Mapping content plans into learning activities: Organizing a portfolio of e-learning activities for teaching emergent knowledge

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Abstract—**The increasing use of low-cost access to a universal communication network as a basis for teaching in universities, poses new challenges to analyze, understand and propose new educational solutions. This requires from education providers sophisticated instructional models, pedagogically advanced, aligned with new demands of educational, social and technological contexts. In such conditions, transition from traditional teacher-centered models, focusing on curricula description and content plans, to student-centered models, in which learning activities are supported in e-learning platforms, is a necessary but difficult task to resolve. An issue that becomes especially important when the knowledge is emergent, i.e. when the activities that this knowledge enables are intensively supported by information and communication technologies, subjected to rapid obsolescence. This paper presents a method for mapping a course content plan into technological mediating tools that form a portfolio in an e-learning platform. The characteristics of the portfolio facilitate the mapping of the content plan to a student-centered learning dynamics. Details on the instructional model are provided; the reasons for implementing a green field e-learning platform are justified; an outline of the results obtained in a post-graduate course discipline of 293 students is reported, with significant results, particularly with regard to team-building skills, student satisfaction and training model.**

Keywords—collaborative learning, instructional models, e-learning, electronic marketing, emergent knowledge, mediating tools, practice fields, puzzles, simulation.

I. THE DIFFICULTIES OF INSTRUCTIONAL MODELS IN E-LEARNING

In social contexts of rising unemployment, universities are pressured to provide their students the skills to succeed in the labor market. This dynamic context of socioeconomic changes requires a new positioning of the university both in terms of curricula and pedagogy. Changes that happen in a technological setting of low-cost access to a universal communications network, with sophisticated computer applications dedicated to support education, creating the conditions for the globalization of supply and increasing competition in education.

One way of answering these challenges is the development of new teaching models supported in distance education. Notwithstanding, this kind of delivery implies pedagogical innovation, with higher risks of failure and possible losses in the reputation of teachers and educational institutions. Failure risks and the frustrations they may cause are well illustrated in cases described in the bibliography related to the application of information technologies to education, usually known as e-learning [1].

Indeed, the implementation of teaching models in e-learning shows distinctive difficulties. These can be characterized as resulting from an excessive focus on aspects related with the content to be learned [2]. During the construction of the instructional model (planning, analysis, design, development and implementation), content plays a central role in the analysis phase. This becomes a problem when in the design phase the instructional designer decides to deliver instruction with e-learning [3]. At that stage, transition from traditional teacher-centered models, focusing on curricula description and content plans, to student-centered models, in which learning activities are supported in e-learning platforms, is a necessary but difficult task to resolve.

When it comes to learn emergent knowledge, i.e. knowledge supported intensively on information and communication technologies (ICTs), these difficulties become more pronounced. E-learning platforms based solely on availability of contents are not capable of supporting learning results in an effective way. Given the growing importance of e-learning as an instructional model, the problem of how to map content into technological mediating tools becomes an important research question. A Mediating Tool (MT) is a set of learning activities organized according to a certain structure. The implementation of MTs requires specific e-learning solutions, well grounded in solid pedagogic principles, with demanding implementations of synchronous and asynchronous learning activities, which must be studied and validated by real users.

One way of being prepared to take the correct approach to such challenges of modern education is to benchmark current instructional models in several knowledge domains that make intensive use of ICTs. The construction and testing of concrete applications dedicated to supporting distance learning activities proves crucial to the study of requirements

for e-learning solutions. In this paper we extend previous work [4,5], where a method for mapping a course content plan into technological MTs that form a portfolio is proposed. Details on the instructional model are provided; the reasons for implementing a green field e-learning platform are justified; and a more comprehensive outline on the results obtained from the use of this e-learning solution is reported.

This paper is organized as follows. Section II explains the concept of emergent knowledge, and outlines the difficulties that traditional teaching methods face as models to this kind of disciplines. Section III describes the intended requirements for the MTs and the reasons why certain MTs were chosen. In section IV, the MTs are organized in a portfolio, according to different dimensions, allowing the mapping of contents into clusters of learning activities. Section V explains the way content is segmented into MTs. In sections VI-VIII a concrete example is described in the field of electronic marketing. In section IX, the results obtained with the actual use of the e-learning platform by students are described.

II. TEACHING EMERGENT KNOWLEDGE

We use the word emergent behind knowledge to give the sense of something that has just arrived but that evolves fast, like nations with social or business activity in the process of rapid growth and industrialization. In this sense, emergent knowledge is new knowledge that emerges from a new or established knowledge domain, and that deprecates rapidly. We can find this type of knowledge in relation with the fast development of some disciplines, like information technologies, engineering management, including electronic commerce and marketing in the internet, some life sciences. In particular we consider Electronic Marketing (EM) a strong example of emergent knowledge.

The application of the traditional teaching model to emergent knowledge presents instructional deficiencies that prevent students from acquiring recent and highly depreciable knowledge, as well as skills and abilities necessary for the effective exercise of their professions. Traditional teaching refers to that kind of learning heavily based on the appropriation of encyclopedic knowledge, usually transmitted by a teacher in a classroom. It has several shortcomings, such as the difficulty in stimulating high-order learning, including the difficulty in promoting practices within the domain of knowledge to be transmitted, especially when the application of that knowledge entails specific practices.

Deficiencies significantly more salient when the traditional model is applied to subjects where students will come to use knowledge acquired in the exercise of professions that require high-technology environments [6]. In a society where ICTs are increasingly part of all professions, the inadequacy of the teaching model to such subjects tends to be generalized [7].

The gap between traditional teaching methods and the needs of students is also a concern in the discipline of marketing. More and more professionals are using ICTs in data research, market studies, price competition and market driven competitive models [8,9,10].

As a main part of their work, professionals of EM use e-mail, social interaction sites and internet sites, whereby they promote products and services. The acquisition of knowledge and literacies suited for this new world requires skills and practical abilities that a teaching model based exclusively on transmission centered on the teacher does not provide [11].

Aware of this fact, many teachers in higher education have been – generally speaking and transversal to many subjects – including in their teaching models new learning activities, such as the resolution of cases, group works, generic assignments using ICTs, this way encouraging the use of ICTs in order to enhance communication and access to content through internet sites. But even these efforts do not prove possible to recreate in a pedagogically appropriate way the nature of interactions with ICTs, necessary for promoting hands-on activities in a broader instructional model, which should promote the underlying conceptual understanding that aid generalization.

Aware of these difficulties and of the increasing level of demand in the teaching of emergent knowledge, teachers are required to have a solution for this instructional problem, whose relevance becomes increasingly pressing [12,13]. They are required to seek and experience other models of education, which given the nature of the skills and knowledge to teach must have innovative features. Innovation that, in our point of view, must result from a model where learning activities are intensively supported by ICTs. Furthermore, these learning activities must be grouped in a way that can address different learning objectives.

The construction of courses of this nature is however struggling with difficulties, including those relating to the ability to implement a specific plan of content in a learning model intensively supported in ICTs, and where learning should be faced by students in a motivating and engaging way [14,15]. Some authors advise the use of case studies or patterns that can be a form of guided support or scaffolding to the process of learning design. Some explain the passage of specific content to e-learning, in which the content is mapped to MTs that cluster learning activities [16]. A learning activity is any form of organized activity that promotes learning. To some extent, this is also our approach. MTs such as puzzles, simulation, practice fields and text/hypermedia are used to deal with a content plan for learning.

But a new value for this kind of learning design must be endorsed, once the interaction between MTs is considered. Interaction requires the organization of MTs in a portfolio, allowing the establishment of practical rules to map the content into learning activities, and enabling new learning capabilities in the e-learning solution.

As we shall see, our proposal allows the minimization of a major problem in the process of mapping content to e-learning solutions: The mapping into text and hypermedia whose learning activities are limited to reading, and that do not provide the development of high-order competences.

Indeed, this solution is unsuitable for disciplines that have contents with emerging character, for such activities do not provide the acquisition of skills related with the reasoning of high-order competencies, such as analysis, synthesis and evaluation.

III. CHOOSING SUITABLE MEDIATING TOOLS

Practioners use a wide range of processes and tools to support and guide decision making when creating learning activities.

The reasons why and how MTs are being used is often aligned with specific discipline needs. It is also aligned with the support and capabilities that ICTs provide. We see with the beginning of web 2.0 a tendency to include in e-learning solutions MTs like wikis, blogs. We also see an increasing trend to include MTs that provide support for certain learning approaches, such as problem-based learning and resource-based learning.

The study of different cases has been the method to develop patterns that could help in the design of learning activities. A design pattern is a three-part rule, which expresses a relation between a certain context, a problem, and a solution [17]. From literature we can identify the development of patterns for: i) person centered e-learning [18]; ii) collaborative learning [19]; iii) designing adaptive hypermedia for learning styles [20]. Specifically for EM we cannot find in the literature design patterns for devising learning activities in an e-learning solution.

But the main difficulties to identify patterns is related to the greater diversity of MTs and the way that these tools are applied to obtain learning outcomes in a broad set of knowledge domains.

Adopting the correct MT is the fundamental task of a teacher when he designs learning activities, which should be aligned with the results that he intends to obtain, and provide a way for checking that the results were indeed achieved by students [21]. MTs should also be aligned with the requirements that one advanced pedagogical model requires.

As part of our proposal, we put forward a specific solution of MTs: i) puzzles; ii) simulations; iii) practice fields; and iv) hypermedia content. All these MTs will cluster sets of learning activities supported in an e-learning system in which students learn EM. They enable us to accomplish the requirements of: i) achieving proper EM learning outcomes; ii) checking the results achieved by the student; iii) allowing students to acquire high-order competencies and skills.

The use of puzzles was already applied as a learning approach to teaching in different courses and universities. Puzzle-based learning approaches enthusiasms students as i) they promote edutainment and ii) engagement with learning; iii) can be applied to solve real-world problems; iv) conclusions taken from puzzles can be applied to a broader context [22]. In the process of learning through problem solving, students are first confronted with a problem, a puzzle or a set of questions, meaning that puzzles themselves can be an effective instrument to implement this type of learning [23].

But the framing of the link between learning through problem solving and simulations has attracted more attention. The simulation in this context appears at different roles, allowing to keep the requirements of good learning through problem solving, namely: i) the management of large amounts of information; ii) the connection of multiple domains in a structured way; iii) the setting up of the need for creating real situations [24].

In some cases simulation is the first choice for teaching [25], appearing as the full implementation of the process of learning through problem solving [26,27]. The analysis of the problem embedded in the simulation, the gathering of information to solve the problem and the analysis of the response obtained with the actions taken to solve the problem, allow the acquisition of skills related with the reasoning of high-order competencies. Learning activities framed in a simulation allow, in a structured way, to pose problems to students. They can also, through the analysis of available information, optimize the actions to solve the problem, insofar as the simulation gives immediate feedback on the result of actions taken.

However, simulations are only a necessary condition to establish a pedagogically advanced instructional model, but not a sufficient condition. Simulations are not able to provide the type of pedagogic characteristics that a practice field does, namely in what respects to authenticity and context of activities. Instructional models only supported by simulations reduce the ability to map the content-plan into mediating tools.

A practice field is also a MT where learning activities can be clustered. Within the adaptation of instructional strategies to the design of online solutions for learning, Edith Cowan at University in Australia [28] developed a model which aims to characterize the best instructional practices in the development of learning units to e-learning.

The implementation of the model is based on constructivist philosophy, situated learning, which emphasizes the importance of the authenticity of the context, the authenticity of the learning activities, the collective construction of knowledge, reflection, articulation and evaluation.

The implementation of practice fields allows the construction of instructional activities that implement the principle of situated learning. It makes learning an active process, on a student-centered learning model, where collaboration and cooperation are promoted through the implementation of practices where students play roles that will be daily present when exercising the profession they are studying for.

So that the construction of the practice field be effective from a pedagogical point of view, it should [5]: i) have a narrative that allows students to generally contextualize the practices to be developed; ii) guarantee that the roles students will perform in the organizational context are close to the ones they will have as professionals; iii) have authentic

activities, equal in means, shape and type of interaction with the organizational context that students will have as professionals; iv) be properly synchronized with the learning platform and in this context with the integration of content that students have to study.

With a complementary role to the previous MTs, we also use learning activities based on the analysis and study of hypermedia and text content. Text and hypermedia format usually shape the content plan of most e-learning solutions. Content, under such format, allows learning activities based on reading, viewing and listening, in a process of low cognition that only promotes remembering, understanding and applying [29]. Learning activities that fall on this group are intended to support other activities in other MTs of the portfolio. In the transition from the content plan to learning activities, text and hypermedia activities are only to be considered after total exhaustion of learning activities on other MTs. They are used as introductory elements, e.g. for puzzles, they are used as a support to its solution. For the practice field, text and hypermedia elements can support the narrative.

IV. A PORTFOLIO OF INTERACTING MTS

To organize MTs in a portfolio we consider two main characteristics of content that could be mapped into MTs. The first concerns the extent to which the content can be modeled.

A second dimension characterizes the kind of interaction that learning activities clustered inside MTs require in the relationship of the student with the learning environment. Learning design has been implemented mainly based in asynchronous situations, where the content in a learning management system will complement learning activities in a learning room. This means that learning in a synchronous environment introduces special characteristics in the learning solution, which the learning designer should have in mind when considering how to map content into MTs.

A. Modeling and non-modeling contents

Content plans seem to have two main tendencies. Content that is easy to be modeled, such as describing facts, concepts or processes, whose origin is based on certain theories, possibly where mathematical functions play a role, that is, functions that can be easily coded and transformed into learning activities framed in games, puzzles and simulations. On the other hand, content not liable to being modeled should be transformed into activities in which learning is based in an-hands on approach, such as a practice field. Practice fields are, however, not always easy to build. In such cases, learning activities should be based on the study of content in the format of text and hypermedia.

B. Synchronous and asynchronous learning

Two kinds of interactions with the system are considered: i) simple interactions, where students develop learning activities asynchronously; ii) complex interactions, where students develop their learning activities in a synchronous environment with the system.

In the former students use the system as an element to support the learning activities that they develop. Learning activities can be carried out without the support of ICTs but with higher relative costs. In the latter, learning activities would not be undertaken without the existence of synchronous moments of interaction between student and system.

Upon constructing the learning environment, learning activities grouped in a simulation and practice field use characteristics synchronous with the system. In highly ICT supported professions the only way to implement a practice field is in a synchronous mode with the e-learning system. Moreover, a simulation can only be effective if its results are given in a short period of time, maintaining the students' interest.

Learning activities organized in puzzles and passive hypermedia elements should be asynchronous with the system. This allows greater flexibility in the organization of the students' time. Puzzles are usually implemented based on information search in different sources, external to the e-learning system, harder to implement in a synchronous mode.

In the context of the method proposed, the organization of a content plan in learning activities, as well as the interactions among such learning activities, is presented in figure 1.

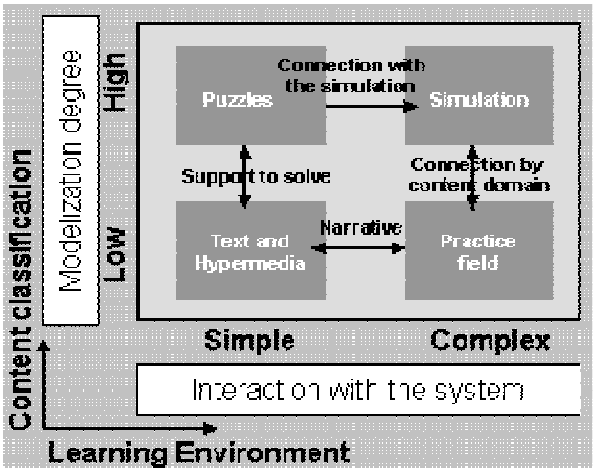

Figure 1. A Portfolio of Mediating Tools

C. Interaction among MTs

In the portfolio MTs interact with each other. Interactions, identified in Fig. 1, are a key success factor for building a learning model in which its value is higher than each one of the MTs alone. Moreover, the identification of such relations will facilitate the establishment of requirements about the architecture of the learning management system.

Solving puzzles allow students to obtain information later used for calculating the model of the simulation. While solving a puzzle, students get "an entrance" to the black box of the simulation. The entrance appears as the knowledge

necessary for solving one of the functions that support the simulation. A number of puzzles should be the solution for a set of formula that forms the black box of the simulation. In sum, for each interaction with the puzzle students acquire additional pieces of information used in the calculation model of the simulation.

A relationship between simulation and the practice field is established through the description of a common base of knowledge characterizing a simulation and a practice field. For instance, EM has a common knowledge base, theoretical and practical, on the use of media that supports online publicity. Theoretical for understanding how to make it effective on advertising campaigns; practical insofar as its effective use demands the knowledge of practical skills which maximize its effect.

The passive learning activities connected with the study of content are related with puzzles, simulations and practice field, having a relationship with puzzles that can be described as an explanation of how puzzles should be analyzed in order to be solved; a relationship with the practice field through the explanation and the framing of the history and the narrative that support it; and with the simulation insofar as they enable the learning of the context and history of the simulation, the simulation rules, the kind of data entry and how results are presented.

V. SEGMENTING CONTENT INTO MTS

Segmenting content into MTs requires an understanding of how learning activities can be clustered inside each MT. In the following sections we explain some guidelines that can be used to properly map content into MTs

A. From content to puzzles

Solving puzzles is a way to implement learning through problem solving and discovery. Its application can be found in the learning of programming languages and in learning related to operating systems [30,31]. Puzzles are often used in a dynamic of game [32]. A puzzle applied to learning is an exercise of discovering and information integration to construct a coherent whole; in doing these activities a person will be able to learn.

As outlined below, we see puzzles as a way to build interest in simulations by open windows in the simulation black box.

In the case of EM, we also foresee the use of puzzles in learning situations where it is necessary to gain knowledge on the use of certain management reports. In such context, the first activity to map content into puzzles is the characterization and segmentation of content, being particularly suitable the modeling of those parts who best characterize the key performance indicators of the management model intended to be learned. For instance, in internet advertising, reports on the characterization of visits to a website may be suitable to be transformed into puzzles, e.g. a perceptual map about the nature of a website could be generated, given to the student, relating it with the response of the market to an email campaign, and ask the student for finding such relation.

The transformation of management reports in puzzles can be carried out by hiding some of its information, which may be obtained by searching similar management reports that have the information fully available. In this process of searching and analyzing, students will learn the purpose of such reports.

B. From content to simulations

Simulation is a consolidated discipline in computer science. At the interface between computer science and management, the increasing application of simulation principles to management shows that in many areas more and more disciplines are being studied and modeled (see e.g. [33]). This trend has been reinforced by the decreasing costs of ICTs. It enables practitioners and theorists to proceed in the implementation of formal models, in order to explain and study technical and management issues. Marketing phenomena has been intensively modeled in different domains [34]. This growing tendency is an opportunity for building simulations.

In the process of transferring content to a simulation, the learning designer should study what parts in the content have been modeled. In the case of EM we have identified advertisement as a type of content that has been highly subject to modeling [35]. The designer must also choose the type of approach to build the simulation model. Most approaches use discrete events to build the mathematical model of the simulation, both in engineering and management.

In the case of EM, we chose an advertising model, ADBUG [36] and implemented it in a discrete-event-based simulation. This allows us to manage time in periods where the state of simulation changes at discrete points in time, which we can associate to management decisions and other events. In each of these discrete-time points, we make changes in the model that reflect changes in the market.

C. From content to a practice field

Instructional designers can model a practice field by observing the roles that their students will play in their professional lives and how they will apply what they learned as students.

In order to transfer content to the practice field, the learning designer should look at his students as the targets of the actions carried out by the students themselves when doing practices. For example, if these practices are related with actions that have impact on a market, the students in the class could play all together the role of consumers. Moreover, each student could be identified as a professional of the practices modeled in the practice field, e.g. in EM, students can do practices related with the profession of a marketeer.

In EM, we focus our attention in content that defines a way of doing electronic email campaigns, forum campaigns, and “banner campaigns”. The learning designer should

identify, design and implement the necessary resources that enable students to do the practices. He/she should also identify what roles will be played by students in the practice field. In EM, we consider a student as a marketer. Developed activities in the practice field should be authentic, in the same social and collaborative context that students will find after concluding their studies. This step enables the learning designer to build a solid narrative that will be the anchor for the practice field.

D. *From Content to Text or Hypermedia Format*

Transferring content to text and hypermedia format is a well established practice. Learning designers should follow the best practices in this domain, namely in what respects to content organization, interface design and tutorial systems [37].

VI. AN EXAMPLE IN ELECTRONIC MARKETING

For teaching EM through e-learning we suggest the passage of a content plan based course to an e-learning solution, whose developing methodology should be based on the grouping of learning activities as outlined above, according to Fig. 1.

The platform was implemented having as base internet technologies, which provide non-traditional learning scenarios, enabling students to acquire a more complete and holistic understanding of EM [38]. Changing the teaching practices to an e-learning solution will explore the synergistic model between EM and the intensive use of ICTs.

This understanding led us to consider that learning through e-learning, when properly implemented, taking into account pedagogical requirements, namely, (i) the application of high-order skills; and (ii) an adequate structure for the involvement of students with the knowledge needed to manage in their domains, is the best way to teach emergent knowledge, and specifically EM.

TABLE I.

	Degree of Modeling	**Level of interaction with the learning environment**	**Type of grouping**
Advertising and business intelligence on internet	High	Low (Solution to develop strongly asynchronous)	Puzzles
Management plan media on internet	High	High	Simulation
Activities of viral marketing on internet	Low	High	Practice field
Learning activities that support other groups	Low	Low (Content in text for printing).	Text/ Hypermedia

VII. MAPPING A CONTENT PLAN INTO E-LEARNING

The content plan we propose relies on management activities for promoting products and services through media channels supported intensively in ICTs. The main issues to be approached are (i) management plan media on the internet; (ii) advertising and business intelligence on the internet; (iii) activities of viral marketing on the internet. The topics can be related to each one of the quadrants of the portfolio (see Fig.1), according to its characteristics and the above-mentioned guidelines. The result is presented in Table I.

Activities supported by text reading and study of hypermedia elements – the last line of Table I – are intended to support the more complex learning activities, including simulation, puzzles and practice fields, as well as supporting autonomous learning activities such as site placing, introduction to EM and conversion strategies.

A. *Puzzles*

Puzzles were constructed as market studies. They are reports of the application of business intelligence to the traffic that visits the targets of the media campaign to be held, in this case Web sites, forums and mailing lists of electronic mail.

The introduction of puzzles in the learning model aimed at transforming a set of content related to advertising in order to provide students with tools for market analysis, that are nowadays part of the techniques adopted in any communication and advertising plan. In connection with such instruments the following were considered: (i) Marketing based on postcode – geographic and demographic analysis of consumers; (ii) Customer segmentation by criteria of income and lifestyle; (iii) Analysis of consumer – product consuming; (iv) Use of product – index of purchasing power; (iv) Maps of perception – application to EM.

For each market research we applied the above mentioned guidelines to transform it into a puzzle. That is, we put into this market survey an enigma, whose solution requires the selection and collection of further information at the internet, additional to the content available in the learning environment.

This strategy for solving puzzles also enlarged the learning objectives by giving students skills for the collection, identification and analysis of information that is relevant to take decisions. Solving puzzles has enabled students to better understand the simulation. This goal is achieved by providing students with openings in the black box of the simulation, giving students the opportunity to understand how the model inherent to the simulation works, as explained below.

B. *Scope, Objectives and Design of the Simulation*

When doing advertising campaigns companies expect to increase sales. Before carrying out a publicity campaign, a set of activities must be done. Marketing managers assume the responsibility to plan, organize, implement and monitor

plans and programs whose design is made to reach certain objectives. Typically, marketing managers encounter scarce resources but have an unlimited willingness for expending it, namely with advertising. This meaning they need to allocate scarce resources effectively and efficiently [39].

In order to be effective and efficient those responsible for marketing have to: i) analyze the situation; ii) identify the objectives of advertising; iii) identify a strategy for the message to be achieved with the advertising; iv) develop a media plan; v) make the budget allocation; vi) implement and evaluate [40].

The planning of a media campaign has as objective the alignment between media advertisement and product segmentation. Marketing managers should develop advertising in media that better correspond to efficiency in which the targets hit by advertising are maximized at minimum cost [41].

Online advertising is not different from this model. One of the phases for media planning on the internet is the search for advertising sites where users correspond to the identified targeting for selling the product.

Students, when using simulation, intend to maximize the achievement of market share through the implementation of a previously defined media plan. This media plan consists of several online sites with a specific address, web-sites, e-mail with requested and non-requested destinations, and a forum. The media vehicles used are banners, e-mail messages, and promotional messages.

A cycle of interaction between teams of students and the simulation consists on the following: i) analysis of information provided by an intelligent tutoring system; ii) data entry for each media type, iii) analysis of the results and shares obtained for the total media used.

1) Analysis of information through puzzles

For some media, we give information on the relation between investment made and share achieved. This information is provided to students through a puzzle, with an educational feature, reinforcing the learning model by problem solving. That is, by solving the puzzle we obtain the equation of the sigmoid function which characterizes the effect of advertising in a particular kind of media.

Given the nature of the puzzle, its resolution in teams becomes simpler as it requires some skills that emerge more easily in a team. This model reinforces collaborative learning. While solving the puzzle students get to know the theoretical response type of markets to advertising, the S-shaped curve proposed in the ADBUG model.

2) Data input

Each team enters the system with seven quantities, one for each type of media. i.e. for banners they enter the number of impressions that will be made by the banner. In Table II we present the type of values that students input in the simulation.

3) Calculation model and results

Figure 2 represents a specific advertising campaign, with seven functions, each one representing the market response to advertising in a specific media. A simulation has several advertising campaigns; changes in the calculation model along the simulation reflect dynamic changes in the market.

Each team, after entering data, receives information on the global market share achieved. The global share is the result of adding all shares for all types of available media. However, the information about market share obtained by each media channel is not disclosed. Students must solve the puzzles in order to obtain this information. This kind of interaction, besides learning in the context of solving puzzles, let students learn the typical market response to EM campaigns.

TABLE II.

			Publicity Vehicle
Media Classes	***Web Sites***	High traffic site	Banner
		Company home page	Banner
		Exchange of advertisement space	Banner
		Sponsorships	Images, technical studies, video
	Electronic mail	Permission mail	Electronic mail message
		Unsolicited mail	
	Forum	Message post	Advertisement message

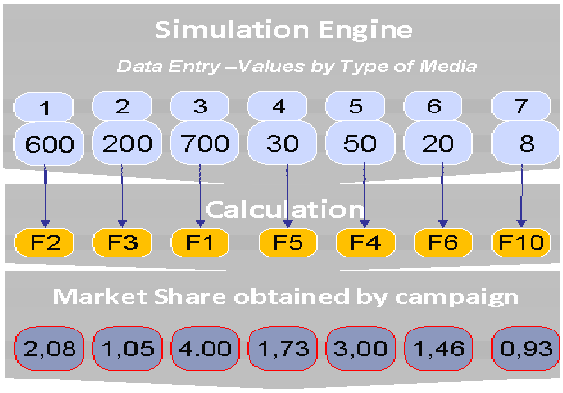

Figure 2.

C. A PRACTICE FIELD

Practice fields are especially appropriate to teach disciplines with high-technology intensity. They are appropriate for EM, insofar as they grant specific knowledge on the practical use of ICTs for developing marketing activities.

A practice field also grants a high maturity education model, promoting alignment among perceivable results, teaching, learning activities and evaluation. The practice field that was developed [5] has three main characteristics for teaching disciplines with high technology intensity: i) it must be integrated in an e-learning environment extended with an intelligent tutoring system, ii) dynamics created by the practice field at the cognitive, social and emotional dimension should be integrated in a framework of significant context, iii) practices should be authentic and supported by the same execution and computer supported contexts as the ones students will find in their professional life.

1) The tutoring system

Instructions to students specified by the intelligent tutoring system are embedded in the learning support system, and duly integrated hereinto, thus enlarging the learning process. The tutoring system also automatically promotes the specific configuration of the hypermedia environment, thus showing students the connections they have to follow, giving easy access to the systems that support authentic activities.

The tutoring system controls the timing of each practice, shows the student what to study before developing it and places him on the role he has to play on the practice field.

2) Building a context with authentic activities

One narrative enables us to contextualize, introduce simplifications, adjust and explain certain dynamics of the practice field, in line with the requirement of building a significant context.

The narrative is based on a situation where an enterprise has just bought a business of electronic commerce and has to maximize its publicity campaigns. The publicity campaigns are developed at the practice field for a specific market.

The set of students defines this market; their role is of a typical consumer. Once they receive structured messages from colleagues promoting products, they will understand the effect that these messages will cause on consumers. They also learn how to structure messages to be sent in an EM campaign.

In the role of consumers, students answer messages, causing in the students that sent those messages a learning effect on how a campaign really works. Questions such as different time zones affecting email answers, geographical globalization of such, confusing answers with unforeseen problems, peaks in the distribution of emails, give students a clear idea of what they will find at the real working world.

A practice field must have several media available so that students can practice. In our practice field for EM the practices comprise activities of electronic mail, messages on forums, online advertising through banners, online purchasing of goods in commerce sites and permission marketing [5].

VIII. IMPLEMENTATION

The e-learning platform was tailor made, with the specific purpose of teaching EM and testing the instructional model. The platform has a tutorial system that implements the synchronization of learning activities and content delivery. It is composed of different subsystems namely, general information; news; FAQs; E-mail; asynchronous communications; learning assessment; puzzle deliver; simulation; synchronous communication.

To implement the e-learning solution our choice was a green field development, due to the following reasons:

i) The positioning of current open source platforms which tend to focus its functions on administrative tasks for teaching, like test delivery, administration, content distribution and asynchronous communication, which hinders the evolution of the education model from teacher-centered to student-centered, which we consider a basic requirement for the success of e-learning solutions.

ii) The mainstream open source platforms are not prepared to integrate MTs like the ones we propose in our model. Some of them support standards like e.g. SCORM, but the implementation of MTs implies significant changes in the technical structure and an understanding of the programming languages that support them.

iii) The main economic benefit of using an existent e-learning platform stems from the reuse of functionalities. Notwithstanding, the same result can be achieved by integrating open source functionalities available free on the web, like forums, e-mail systems, frequented asked questions, chat systems, online shopping systems.

iv) In order to exploit the MTs synergetic effects proposed in our model, learning activities need to be carried out by the students in a specific order. Furthermore, the transfer of information among such learning activities is demanding. Additionally, at each point in time the hypermedia interface must be configured with the appropriate information to students. This kind of integration is not easy to achieve with the available platforms, for most of them do not have intelligent tutorial systems with flexible requirements for integrating the sequencing of activities, information transfer and interface/hypermedia configuration.

IX. RESULTS AND EVALUATION

Two hundred and ninety three students in eight post graduate courses attended the discipline of EM with the instructional approach presented here. The instructional model was based on the grouping of learning activities as explained before, and delivered at distance with an e-learning solution via the internet. Each class had between 25-35 students; ten classes were delivered with this instructional model. The discipline lasted for five weeks, in eighteen different modules.

A. Results

A 6-page survey was administered to all students at the final of the discipline. The purpose of the survey was the evaluation of the instructional model as well as the IT supporting the e-learning platform. All questions in the surveys were based in a scale of one to five. The surveys were organized in three main groups: (i) a survey from the "IDEA Center" [42]; (ii) a survey especially developed to

evaluate technological issues; (iii) a survey developed to evaluate specific characteristics of the discipline. The latter was further divided in three groups concerning program quality, content quality and training model.

To benchmark the team building capabilities we compared our results with other results collected from two other sources, namely, a survey applied to different online courses using the IDEA center survey [43] and a web assisted course in the field of marketing education [44]. The web assisted course has also been benchmarked with a teacher centered discipline delivered in a traditional class. The results show that EM reached a higher score than both the Web assisted course and the scores of the IDEA survey.

TABLE III.

Benchmarking – Team building skills	
Traditional class	4,1
Our discipline – E-Marketing	3,7
Web assisted course in the field of marketing	3,4
Online courses rated with the IDEA survey	3,3

Student satisfaction was benchmarked with reference to the web assisted course and the traditional course in the field of marketing. The results show that student satisfaction in EM reaches a higher score than in the web assisted course.

TABLE IV.

Benchmarking – Student satisfaction	
Traditional class	4,2
Our discipline – E-Marketing	4,0
Web assisted course in the field of marketing	2,6

Student perception of learning was also benchmarked with reference to the other courses in the field of marketing, as well as to the online courses rated with the idea survey. Our discipline achieved a higher score than the web assisted course, though below the average scores of the IDEA survey.

TABLE V.

Benchmarking – Student perception of learning	
Traditional class	4,2
Online courses rated with the IDEA survey	3,9
Our discipline – E-Marketing	3,2
Web assisted course in the field of marketing	3,0

Program quality was evaluated with a survey of four questions, with possible scores between one and five.

TABLE VI.

PROGRAM QUALITY	
QUESTION	**SCORE**
Objectives are clear?	3.39
Program content is applicable?	3.19
The content is adequate?	3.49
The duration is adequate?	3.41
MEAN	3.37

Content quality was evaluated with a survey of five questions, with possible scores between one and five, representing poor quality and excellent quality.

TABLE VII.

CONTENT QUALITY	
QUESTION	**SCORE**
Content structure	3.59
Presentation	3.13
Interactivity	3.38
Team work	3.93
Evaluation Model	3.15
MEAN	3.44

Training model was evaluated with a survey of five questions, with possible scores between one and five, representing not important and very important.

TABLE VIII.

TRAINING MODEL	
QUESTION	**SCORE**
Study where I want	4.20
Study where I wish	4.18
Study at my place	4.15
Study on my own	3.49
Collaborative work	4.19
MEAN	4.04

B. Discussion

Our discipline was the first one delivered with this method in each post-graduation course. One objective was the development of skills for building consistent teams that could proceed strong in the entire course. Achieving this objective, while delivering the EM discipline, was one of the main results of the instructional model.

We consider our results particularly significant when benchmarked with other disciplines delivered with the same distance model. Team building skills (Table III) reaches a score of 3.7, the highest score among the distance delivery approaches, and close to the traditional teaching model. The EM discipline had also a student satisfaction (Table IV) better than the web assisted discipline.

The instructional model has worked and the students reported a good perception of learning (Table V). In this case, EM achieved a higher score that the web assisted discipline, though below the average scores of IDEA survey. One should remark that the score is a good figure in the context of on-line delivery for e-marketing disciplines. Given the diversity of web courses evaluated by IDEA inquiry, a direct comparison with the IDEA score may reveal erroneous. At any rate, the previous scores bypass by large the students' perception of learning, for the results show that globally the proposed instructional model supported in e-learning is able to promote levels of satisfaction and teambuilding skills that increase by far the students' motivation, having positioned the solution near the teaching model of a traditional class.

As a main benefit from the delivering method, students reported the advantages of the training model, with a mean of 4.04 (Table VIII). The program of the discipline (Table IV) was evaluated positively, reaching an average score of 3.37, a good figure in the context of distance learning based on e-learning, though there is still much room for improvement. As regards the aspects of quality of content (Table VII), working in teams was well evaluated, reaching a score of 3.9, in line with the results of team building skills. Other technological features, such as download times and system time response, were much appreciated.

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