Thinking over b-learning strategy: The MIPO Model Approach

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Abstract

This article describes the main research results in a new methodology, in which the stages and strategies of the technology integration process are identified and described. A set of principles and recommendations are therefore presented. The MIPO model described in this paper is a result of the effort made regarding the understanding of the main success features of good practices, in the web environment, integrated in the information systems/information technology context. The initial model has been created, based on experiences and literature review. After that, it was tested in the information and technology system units at higher school and also adapted as a result of four cycles of an action-research work combined with a case study research. The information, concepts and procedures presented here give support to teachers and instructors, instructional designers and planning teams – anyone who wants to develop effective b-learning instructions.

Keywords: e-Learning; b-Learning; Instructional Design; Higher Education.

1 Introduction

Nowadays, we deal with a growing offer of educational technology solutions and a constant pressure to use them. It is important to analyze carefully the best pedagogical approaches, in order to explore properly the technologies available. The fact of making computers merely available in classrooms does not promote the knowledge construction. Our higher institutions continue to use the traditional education schema which promotes an environment based on providing information (European ODL Liaison Committee, 2004). Whenever an institution adopts an LMS (Learning Management System), it does not ensure the integration of WEB technologies on the educational process.

Throughout the study presented in this paper, we had the opportunity to deal with many different experiences on the e-learning domain. Many times, the changes occur in the technologies and without any methodological or pedagogical support. For instance, whenever printed documents are replaced by digital contents, using the same communication schema (emitter-receiver) but with more sophisticated tools.

All technologies should be viewed as work tools and not as an end itself. The selection of the learning strategy, in order to achieve the defined goals, is more important than choosing a tool itself. We believe that the existence of a model that supports the complex management process of blended-learning (b-learning) may promote the systematization, the usefulness and the organization of the web classroom integration. The MIPO model (integration model by objectives) presented in this paper intends to be a dynamic and flexible structure that offers a large set of orientations in order to conduct a combined learning process.

The literature review added by personal experience resulted in a new conceptual model (MIPO model) which helps tutors to integrate web technology in the teaching-learning process. This holistic model intends to align on-line strategies with learning objectives.

The rare data found regarding the higher education and namely the information system area conducted to the development of a general model, transversal to different areas of knowledge.

Considering the support offered by the ADDIE model (McGriff, 2000) (Kruse, 2006) and the advantages of aligning objectives and evaluations, the MIPO model suggests a progress in 5 phases (learning environment analysis, instruction

design, instruction development, unit implementation and model evaluation) and also adds a dynamic and interactive adaptation, in order to reach defined objectives.

In 2006, we planned a research process that intended to validate the MIPO model created. The initial model was tested and validated on the information and technology system units at higher education. This model was adjusted as a result of four cycles of an action-research work combined with a case study research.

As an instruction model, the MIPO model intends to be a guide for the definition of management procedures, planning, developing and implementation of teaching-learning processes using web technologies. It enhances the designing of creative strategies that promotes the motivation and the accomplishment of objectives. The main concern is about the pedagogical/educational dimension of the learning management systems when comparing with the technical and administrative/management dimensions.

The MIPO model was applied and adjusted in four cycles of an action research, according to the following schedule:

- 1st semester of 2006/07 school year: application of MIPO model I, getting as a result the MIPO II;
- 2st semester of 2006/07 school year: application of MIPO model II, getting as a result the MIPO III;
- 1st semester of 2007/08 school year: application of MIPO model IIII, getting as a result the same model MIPO III, named by MIPO;
- 2st semester of 2007/08 school year: application of MIPO model by four teachers, getting the final validation of the MIPO model;

Each cycle included four phases: planning, action, evaluation and analysis. During the four cycles of the action research we intended to validate the MIPO model, considering its performance and implication on the learning results. All cycles involved units about the information systems area, lectured at ISCAP, in the enterprise communication course.

The last interaction of the action research process, the MIPO model was validated by four teachers from four classes of the information and communication technologies subject, set in the enterprise communication course. Two classes were studying during the day and the other two were studying in the evening. All teachers attested the performance of the MIPO model to guide the b-learning process. The data was collected by semi-structured interviews, questionnaires, direct observations and documental analysis.

Unlike the majority of e-learning models proposed (Laurillard, 2006) (Schofield *et al.*, 2006) (Klein *et al.*, 2003) that describe general procedures, the MIPO model gives a special emphasize to the activities design strategies and is targeted to the blended-learning systems, at the higher education.

MIPO MODEL

The MIPO model proposes the integration of web technologies by learning objectives and relates, in a systemic view, the elements that come up from the literature review and that were validated both in a research and in a practical context. The expression “Integration by objectives” enhances the importance of the integration of web technologies on the educational context, supported by the learning objectives defined to the unit and to the course. This orientation intends to avoid the promotion of online activities without causing any advantages in reaching learning objectives. Despite their importance, the lack of time demands the main concern on the developing activities, in order to reach one or more course and unit objectives.

Based on the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) (McGriff, 2000) and on the activity theory (Engestrom, 2001) the MIPO model added the main tasks to perform in each phase and also a dynamic, flexible and constant adjustment to the needs that come up and are specific of each combined learning process. According to this, we should follow, interactively and dynamically the following phases: learning environment analysis, instruction design, instruction development, unit implementation and model evaluation, as presented below:

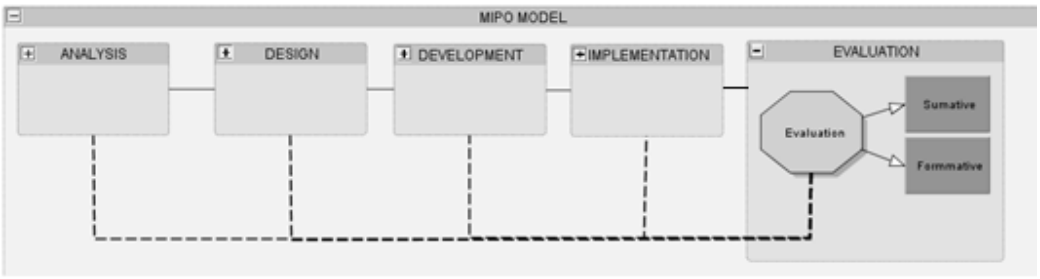

Figure 1: Global vision of MIPO model

1.1.1 Phase I – Learning Environment Analysis

According to the MIPO model, the first phase of the integration process is the analysis of the system. Teacher acts as an architect, who before starting a project, analyses contextual requirements. Later, the results are reflected on the space organization, that is, on the instruction design.

At this stage, we analyze elements such as the identification of context, learners' features, instruction needs, available contents, prerequisites and tools:

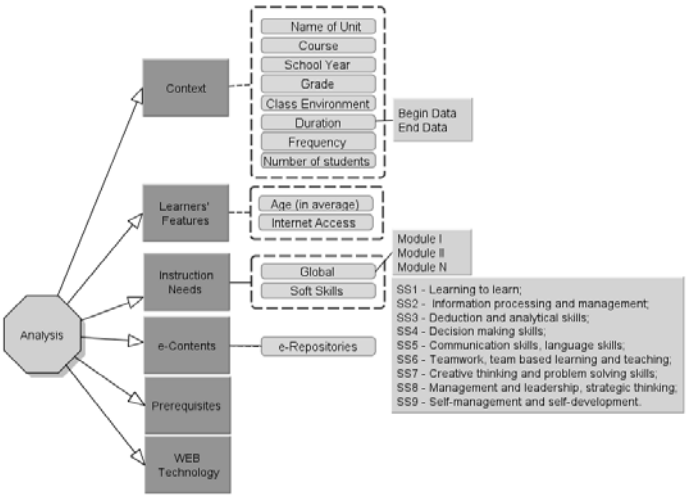

Figure 2: Analysis phase of MIPO mode

1.1.1.1 Context

The context describes the environment where learning will take place, namely by identifying the unit (e. g. Information technologies), the course (e.g. enterprise communication), the school year (e. g. 2008/09), the grade (e. g. 1st), the class environment (e. g. classroom equipped with computers connected to the Internet), the duration (e. g. 44 hours) making reference to begin and end date (e. g. 01-10-2008 to 23-01-2009), frequency (e. g. 3 classes per week) and number of students enrolled (e. g. 30 students).

1.1.1.2 Learner's features

The identification of age (in average) helps to obtain important indicators on students' motivation and personal objectives.

The students, who are in average 18 years old, are, in general, motivated to the online learning. However, many times they show difficulty in describing their personal objectives and expectations, when enrolling both in a course and in

a unit. On the contrary, the older students that usually enroll in evening classes, show more difficulty in using the web tools but are also motivated. These students have more ability to describe their personal objectives when enrolling both in a course and in a unit, probably due to their professional experiences. In general, students enrolled in day courses are more competitive and prefer activities that use learning games. Despite the interest shown by evening students in this kind of activities, they also appreciate the recreation of an enterprise environment.

The identification of students' previous experiences and abilities to work in certain environments as defended by (Kemp *et al.*, 1998) is an important fact and may be obtained on the face-to-face classes.

The easy access by students to the Internet is crucial to the learning success on a blended-learning environment. If it does not happen, the process of web integration is at risk. Hence, it is useful to make an online inquiry at the beginning of the course to determine the kind of access students have. The research developed revealed that students' access to internet through broadband has been increasing.

1.1.1.3 Instruction needs

The objectives specification, global to the unit and transversal to the course, should guide the learning paths definition and lead the creation of contents modules. Global objectives are detailed afterwards, at the design phase, in order to develop targeted learning actions. At this stage, the definition of contents modules according to the global objectives, scaffolds the whole learning process. Parallel to the definition of the global learning objectives, it is important to determine which transversal objectives (also named soft skills) are defined to the course.

1.1.1.4 Available e-contents identification (e-repositories)

The e-contents analysis is the identification of available resources that may support the teaching-learning process and help reaching the defined objectives.

1.1.1.5 Prerequisites

The process of prerequisites identification establishes a platform, in order to ensure the same level of previous knowledge among all participants (Allen, 2007). It is crucial to clarify and spread the unit prerequisites. We may use the self-learning and constant support in order to help students that do not satisfy the prerequisites. Students should be hold responsible for the importance of long life learning. The lack of prerequisites might give rise to doubts on the learning strategies success.

If, for example, students are asked to create a document in the MS Word based in a study result, and if they are not able to use that specific application, the success of the activity may be threatened. These students will need more time and monitoring from the teacher so that they become able to make an effective and qualified participation.

1.1.1.6 WEB Technology

The analysis of Web technologies corresponds to the identification of the available web environments, which may be used during the instruction process. This may be the learning management system made available by the institution such as the moodle or other web environments as the *yahoogroups*, *wikispace*, *google groups*, *blogspot*, etc. These last are not specifically oriented to the learning environment. As a result, they may demand the use of other complementary tools, such as *quizstar* to make tests available online. One of the advantages of using a LMS, when comparing with other online environments, is based on the multiplicity of educational tools gathered in a single place made available by itself.

1.1.2 Phase II - Instruction Design

The system analysis supports the instruction design which, according to the MIPO model, includes the specification of objectives, the evaluation methodologies, the definition of contents sequences and learning strategies, as presented below:

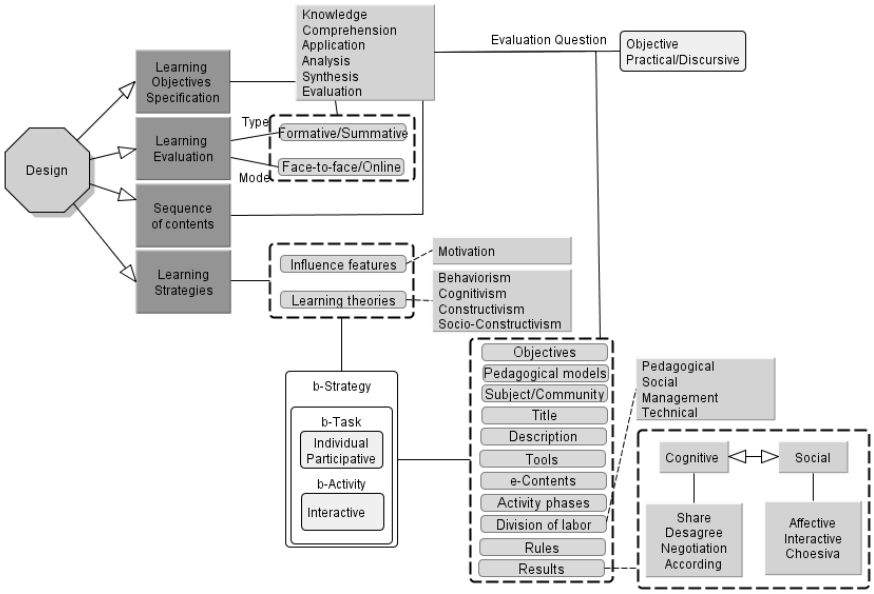

Figure 3: Figure 3: The design phase of MIPO model

1.1.2.1 Specification of learning Objectives

The learning objectives specification process conducts the development of an important guide to be used both by teacher and students.

If students do not understand what is expected from them, they will not be able to have success in their learning. The use of a taxonomy may facilitate the process. Bloom (Bloom *et al.*, 1975) suggests a taxonomy of learning objectives sorted out in six levels: Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. The intention is to display the different behaviors, starting from the simplest to the more complex one. Any taxonomy may be used if it helps to promote the referred understanding.

It is important to establish a balance between the level of demand and the time available for the study of the unit. The highest level of knowledge demands more time and teacher support.

1.1.2.2 Learning evaluation process

According to MIPO model, after defining the objectives, we should design the evaluation process. Making decisions about what to evaluate is useful to understand clearly the learning objectives. The design of the evaluation process has the objective of making clear the way how students will demonstrate their knowledge.

Evaluation can be classified in two main groups: formative and summative. In the summative way, the evaluation occurs at the end of the instruction. In the formative way, the evaluation occurs during the instruction process and it consists in a continuous collection of learning thoughts (Born, 2003). The contextual importance of formative and summative evaluation conducts the decision about the use of the evaluation modes such as: face-to-face, online - with or without supervision.

The nature of the questions to ask and the standards to the success should be based on learning objectives and spread around the entire class. These procedures scaffold the students' understanding. The specification of evaluation modes to each learning objective may facilitate the alignment and leads to the later activity design.

1.1.2.3 Sequence of contents

According to the MIPO model, after defining objectives and designing learning objectives, we should establish the sequence of contents. This organization avoids the specification of learning objectives based on the contents. This scenario usually

results in sentences such as “understand the content A” and in a lowest level of knowledge (first or second Bloom level). Despite the importance of these levels, if the learning objectives consist in achieving a higher critical thinking level, it is important to explicit it on the objectives definition associated to analysis, synthesis and evaluation.

1.1.2.4 Learning Strategies

A combined instruction strategy design (blended-strategy or simply b-strategy) demands the biggest effort of all. In the MIPO model, the design of a b-strategy includes a set of learning individual tasks (for instance an online test) or participative tasks (for instance the building of a repository of assignments) and interactive activities (for instance an interactive game of learning). These tasks and activities are more or less complex and intend to promote the learning in a semi-online environment (b-task or b-activities).

1.1.2.5 Influence features

A b-strategy design should consider the results of the context analysis done in the previous phase. Time available, students’ age, class dimension, the course, the grade, etc. are elements that need to be considered. Motivation comes up as a crucial element that influences the way people participate on learning activities and develops self-regulation, time and task management.

Many authors defend that we should provide students cooperation, use active learning and contextualized activities, and consider the learning objectives.

Learning activities that are more demanding in terms of objectives, also demand more monitoring to students and more time to assimilate.

The complexity and the time available for students to develop the b-strategy are crucial elements that influence the number and quality of participations.

If a certain activity is too complex, students may try to discover the solution, but after a period of time they may give up. Otherwise, if the activity is too simple, students are not motivated to participate because they feel that they will not learn.

At the same time, the time available for the development of the activity is also crucial to get students engagement. If students feel that they are not able to participate in a short period of time, many times, they give up, even before starting. Unlike, if students feel that they have too much time they direct their effort to other things.

This process may become more sustainable if we add other features such as: establishing frequent contact with students, providing correct time to achieve objectives, communicating to students the great expectations and respecting differences.

Students’ motivation and general principles for the learning success are, according to the MIPO model, important features to consider on the design strategy phase. Nevertheless, learning something new or developing a deep study on a subject is not a linear process. The way as we learn, individual learning styles (Kolb, 1984) (Felder & Brent, 2006) and multiple intelligences (Gardner, 2000) characterize the singularity of the learning process. In this sense, we should consider these features when we are designing instructions.

Features as culture, motivation, emotional feelings, previous experiences and personality are also important. Whenever possible, teachers should give value to diversity responding to students preferences, but never forgetting the learning objectives. We should also consider pedagogical models in order to scaffold interactions (McGriff, 2000) (Kemp *et al.*, 1998).

Summarizing, we identified the following main learning influence features: Contextual analysis results; Time definition; b-Strategy complexity; Nature of subject in study; Personality, ways and individual learning styles; Previous experiences, knowledge and culture.

1.1.2.6 Learning theories

The learning strategies designed may be based on influence features, learning styles, multiple intelligences but also learning theories. Today’s theoretical design approaches can be seen as a derivation of behaviorism, cognitivism and constructivism viewpoints (Allen, 2007).

Students' participation in small online tasks (b-tasks), either individual or participative helps the construction of knowledge scaffold. This fact allows a better participation on b-activities with more complex demands.

The choice of the pedagogical model should consider the moment of learning. At the beginning of the subject study, it is important to make sure that students are getting the basic knowledge. Then, it is important to consolidate it and promote the self-learning based on previous experiences. At the end, it is important to promote a deep learning by social interaction. This path should be aligned with learning objectives. In this context, learning may be achieved by defining behaviorist b-tasks, based on the repetition, mainly to assimilate concepts. These tasks correspond to the implementation of individual objective questions. In order to go from a short term memory to a long term memory, the knowledge understanding may be promoted by using individual or participative questions and by implementing practical or discursive b-tasks. The use of synchronous and asynchronous communication available in the internet and identified in the previous analysis phase helps the implementation of interactive b-activities supported in the socio-constructivist approach.

The choice of a pedagogical model does not have to be exclusive. On the contrary, it may be combined in different moments of the learning process.

b-strategy of learning

The *b-strategy* instruction design includes the definition of b-taks and b-activities which, while considering the influence factors and pedagogical models leads to the reaching of the objectives defined and should be aligned with the evaluation questions (objectives or practical/discursive). In the instruction design, it is important to make sure that we are promoting different activities that cover all objectives defined and that we are in fact helping students to prepare themselves to answer the evaluation questions.

A b-task is mainly individual, but may include the participative type when an individual work has the objective of reaching a common goal. Unlike b-tasks, the b-activities are interactive and have as a main objective to help students to reach the high level of complexity of objectives associated with analysis, synthesis and evaluation ability according to the bloom taxonomy. A b-activity differs from a b-task mainly due to the collaborative nature applying the socio-constructivist approach. Usually a b-activity demands more time to design and to develop and also demands the definition of participants' roles. The b-activity phase definition helps to sort out the individual work.

B-strategies (that include b-activities and b-tasks) should be aligned with course objectives in order to facilitate the organization and procedures and also ensure that all the contents of the program are covered.

The design of a b-strategy is the main step in the MIPO model and demands more time and creativity. It is characterized by: Objectives (specific and soft skills) and pedagogical models, Subjects/ Community, Title and general description, Tools, e-Contents, Activity phases, Division of labor, Rules, Results

The building of a database with different b-tasks/b-activities in order to achieve different objectives will sustain the re-use in future editions.

1.1.3 Phase III – Development

The development stage is based on the previous phases of analysis and design. The purpose of this phase is to generate the lesson plans and lesson materials. During this phase, one will develop instruction lessons and all media and support documentation that will be used. This may include hardware and software. Materials and procedures development must be based on the instruction strategy. For each lecture, it is important to develop or adapt material, develop presentations, organize lessons, seek for cooperation and represent it on the e-learning platform.

The following tasks should be performed on the development phase:

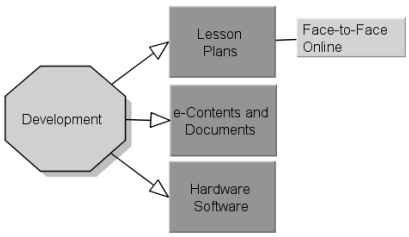

Figure 4: Development tasks

In the development phase the design of the lesson plan is important. It includes the identification of online and offline activities and also the alignment between objectives and program. This phase may include the planning of the messages that will be used during the application of the b-strategy. It is also important to adapt the existing e-contents to a particular context.

1.1.4 Fase IV – Implementation

The implementation phase refers to the delivery of the course. The purpose of this phase is to promote an effective and efficient delivery of instruction. This phase must encourage learner's understanding of contents. It is important to provide a good support in order to achieve the objectives defined.

The following tasks should be performed on the implementation phase:

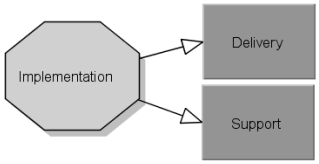

Figure 5: Implementation tasks

Face-to-face sessions are useful to the presentation, accomplishment and clarification of doubts about the activity.

1.1.5 Fase V – Model Evaluation

The evaluation phase measures the effectiveness and efficiency of instruction. Evaluation should occur throughout the entire design process, within the phases, between the phases and after implementation. The constant evaluation allows the adjustment to a particular context.

On the formative evaluation we should answer questions such as "do the b-tasks and b-activities cover all learning objectives?"; "are there activities that are not covering any objectives?"; "do students have all the necessary information?" etc.

The summative evaluation is made at the end of the process and the results should be used on further course editions.

2 Conclusion

In the higher education context, besides everything that has been said about the use of e-learning technologies, we attested the idea defended by the European committee (European ODL Liaison Committee, 2004): Our higher institutions continue to use the traditional education schema promoting an environment that is based on providing information. This scenario constitutes the best option for many students, teachers and institutions. When an institution adopts an LMS (Learning Management System), it does not ensure the integration of WEB technologies on the educational process.

Updated technologies help the construction of a huge set of learning strategies and methods options, as large as our imagination. All technologies should be viewed as work tools and not as an end itself. More important than choosing a tool is the selection of the learning strategy, in order to achieve the defined goals.

However, during this study we had the opportunity to deal with many different experiences on the e-learning domain. Many times the changes occur on the technologies and without any methodological or pedagogical support. For instance, whenever printed documents are replaced by digital contents, using the same communication schema (emitter-receiver) but with more sophisticated tools.

Updated technologies give support to the construction of such a huge set of learning strategies and methods' options that can be as large as our imagination. All technologies should be viewed as work tools and not as an end itself. More important than choosing a tool is the selection of the learning strategy, in order to achieve the defined goals.

We believe that the existence of a model that supports the complex management process of blended-learning (b-learning) may promote the systematization, the usefulness and the organization of the web classroom integration. The MIPO model intends to be a dynamic and flexible structure that offers a large set of orientations in order to conduct a combined learning process.

Unlike the majority of e-learning models proposed (Laurillard, 2006) (Schofield *et al.*, 2006) (Klein *et al.*, 2003) that describe general procedures, the MIPO model gives a special emphasize to the activities design strategies and is targeted to the blended-learning systems, at the higher education. This model results from the evaluation and analysis of various pedagogical approaches and helps the instruction design beyond the traditional classroom environment. A profitable use of technologies on higher education demands individual and collective behavior changes. The implementation success always depends on the teacher's will.

The theory associated to MIPO model was generated by inductive methods in which generalizations were extracted from specific observations. This model may be tested by other researchers who by a deductive method may foresee new data.

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