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**Abstract:** The aim of this study is to analyze the role that simulation plays in learning methodologies in higher education. As a research strategy we will use a case study, to describe and to find out the impact of the course called Professional Project, as a PBL (Project-Based Learning) methodology type, in the teaching of accounting at ISCA-UA, involving the perspectives of employers, academic staff, students and graduates.

## **1. The case study**

### *1.1. Introduction and context*

This article is part of a research programme on the role of simulation in vocational degrees. The main objective of our study is to analyze the role played by simulation in the learning processes of vocational higher education. Although this article is restricted to a conceptual reflection on the issue of simulation in teaching and learning in vocational degrees, it seems important to introduce the context where this project was initiated, so the reader will better understand the scientific and educational concerns behind this particular way of organizing learning.

A case study approach will be used, to describe and ascertain the impact of the Professional Project, as a Project Based Learning (PBL) type methodology in the learning of accounting, at ISCA-UA. The perspectives of employers, academic staff, students and graduates will be triangulated.

In May 1996, ISCA-UA introduced a course called Professional Project in the syllabus of its degree in Administration and Accounting. The new course has the duration of a semester (3<sup>rd</sup> year, 2<sup>nd</sup> semester) with 8 tutorial-type hours per week. The idea of creating this new type of teaching methodology was initially related to the difficulty of having tutorials with a great number of students, on the one side, and the need for practical preparation for the graduates, which would satisfy as much as possible potential employers, on the other side.

Taking the opportunity that the school was restructuring the degree, and putting aside the idea of having traineeships within the syllabus (which would entail finding placements for around 160 students per year), the idea of simulating the business reality within the school arose. The basis of the Professional Project lays in a simulated market of virtual enterprises, which small groups of students must manage an undertaking. This led to the inclusion of the course Professional Project in the degree syllabus, and it is this simulation project, implemented in ISCA-UA since the academic year 1997/98, which is the subject of our study. As a result of a critical analysis of the results obtained in previous years, the Professional Project has changed along the years, trying to consolidate its strengths and minimize its weaknesses.

Taking a different view of more and more adjusting of new graduates to the market needs, the Professional Project turns up in ISCA-UA, as a big bet in *learning how to do* inherent to polytechnic schools. This vision reflects new learning models of acquiring competences where *learning how to learn* emphasizes learning rather than teaching (Machado, Inácio, Fortes, & Sousa, 2001).

The objectives of Professional Project refer to the pursuit of a wide interface between academic and professional environments, involving different working areas in a multidisciplinary perspective. As a final synthesis, it is acquainted with a practical and interactive view of entrepreneurial contexts, increasing abilities, attitudes and competences previously identified with the graduate in accounting profile.

In acting as professionals and upon reflection on the needs of their practical actions, students will feel the need to theoretically justify their choices, either stressing interdisciplinary or turning to teachers support. This impels interactive learning among students, leaving to teachers a moderator role in a debate where the student is the leading actor. Being the aim of the Professional Project the applied integration of knowledge in a global perspective, capable of intensifying professional, personal and social skills in the future graduates, it seemed obvious to think over the methodological frame of the syllabus. As an answer to that problem and fitting in new emergent methodologies, the Professional Project runs in a simulation and virtual environment, following a PBL methodological type either in a *project based learning* mode or in a *problem based learning* way.

In all this interactivity, the methodological strategy of the Professional Project centers itself in learning rather than teaching, providing student with a discovery and experimental environment, where the role played by teachers and students is inverted.

In fact, the traditional tasks of the teacher as a knowledge transmitter and of the student as a passive receiver, takes no place in Professional Project. In this simulation project, students must seek out the information they need as an answer to their problems, while teachers guide them through the process. On the other hand, interdisciplinarity becomes an essential and cross-sectional element, permitting that different subjects could be seen in an integrated way, which is vital for the full exercise of relationship between different knowledges'.

As mentioned by (Machado, Inácio, & Sousa, 2001), the nature of this new course emphasizes facilitated learning, which withdraws from the emphasis in teaching in the so called traditional methodologies, to centre itself on learning. The importance of the Professional Project is recognized by the Chartered Accountants Association (CTOC), as it has the same objectives that this association has, by requiring its associates to have had contact with real business situations before they can join as members. The association considers that the candidates who have done Professional Project are dismissed of the traineeship demanded by the association before a person can join it as a chartered accountant.

As the research developed and reviewing the literature on teaching and learning a need was felt to review other subjects, such as: the mission of higher education, traditional and modern teaching methods, how these concepts affect the curriculum, how PBL can improve learning, and the role of simulation in learning. From these explanations of the state of the art about teaching methodologies and learning processes, some questions arise.

Do the students that attend the Professional Project considerer this PBL methodology an attractive profile in the sense of reaching more efficient learning at the same time they are improving performances and motivations?

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Does the academic staff involved consider this methodology as aggregating different knowledge, developing a logic thinking structure that make students able to apply previous information to deal with problems at the same time it helps improving their performance as teachers?

Do the employers feel that the profile of a graduate has change his tune as a result of the implementation of the Professional Project, namely in increasing efficiency?

Are the graduates who have attended Professional Project more skilled than the ones who haven't?

Despite the fact that there are not any known studies on the impact of PBL-type methodologies in Portugal, in the particular case of a Professional Project, the anecdotal evidence, in general, is that the Professional Project has had a positive impact and it is a well established method. In particular in the vocational degrees of accounting, simulation has good possibilities to become institutionally recognized as an important training method. However, this process of innovation seems to result more from exercises of benchmarking, and the belief sustained by empirical evidence of economy of resources, than in solid scientific evidence. That is why we think appropriate the main objective of this paper: to analyze the impact of simulation in the teaching and learning processes.

For all the above, it seemed extremely pertinent and urgent the proposed theme, and its contribution to knowledge on the learning and teaching methodologies in higher education, in order to obtain a better understanding of curriculum organization and management.

## **2. Conceptual framework**

### *2.1. Higher education*

Although the idea of higher education has an history, it has developed over time, emerging from its institutional forms in classical Greece and in the medieval ages, to be articulated in written form in successive versions in the nineteenth and twentieth centuries. While there are definite links between the successive formulations of the idea, each version has to be understood in its own age (Barnett, 1994).

The Greek idea of higher education is clearly represented in Plato's dialogues. From the key elements in Plato's idea, we emphasize knowledge as a particular view of an observed world, where it is possible to see through the conventional knowledge of appearances to a new realm of unchanging knowledge. In this searching for truth, the way forward lies in critical dialogue where the pupil learned not through the master's didactic instructions, but through the technique of asking and answering questions (Barnett, 1994).

Extending the Hellenic idea of higher education, the university, as a higher education institution, ascends to medieval ages at institutions underneath roman church (Amaral, 2000). (Barnett, 1994) refers to essential features of the idea of the medieval university. First, universities were democratic because they were open to all that wanted to know in a participated way. Secondly, each foundation constituted a *stadium generale* and the guild of students and masters were joint participants whatever their specific level of competence. By these, universities were seen to warrant an independence from the rest of society.

As (Carvalho, 1995) reports, there was an underlying axiom that what counted as knowledge required demonstration, and one of the key methods to do so, was based in

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critical and structured discussions, organized in two parts: the *lectio* and the *disputatio*.

In the opinion of (Barnett, 1994), the same conducting wire of the idea of higher education in ancient Greece and in medieval ages, still extends in the early XIX century, with Cardinal John Newman. The Cardinal set out his ideas in a series of Discourses on the Scope and Nature of University Education. Newman considered that a university education should form a connected view of things as a net of interconnected subjects, conceiving knowledge as its own end more than being useful.

In order to be able to offer this larger view, the university had to take a generous approach to a great sort of domains by teaching all branches of knowledge. But this breadth has two fundamental implications: on one hand it requires a new curricular organization and on the other hand it calls for an active and auto-reflective learning process. In this act of reflection, it was important for the student to retain a proper conception of the relation of the parts to the whole, gained through self-reflection on what is taken for knowledge.

The closeness between Newman's idea of a university and Plato's conception lay, then, in a continuing process of intellectual reflection on what had already been perceived. Another point of the conducting line, stated by (Barnett, 1994), considers the university's possibility to play a role in the reconstruction of a more human society following the twentieth-century world wars, but based on a more unitary and purposeful conception of knowledge. (Jaspers, 1959) considered that the modern university had four main functions: research, teaching, professional education, and transmission of a particular kind of culture.

In parallel with Newman, (Jaspers, 1959) considered that the different disciplines constituted a single cosmos of knowledge, and so the university could not arbitrarily restrict the range of knowledge in which it was interested. The Jasper's idea of knowledge linking up theoretical knowledge with practice of experiment, approaches the idea of (Weber, 2003). In fact, (Weber, 2003) assumes the possibility of objective knowledge, since it extracts symbolical subjects from the facts of empirical knowledge.

(Barnett, 1994) stands up that the four sets of ideas just outlined have to be understood in terms of their own history and culture and the social interests they represent. In spite of that, this author believes that there are certain recurring themes, such as knowledge, truth, reason, wholeness, dialogue and criticism.

Although those recurring themes appear in the different ideas of higher education, different organizational models can be stated. (Ruivo, 1994) and (Scott, 1995) identify three dominant strands within the European university tradition.

These are the knowledge model, represented historically by the Humboldtian university in Germany, which placed graduated study and research at the heart of higher education; the professional model, represented by France's *grandes écoles*, which concentrated on producing professional workers and, in particular, state functionaries; and the personality model, centered on Oxford and Cambridge, which aspires to initiating students into a liberal intellectual culture.

Differences between America and Europe are also significant because recognizably mass higher education emerged first in the United States. As a result, (Neave, 2000) adds the American model with its paradoxical combination of extensive state regulation and strong commitment to the market.

Remembering the characterization of post-fordism by (Scott, 1995), as a dismantling of a nation state and of useful knowledge, the post-fordist perspective grasp the meaning of new technological, economic and organized qualifications as well as new ways of working layouts. As (Amaral, Magalhães, Rosa, Santiago, & Teixeira, 2002)

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states, Portugal followed the post-fordism trend of other European countries, and over the last thirty years the pattern of the relationship between higher education institutions and the state and society has been changed (Neave & van Vught, 1991).

In Portugal, one can also see the rise and political deployment of the concept of stakeholder. But the Portuguese higher education system is characterized by two main drifts: the polytechnic and the university. And the situation of polytechnics is very different from that of the universities, because from the start polytechnics schools were considered to have a closer connection with the economic and industrial situation. In this way and historically, polytechnic schools enabled a more specialized teaching of narrow flank (in opposite to a wider flank ministered in universities), providing a more closeness with professional jobs, in an entrepreneurial vision. As a consequence, the knowledge production and diffusion shows important changes as the prevalence of the mode 2 of knowledge over the mode 1 of (Gibbons et al., 1994), and the entrepreneurialisation of services.

The university in Portugal was institutionalized in the reign of king D. Dinis, by the year of 1288, as a will to educate an intellectual elite for the nation. Later and as a result of the political changes occurred, it was felt necessary to know more about the needs of workmanship. The answers took the form of a report called *Le Project Régional Méditerranée*, in the late 60s, which clearly showed the urgent need of Portugal for technical education.

It was the beginning of a vocational guidance as a diversification for higher education. This institutional vocation distinguishes between two different logics: on the one hand and in the university education we have the *know* and the *know how* in sequential terms in a medium or long term vision; on the other hand and in the polytechnic education we have at the same time the *know*, the *know how* and the *do*. After Bologna we can affirm that the core missions and values of higher education are not only the mission to contribute to the development of the *knowledge society* but also to the internalization of a culture's quality.

Although the early idea of polytechnic schools was mainly oriented to supply regional needs, many of the curriculums pour over workmanship. With this perspective, (Amaral et al., 2002) identify the idea of higher education in polytechnic schools with a sweeping assertion of a specific identity longing for defining his own space of activity. Setting in an international context and encouraged by a *knowledge society*, it is necessary to think over higher education mission ((Amaral et al., 2002) and (Simão, Santos, & Costa, 2002)).

This assemblage of studies was of use to circumscribe a set of problems, inducing us to think in a broader set of questions. In particular, and after these considerations, we felt a need to explore how the concepts we analyzed are reflected in higher education methodologies.

## 2.2. *Teaching methods*

In medieval times the teaching methods were basically based in two moments: the *lectio* (when the teacher read out loudly a text at the same time he annotated it) and the *disputatio* (when there was a confrontation of the pros and cons). The role played by the learner was a passive one at the same time that the teacher was the one who knew everything. It was a magisterial way of teaching. Later the concept of modern teaching methods identifies not only the theoretical contents' transmission but also the *hands on* experience.

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The teaching portfolio project commenced by the American Association of Higher Education (American Association for Higher Education, 2003) in the early 1990s could be considered the starting point for recognition that, within universities, different disciplines combine generic aspects of teaching in ways quite specific to the discipline (Neumann, 2001).

Some recent studies have highlighted disciplinary differences not only in types of teaching, but also in hours of contact and preparation time, as well as in research supervision and undergraduate teaching loads. Lecture, tutorials and seminars, laboratory practices, field trips and practice are the main teaching modes within universities. The lecture method started in medieval ages seems to pervade all disciplines as the dominant mode of teaching.

An understanding of teaching processes involves culture's knowledge and context's knowledge in which teaching occurs, as well as attitudes of academics and students about teaching, educational goals, values, philosophies and orientations and also academics' perceptions of the curriculum and assessment issues (Neumann, 2001).

*Learning to learn* has become part of the skills agenda. The position is developed that *learning to learn*, to be truly effective within a changing world, involves a far greater depth of personal learning than skill development alone. The model of *learning to learn* that has been developed requires the learner to be involved in a self-reflexive process of learning, motivating a conscious examination of his learning processes. It involves learners in formulating new ways of understanding reality, of interacting with others and of perceiving their own identities.

(Rawson, 2000) writes that more than this, the learner needs to understand how these processes, and therefore the resulting models, might be changed. This involves capabilities like the development of critical spirit, the ability to think constructively under the pressures and limitations of life, or the produce of self-understanding.

Although skills, for example those of communication and debate, might be developed and used, the view of *learning to learn* that has been argued for involves a far deeper and much more personal learning processes. This will surely provide a much sounder basis for *lifelong learning* and for a *learning society* than the acquisition of a skill set.

As we are concerned more and more with the *knowledge society* we want to become, teaching and learning methods includes other competences that induce every citizen to be aware of its personal growth. That involves a will for *life long learning* within a social vision. To encourage this level of learning, (Rawson, 2000) reports that this view of *learning to learn* embraces more than solely intellectual activity. It involves awareness of individual learning styles, and understanding and dealing with personal perspectives and aspects of self. The learning involved not only covers the development of the whole person but also requires her involvement. This personal development illuminates an holistic view of the nature of *significant learning*, and the engagement of feelings, attitudes and values.

Given the diverse public that today attends university and given the heterogeneity of its scientific knowledge, motivations, and professional projects, it is urgent to emphasize *active learning*, which sits in the discovery and resolution of problems, and supports the auto-capacity of students for their own learning, reinforcing their sense of autonomy and thinking. In those strategies and conscious that the success of learning depends on various variables that promotes student's harmonious development, the teaching models used at university level will have to be new models in particular those involving new technologies. The technologic revolution implied a revolution at the learning level, which involves competencies as flexibility, change adaptation, sociability and commitment.

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(Nyhan, 1994) synthesizes the information emanated from the report of the Eurotecnet inquiry of 1989, about new learning methods capable of developing new abilities of self-learning. One of the major ideas is that the technological revolution is intrinsically linked with knowledge and learning revolution. The inherently connection is unmistakable in the working standard demanded, which requires an efficiently combination of technological, organizational and entrepreneurial events. And this involves the up growth of competences like flexibility, sociability, engagement or fitting to change.

So and within the new challenges faced by universities, it is included in the competencies profiles required at leaving university not only training in a certain area of knowledge that allows professional flexibility, but also personal and interpersonal development, leadership capacities, and psychic and social maturity. All this development should promote autonomous learning on the part of the student in order that he manages a greater degree of success in his learning (Gonçalves, 2002).

(Morandi, 1997) defends that more than localized in relation to a time, the traditional pedagogic methods are localized in relation to a mentality. Generically, we will assume a method as a traditional one when it centers itself on teaching rather than learning. To (Nyhan, 1994), this abilities cannot be acquired by traditional methodologies once they get hold of working experience but can be acquired with the *learning by doing* of (Cowan, 2000), (Kolmos, 1996), (Fink, 1999) and (Powell, 2000).

In these new methodologies, the role now played by the teacher is totally different from the traditional role. He is no longer a master, to become a co-partner and a facilitator. He will be a partner given his necessary involvement in the professional and personal life of the student, and facilitator given his global vision of the path to follow in solving the problem. The comfortable traditional role played by the teacher seems to no longer exist, to give place to new challenges enfolding hazard and commitment. In this acting, educators must have much more active and synchronized capacities of organization and management, either in technical and scientific subjects or even in human resources (Caspar, 1994). The student has now an active role as the teacher becomes a guide.

But if the previous reflection carries us to the analysis of higher education methodologies, it also brings us to the interrogation of knowing how these concepts affect the curriculums.

### 2.3. *Curriculum*

The changes in the system of a vocational education are based on the idea that the curriculum should focus more on competencies. The transition from a subject matter-based curriculum to a competency-based curriculum, make schools to be redesigned as workplace environments and as places for *lifelong learning*.

Concomitant to these changes, vocational education is becoming more and more characterized by programs and curricula focusing on the competencies needed for successful job performance, such as *learning to learn*, interactive skills and communication skills, information processing, problem-solving and reflective skills.

On the other hand, in this era of significant change, where we witness a growing cultural and scientific openness, the rapid new information technology development has promoted a globalization phenomenon with new social demands. In this perspective, it is imperative to adapt the educational systems to this new reality, motivating new forms of curricular development. This means, that to face this new

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challenge, the school cannot resume its role to a mere transmission of knowledge, but it has to face a restructuring, which will allow it to give more diverse and heterogeneous answers to a society who is more demanding, informed and competitive (Morgado, 2000).

According to (Jackson, 1992), the problem of the definition of the concept of curriculum, is that it does not hold a single meaning. This author presents an historical perspective of the concept developing underlying conceptions to different points of view.

Although curriculum can assume a variety of meanings there is some consensus to the components of curriculum: objectives, contents, assessment and learning processes. Thus, the curriculum should describe the goals to be attained, select the material to teach, propose teaching methods, and include an assessment plan of the learning that it purports to develop (Ribeiro, 1998).

Despite other opinions we claim the social nature of the curriculum as an integration of different skills that leads to efficient performances for a citizen personal and professional life. The answer to what schools should teach encompasses knowledge, competencies development and ways of integrating that knowledge in such a way that the curriculum must provide the access to knowledge in a lifelong vision (Roldão, 2000a).

To (Roldão, 2000a) this new social differentiation will be the great discrimination of the future, as practical life demands an intelligent congregation of knowledge. Also (Harpe, Radloff, & Wyber, 2000) and (Rawson, 2000) voices' their opinion in defense of the need of curricular changes from a vision solely concerned with objectives and subjects to a new proposal based in competences that conceive the student as an active and active part in his own learning process. Changes in the undergraduate curriculum are related to these shifts and might be expressed in terms of traditional and emerging curricula. If until the mid-twentieth century, the role of the traditional teacher was just to execute the curriculum (programme of study), where the pedagogical relationship sat on a mere transmission of knowledge, today that relationship has changed.

This new relationship between the teacher and the curriculum, in which the teacher needs to decide and act according to the contextualization of different situations that arise, allows the teacher to make his own curriculum management. Thus, the new competencies that the student is supposed to acquire will demand new roles from the teacher ((Roldão, 1999) and (Tavares, 2000)).

The next question then, is to find out what learning methodologies should take place to carry out the new curriculums.

#### *2.4. PBL methodologies*

PBL-type methodologies are an example of these modern teaching methods, centered on the student-learning experience. In our work we will use the abbreviation PBL for *project-based learning*, assuming that other types of PBL methodologies can include *problem-based learning*.

PBL is both a teaching and learning method with its own logic, based on cognitive theory. The main idea beyond both project work and problem-based learning is to emphasize learning instead of teaching so as the most important innovative aspect of PBL is the shift from teaching to learning. In fact, PBL is concerned with both what students learn and how they learn it. Consequently, the task of the teacher is altered from transferring of knowledge into facilitating to learn (Kolmos, 1996).



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PBL learning, especially when given fuller scope as problem-based education, has a built-in capacity to respond to the challenge of giving some problems the place that their importance merits in real life. It enables discovery – by both learners and teachers – of whatever is most important in the improvement of knowledge and understanding.

Under the social nature of the concept of *curriculum* asserted by (Morgado, 2000), (Paraskeva, 2000), (Ribeiro, 1998), (Roldão, 2000b) and (Tavares, 2000), student's development aims to provide him with a life learning process almost as a *philosophy of life*. With this standpoint and remembering that the core mission of higher education crosses over professional and social integration, we can understand that new ways of socialization are under way. Within the social vision of the curriculum which leads us to the profile we want to develop for each higher education student, we can define PBL as a learning methodology for a purpose and with a purpose made to fit each one measure. This means that also the teacher is no more the master of the class but has to develop new skills to support learning. Like in a game the teacher is comparable with a coach, which means that he is neither a team player (he is not a student) nor a leader (he doesn't assume a magisterial role).

As (Ribelles, 2000) states, the main two points that better explain what is not the objective of higher education, are that training for a particular job and to assure that the graduate students have acquired a determined level of knowledge in a particular branch, are not the objective of higher education.

Instead, the education at the university should make the student able to develop his career in various possible directions, at the same time that he should learn how to acquire new knowledge during the whole professional life (Powell, 2000).

(Powell, 2000) adds some other characteristics to the graduate profile of a student that made use of a PBL learning methodology. This author refers the strong motivation, the ability of *learning how to learn*, the better teamwork and learning partnership with each other and with staff, the understanding of syllabus in the context or the trained to work with agreed deadlines. PBL aims to speed up the process and efficiency by placing learning in a functional context. Learning in context enables students to organize their long term memory for ready retrieval. Such an educational strategy has proven valuable not only in enhancing problem-solving capability, but in the acquisition of such skills as the holistic approach and self-directed learning.

Also (Cowan, 2000) believes that although, chronologically, assessment follows both teaching and learning, it makes good sense in curriculum development to begin by working out how students are going to be assessed, and even by planning assessment in full detail and check out intended assessments against learning outcomes. So, it is inside this interactive environment between the learning outcomes and the desired profile and in an opposite to a chronological way that (Cowan, 2000) makes use of the terminology *hidden curriculum* to touch on the assessment process.

Other advantages of a PBL methodology includes learning team collaboration, learning to listen, and participation in interdisciplinary discussion. The student becomes socialized as colleague and professional as he learns not only the value of his own way of knowing, but also to obtain and accept information from various other sources, at the same time he learns to question others critically, and to obtain feedback on his own learning outcomes. The method, being radically different from the didactic tradition, demands a different mind-set regarding learning objectives, process and methods of evaluation.

As (Donner & Bickley, 1999) refers, the role played by the student in a PBL environment is an active one as he can formulate working proposals in order to solve

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the problems he faces. (Margetson, 1998) alludes to PBL methodologies as a support of real professional situations where lately the student can integrate.

In short and if there is an agreement among the authors of the advantages in the use of a PBL methodology in simulating environments, the next step is to discuss about simulation processes.

*2.5. Simulation*

Like (Cowan, 2000), (Kolmos, 1996), (Morgado, 2000), (Nielsen, 2000), (Paraskeva, 2000), (Powell, 2000), (Ribeiro, 1998), (Ribelles, 2000), (Roldão, 2000b) and (Tavares, 2000), also (Dowling, 2002) avers that knowledge is, in fact, socially constructed.

As already mentioned, in a traditional classroom curriculum is presented part to whole, with emphasis on basic skills. Students are viewed as empty vessels into which knowledge is poured. In a traditional classroom, teachers behave in a didactic manner, disseminating facts and correcting answers. Strict adherence to a fixed curriculum is highly valued and activities rely heavily on textbooks and workbooks. In a traditional classroom, assessment of student learning is viewed as separate from teaching and occurs almost entirely through testing (Dowling, 2002).

In a constructivist classroom, learning is structured around primary concepts, whole to part, with emphasis to the sum total. Students are viewed as thinkers with emerging theories about the world. Lessons are not arbitrary, but built on issues relevant to the student. In a constructivist classroom, teachers behave in an interactive manner, mediating the environment for students, like *a guide on the side, not a sage on the stage* (Dowling, 2002).

As we have already discussed, the knowledge based economy demands new skills from employees, and new virtual learning environments from educational institutions.

Long ago, different types of institutions specialized in different types of learning and knowledge. For instance, in work environments, practical knowledge was important, and *learning by doing* was essential. The institutional vocation of different schools made it necessary to provide *hands on* experience. On the other hand, academic environments traditionally focused on theory and concepts rather than on practice.

In part because universities could not afford to recreate the workplace and environment and infrastructure, they were largely confined to teaching theory, and the practical training of employees was left up to the workplace. As a lot of schools could not afford to recreate the workplace environment needed to perform like it, and because traineeship was often impossible to achieve as it was difficult to find enough work placements for all the students, new learning pedagogies were adopted.

So and in (Dillinger, 2001) opinion, the core of the problem is redefining the mission of the university for the next millennium, putting the focus of change on the nature of the learning environment. Thus, the new concepts of learning must be rethought, centering them in the individual characteristics of the learner and maximizing the learning environment. This urgent need for rethinking the new learning ways comprehends things as curriculum reform, technological change, competencies certification or the capacity for solving problems in a working environment ((Dillinger, 2001), (Dowling, 2002), (Hanna, 1998), (Szczyplula, Tschang, & Vikas, 2001) and (Tschang, 2001)).

The evolution of technologies beyond imagination made possible the storage, transfer and sharing of information. These new technologies led to new alternatives for providing education and training. The knowledge management researcher (Tschang, 2001) stresses that there have been many discussions of knowledge and

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learning in various academic fields ranging from psychology and education to philosophy, and more recently, to management and economics.

According to this researcher, a popular recent distinction in the management literature has been that of *tacit* and *explicit knowledge*. While *explicit knowledge* is knowledge that is easily codified into and learnt from objects, *tacit knowledge* is often associated with skills learnt by doing. Despite widespread recognition that knowledge is advanced in scientific and other means, the knowledge taught in a traditional classroom is still taken to be a fixed stock from which teachers can draw from. Making use of a management speech, (Tschang, 2001) declares that in the modern context, *knowledge flows* are as important as *stocks*, and learning how to tap in those flows may be as important as learning about those stocks.

As a result in *knowledge societies*, rapid responses are needed to widely varying situations, so knowledge may be required to be supplied *on demand*. Thus, knowledge has to be at the *finger tips* of organizations or people, and people have to learn how to access this knowledge rapidly and efficiently.

All these leads to an important issue that is to know how we can integrate workplaces into universities' learning environments. Like (Dillinger, 2001) says, it is fundamental to change in the direction of bringing to the classroom the situations of the real world, not only to accompany social change, but furthermore to lead the *knowledge society* in the era of information. That means that instead of putting more reality into the learning universities will need to put more learning into reality.

But with the advent of newer ideas on learning and with the development of new technologies, we can now recreate certain types of virtual workplaces within virtual universities. An example is the simulation software that helps along the work place and academic learning environments to converge in many ways. Thus, technology makes it increasingly possible to teach both theories and practice in virtual environments. The pressure on schools to offer experience is aided by workplace expectations for employees to possess more practical skills. Learning theories and continued evaluation of new technologies are increasingly placing strong emphasis on the growth and development of student-centred learning (Tschang, 2001).

The new competencies requested of professionals results of an unprecedented demand for experts who possess the new abilities to create knowledge and new skills to manipulate technology, data, information and knowledge (Szczyppala et al., 2001).

From this point of view, it is fundamental the *learning how to learn* of (Szczyppala et al., 2001), which is nothing more than the need to learn during a life time, *lifelong learning*, and in different learning environments. Remembering the social context of learning and as learning interconnects with different personal and professional experiences of each individual, it becomes vital the growing interdisciplinary syllabus. That fact raises the question of curriculum restructuring, as the syllabus needs to contemplate the new required competencies (Hanna, 1998).

The same opinion is shared by (Forcier, 1999), that believes that drill and practice and simulation are instructional strategies that constructivists can apply in a student-centred environment. These strategies can gain attention, stimulate recall of prior learning and present new information in ways that approximates real life situations at a more concrete level.

New technologies can provide virtual education systems with comparative economic advantages over traditional education, as well as flexibility and access to more sources of knowledge. An example is the simulation software. The context of a simulation study literally means executing the random events as they would occur in real life free of limitative elements as time, security or risks. A simulation can present a sample of

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real life situation and can offer genuine practice at solving real problems unhampered by danger, distance, time or cost factors (Forcier, 1999).

Simulations can call for decisions made by the student. The computer is an useful tool to manage this technique. At the same time, simulation is effectively student centered enabling the student to react to a situation and make choices while the teacher selects appropriate materials and prompts students to discover concepts. This student-centred environment provides a climate for discovery learning to take place or for newly acquired skills and concepts to be tested.

A sophisticated simulation can present the facts as rules of a situation in a highly realistic manner without the limiting factors of time, distance, safety and cost and then can adjust these factors to respond to interaction by the student. High levels of cognitive skills are involved in the synthesis of facts, rules and concepts in solving problems. Simulations, lending themselves to group use, also promote social interaction. In a constructivist model, simulation software may be suggested by the teacher as a way for the student to develop a particular skill or concept in a manner that is close to a real life situation.

In problem solving strategies the computer can provide background knowledge and can offer a tool to explore solution strategies. It can organize and manipulate information, allowing the user to test tentative solutions before adopting the most appropriate. In this manner, the curriculum favours the integration of disciplines to foster richer learning environments.

### **3. Data analysis**

Along the investigation various research strategies were engaged namely the case study of the Professional Project. Further and among social sciences methods ethnography was also employed.

The case study research is but one of several ways of doing social sciences research. Each strategies includes peculiar advantages and disadvantages, depending on the type of research question, the control the investigator has over actual behaviour events and the focus on contemporary phenomena. In general, case studies are the preferred strategy when *how* or *why* questions are being posed, when the investigator has little control over events, and when the focus in on a contemporary phenomenon within some real life context. Such explanatory case studies can also be complemented by two other types, exploratory and descriptive case studies.

In this case study design, we took a single case (the one of the Professional Project in ISCA-UA) with more than one unit selected. The embedded case study design has Professional Project, in global, as the major unit and students, academic staff, employers and graduates as minor units. Being the researcher a member of the teaching staff it was possible the direct and extended contact with the social actors of the present investigation. Putting emphasis on different *modus operandi*, the ethnography method selects two main central techniques: observation and participant observation.

The information gathered closed to the students and graduates was acquired through a questionnaire device while the information gathered closed to the employers and academic staff was acquired through an interview device. All of the questionnaires were anonymous and all the interviews were not identified all through the research program.

Although participation was voluntary we took a 96% rate of responses with the students and a 48% rate with the graduates. Nevertheless, it is useful to remember that

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students were still at school as the greatest part of the graduates was already working with none or few ties inside university. Besides, the questionnaire was sent to all the graduates from ISCA-UA who had Professional Project since its beginning while only the students that were in school in the year of the investigation, get it the process.

What concerns academic staff and employers only the teachers with more than three years experience in Professional Project or those who took part in the coordination team were included in the investigation. For the employers and as ISCA-UA did not possess a database of graduates' employers, the sample that was took was representative not in the sense of being statistical significant but in the sense of being qualitatively significant.

It is to bear in mind that data tend towards mainly to describe and evaluate the impact of a PBL learning methodology type as well as a simulation learning methodology in a higher educational vocational degree.

However and before we put on data analysis, it is necessary to remember that different tools of information assemble calls for different handling analysis. In this way, the student and graduate outcomes were reported with the SPSS v13 that provides a powerful statistical analysis and data management system in a graphical environment. On the other hand, the employers and academic staff outcomes were reported with the QSR N6 software for qualitative data analysis designed as a toolkit based on coding text documents transcripts and analyzing and exploring that coding.

#### **4. Conclusions of the data analysis**

##### *4.1. Students data*

In the students' data report the new learning methodology proposed by the Professional Project revealed to be an interactive learning methodology indeed. Students referred the model as student centered, stressing professional, personal and social competences' development.

As a rule and in their opinion, the new model helps on a learning partnership into and inter students group, witnessing the *learning to learn* and carrying out some stimulus and motivation. However students revealed that there are some aspects that must be improved. In this case it is important to keep on endowing Professional Project of strategies that more and more impels undergraduates in an enduring and reflexive learning able to a further profound knowledge in teaching and learning processes.

From the students' point of view the Professional Project fulfill a global, continuous and applied vision of useful learning for future professional life. Also students agree that the learning model of Professional Project intensify social skills mainly in working teams, social relations and change of experiences with professionals. Furthermore students also agree that the learning model of Professional Project intensify personal skills mainly in critical analysis, time management and task planning. According to students the Professional Project allows subject integration explained all through the curriculum as well as it makes it able to suit new experiences. The Professional Project methodology stimulates a guided learning leading to new skills. Another conclusion respects to the nature of the learning methodology. In the students' data report the new learning methodology proposed by the Professional Project reveals to incite students' motivation allowing them to recognize knowledge procedures.

#### *4.2. Graduates data*

As with the students also in the graduates' data report the new learning methodology proposed by the Professional Project revealed to be an interactive learning indeed. Graduates referred the model as student centered, stressing professional, personal and social competences' development. As a rule and in their opinion, the new model helps on a learning partnership into and inter working groups, witnessing the *learning to learn* necessary throughout life. However graduates revealed that there are some aspects that must be improved. In this case it is important to keep on endowing Professional Project of strategies that more and more impels undergraduates in an enduring and reflexive learning able to a further profound knowledge in teaching and learning processes.

From the graduates' point of view the Professional Project fulfill a global, continuous and applied vision of useful learning for professional life. In what concerns professional success, and generally speaking, graduates are aware that professional success depend upon innumerable factors extrinsic to merely professional aspects. Another conclusion of the graduates' data analysis concerns the eventual dissimilarities between graduates with and without Professional Project. In the graduates' perspective and speaking in professional terms, the difference was not notorious.

As well as students, graduates also agree that the learning model of Professional Project intensify social skills mainly in working teams, social relations and change of experiences with professionals. Furthermore students also agree that the learning model of Professional Project intensify personal skills mainly in critical analysis, time management, task planning, decision base and working methods. According to graduates the Professional Project allows subject integration explained all through the curriculum as well as makes it able to suit new experiences. The Professional Project methodology stimulates a guided learning leading to new skills. Furthermore, graduates confirm the development of Professional Project in a real life environment.

Another conclusion respects to the nature of the learning methodology. In the graduates' data report the new learning methodology proposed by the Professional Project reveals increased students' motivation allowing them to recognize knowledge procedures.

#### *4.3. Teachers data*

In the teachers' data report the new learning methodology proposed by the Professional Project revealed to be an interactive learning indeed. Teachers referred the model as student centered, stressing professional, personal and social competences' development.

As a rule and in teachers' opinion, the new model helps on a learning partnership into and inter students group, witnessing the *learning to learn* and carrying out some stimulus and motivation among students. However teachers revealed that there are some aspects that must be improved. In this case it is important to keep on endowing Professional Project of strategies that more and more impels undergraduates to assume successful attitudes based not only in professional skills but also in personal and social ones, as well as in engagement and motivation.

Also teachers point out to an enduring and reflexive learning able to a further profound knowledge in teaching and learning processes. From the teachers' point of

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view the Professional Project fulfill a global, continuous and applied vision of useful learning for future professional life. On the other hand, and though teachers states that Professional Project makes students potentially more suited for being successful, they also declare that it is an advantage only in the beginning of their careers.

As well as students and graduates, also teachers agree that the learning model of Professional Project intensify social skills mainly in working teams, social relations and change of experiences with professionals. Furthermore, teachers also agree that the learning model of Professional Project intensify personal skills mainly in critical analysis, time management, task planning, decision base and working methods. As graduates, teachers also stress the real life environment of Professional Project, recognizing all the advantages that come from it.

In the teachers' data report the new learning methodology proposed by the Professional Project revealed enduring challenges that stimulates on them synchronized and actual technical and scientific abilities.

Another significant conclusion from this investigation respects to dissimilar approaches taken by teachers with professional experience and academic ones. In this double vision, the different trends reflect in strategic and orientation sights. As a suggestion, teachers refer the need to choose among them those that most identify with the innovative spirit of Professional Project opposite to traditional learning methods.

Another conclusion respects to the nature of the learning methodology. In the teachers' data report the new learning methodology proposed by the Professional Project reveals to incited students' motivation allowing them to recognize knowledge procedures. Fairly to students' performance, teachers' opinion is that, in general, they have a reasonable and even good performance.

#### *4.4. Employers data*

Essentially professional skills revealed to be a surplus value in the employers point of view. According to the employers' data report the Professional Project methodology enhance contextual learning with the clearly advantages that come from that. Nevertheless the undoubted growth of professional skills is not followed by personal and social competences up growth. As a rule and in employers' opinion, personal and social skills seem not to be developed with Professional Project methodology.

In particular employers assert a positive dissimilarity between employees with Professional Project in comparison with others workers. As with teachers' opinion, one of the advantage tips pointed out by employers is the easier insertion of Professional Project graduates. Being a clearly advantage in the beginning of professional activity, it is going to drive away as time goes by.

Contrary to students, graduates and teachers, and in terms of social and personal skills employers do not notice special differences between Professional Project graduates and others. On the other hand, employers emphasize the larger number of generic skills of Professional Project students comparing to other employees without that experience. However and in spite of all the proceeding advantages and recognizing that employees from ISCA-UA generally fulfil the employers requirements, there are still some improvements to do namely in a rearrange of employers needs. In general and fairly to employee's performance, employer's opinion is that their performance is positively different from those employees without Professional Project experience, although it is needed a better one in order to satisfy employers increasing needs.

*4.5. Suggestions for further research*

In order to generalize the acquired conclusions and according to (Rose, 1993) and (Yin, 1994) it is licit to think about literal facsimile experiences in order to confirm and to wrap up a theory. In this way it seems motivating to replicate the analysis of a similar model of entrepreneurial simulation close to other's higher education institutions. Equally, it seems worthwhile a researcher triangulation of the Professional Project in ISCA-UA especially at a later date aiming to analyze subsequent fine-tunings judgments. In a later stage, we recommend a database production of graduates' employments endeavor an upgrade of ISCA-UA's information. In view of this references it would be possible a better idea of market real demands. At last but not the least it seems crucial the raise of a systematic model of companies' needs appraisal in order to adjust in (almost) real time the Professional Project model.



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