of design categories for some specific domain areas and a localized context. This categorization will also be compared with others already in existence in the literature, moving towards the modeling of learning design patterns specific to the institutional context, developed using standard metadata. In the future it is possible to incorporate the analysis of intrinsic characteristics of the design elements created as learning goals, as well as relations among components and the specific context (teaching styles by discipline, pedagogic models, among others) and/or adaptation to characteristics of student profiles.

Three years from the opening of the EVA courses at the University, we consider that this type of study is useful to obtain information about the actual uses of virtual spaces. Also, to evaluate alternatives for future interventions that allow the support of educators in the development of skills [7] needed to use the EVA as a comprehensive component of the learning experience, thus adding to the quality of education.

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