Change in the Educational Scheme From a Traditional to a Redesigned System: Case Study of the Management Department at the ITESM-Campus Monterrey

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ABSTRACT
The objective of this paper is to present the implications of the change in the educational system at the ITESM. The main objective of this educational system's change is to incorporate different didactic techniques together with a different infrastructure. Two hundred and fifty undergraduate students answered a questionnaire and twenty members of the academic staff were interviewed. One of the major conclusions found from the students and academic staff is that the education system is a changing process which implies a transformation of the profiles in both academics and students. Thus, educational technology might be essential in the current changing environment.

Keywords
Education, collaborative learning, technological tools, infrastructure

INTRODUCTION
Education systems effectively produce a convergence of belief, values, and eventually administrative practices among members of one nation, which in turn distinguish that nation for others (Caroli *et al.,* 1997). Indeed, educational institutions, particularly school systems, are one of the cornerstones of determinacy, transmitting beliefs and practices to successive generations. Therefore, the transformation of an education system needs to respond to the challenges that the environment demands. One of the perspectives of this change could involve the following elements: (1) matching the academic courses' content to the environmental demands; (2) transforming the teaching strategies; (3) adopting new and different technologies for the teaching-learning process and, (4) developing the adequate infrastructure which could respond to current and future educational demands (Ornelas, 2000). We could create two broad characteristics from these four elements: 1) transformation of the professors' and students' abilities, values towards a new form of education; and 2) an infrastructure that could support the smooth change from traditional education to a different method in the education system. Mexico, like other countries around the world, must face the challenge of turning its educational system around. The different innovations in the educational would enable the Mexican people to respond to the present and future challenges that the world is currently facing (ibid). In this paper, we do not seek to present a detailed account of the historical development of the Mexican educational system. Rather, we are examining the implications of the transformation of the educational system at the ITESM-Campus Monterrey (Instituto Tecnológico y de Estudios Superiores de Monterrey), which is a Mexican private school system. The main objective of the change in its educational system, which started in 1994, is to incorporate a collaborative learning approach centred on the students.

THEORETICAL BACKGROUND
The perspectives studied here are centred on the activity theory (AT), which attempts to develop conceptual tools to understand dialogue, multiple perspectives and voice, as well as networks of interacting activity systems (e.g. Engeström, 1987; Cole, 1988). AT's emphasis on social factors and on interaction between agents and their environments explains why the principle of tool *mediation* plays a central role within the approach. Tools

are created and transformed during the development of the activity itself and carry with them a particular culture — the historical remnants from that development. According to Vygotsky (1981), there are two kinds of tools: technical and psychological. Technical tools are intended to manipulate physical objects while psychological tools are used by human beings to influence other people or themselves.

Infrastructure: Information Technology

According to AT, infrastructure could be classified as the technical tools. Infrastructure plays an important role in the new form of education. The change in education methods follows a parallel growth along with technology changes that can be termed as 'information infrastructure' (Hanseth and Monteiro, 1996; 1998). This term has been increasingly used to refer to integrated solutions based on the now ongoing fusion of information and communication technologies (1998: 1). Nowadays, information communication technologies ICT are becoming a basic infrastructure for "all" our dealings in our world. Therefore, infrastructure is an important element in education, because the reapplied technology change dictates the schemes in the learning process that the present business dynamic demands. In the study we consider infrastructure as the learning environment which involves: (1) computers, (2) interactive class-room, (3) wireless connection, (4) laser blackboard, (5) in-focus projector, (6) lap-top, (7) VCR, (8) software (e.g. lotus-notes or blackboard), which could assist the teaching process. On the other hand, infrastructure is considered as a living organism that needs to be fed in order to transform into a strong element in the education process. The question that might arise from the infrastructure point of view would be: to what extent does infrastructure dictate the development of the education process? However, before giving some evidence in this respect; it would be important to clarify from which perspective the education system in Mexico and especially at the ITESM-Campus Monterrey it would be necessary to change.

FRAMEWORK OF EDUCATION: FROM A TRADITIONAL TO A NEW METHODOLOGY IN EDUCATION SYSTEMS

Traditional Education in Mexico

At a national level, the Mexican educational system has presented the following characteristics: (1) a lack of a national strategic plan, only good intentions; (2) a lack of continuity in the education programs and strategies; (3) focus on political interests; (4) a contradiction between the plans and the actions developed; (5) teachers have the central role in the education process at school; and (6) Mexican intellectuals, politicians and technocrats play a protagonist role (UNAM, 2000). In the traditional educational model the teachers' exposition is the main didactic technique. Teachers answer students' questions encourage students' participation by questioning them and giving the some assignments and projects to be developed inside or outside the classroom and individually or as a team. The students concentrated on note-taking, reflected on what the teacher said, participated in group discussions and asked the teacher to clarify the concepts that they did not understand. This traditional education system has been effective for many professors through the years, and has responded to society's requirements at that given time. Additionally, the traditional education model is not explicitly stated; therefore the abilities, values and attitudes to be developed by the students are not planned in advance. Thus, students might or might not develop their optimal capabilities. In this situation is not common for the teacher to clarify the methods for measuring the development of the students' values, abilities and attitudes. In this education model the professor takes the central role in the learning process. He or she decides what should be learned by the students and the way in which it will be assessed. Throughout history, Mexican teachers have played a central function in the education process without giving the students their place in the learning process. One would think that it has been forgotten that teachers and students work together, from which knowledge emerges in the teaching-learning process. It is important to underline that this scheme of education still exists in many private and public school in Mexico. On the contrary, the ITESM-Campus Monterrey started a transformation of their education system called redesign which is described below.

New form of education: 'redesign'

Background of the Redesign at the ITESM-Campus Monterrey

The new educative model requires a re-engineering of the traditional education. The first phase of this transformation process started at the ITESM in 1994. Faculty, ITESM graduates, politicians, business people

and current students at the ITESM got together in order to discuss the new educational model towards the ITESM 2005 mission. Two major factors were evaluated in this process: 1) The professional work experience of the graduate students: This study developed by the ITESM in 1994 revealed that 40% of the students after finishing their studies never worked in the area of their bachelor's degree (university degree). Additionally, ten year after leaving the ITESM, 25% of the students worked in the area of their bachelor's degree. Given these facts, it was thought at the ITESM that the new educational model needed to incorporate procedures to meet the students' needs: to learn and develop abilities different from their specialisation area. The new paradigms in the world call for students with the ability to learn by themselves. Additionally, the research developed found that there are ten abilities, attitudes and values that students need to develop in order to be prepared for the business-world dynamic: a) team-work skills, b) decision-making ability, c) analytical way of thinking, d) honesty, e) commitment towards their society, f) culture of quality and commitment to excellence, g) entrepreneurship, h) leadership, i) willingness to take on responsibilities in work-oriented situations and 10) problem-solving abilities. 2) The social context and the work situations in the new world environments: The rapid development of telecommunications, electronics and information technologies has created a society of knowledge. Information is instantly available anywhere in the world. It is just necessary to plug in to the Internet to have access to worldwide databases. These ICT developments bring different scenarios to the learning process. For example, professors could communicate virtually with their students. Education becomes more visual and interactive. Therefore, didactic techniques need to be developed according to the ICT development.

Redesign

Taking into consideration the two aforementioned factors, the ITESM-Campus Monterrey implemented the redesign in 1997. We see it as a process of formalisation, documentation of a course with the help of the education technologies. In this way, lecturers clearly define the educational aims for the course and a detailed schedule of the activities to be developed by both students and faculty. In this way faculty and students can plan their time well in advance for a given course. This helps to diminish the lack of clarity of what is expected from the students and professors. In this new education model, the central role of the learning process is displaced from the professor to the students. In this way, the professor guides students in order to help them to develop their capabilities in the self-directed learning process. In this model the values, attitudes, abilities and knowledge that the students should acquire are clearly and well established. Additionally, the didactic processes and academic curricula of the course have to be linked to each factor that the student should develop. ICT enriches this learning process.

Infrastructure (ICT)

Lotus Notes was the principal technological tool in the first stage of this transformation process, which now has been changed to Blackboard 6.0. Today, 100% of the academic staff at the ITESM-Campus Monterrey is involved in this 'new' perspective of the learning process. Some members of the academic staff have worked on 'redesigning' the courses while others have adopted the 'redesigned' courses. The new form of education aims to create an awareness in the students of their local and global environment challenges, the information age in which they are living, as well as the challenges that phenomena such as globalisation might pose in their working lives. In this way, the ITESM can make sure that their students can compete nationally and internationally in their area of specialisation. The main characteristics of the redesign are: 1) It advocates self-study — the gathering of information from different sources, 2) it cultivates collaborative learning through problem-based learning and case studies, 3) it provides distance learning opportunities through the Virtual University's satellite broadcast system, which offers undergraduate and graduate degree programs, 4) it gives students access to international information banks and networks, 5) it exposes students to research and development projects in manufacturing, automation and biotechnology, among other disciplines.

THE STUDY

While AT does provide a general conceptual framework for understanding and analyzing human activity, it does not provide any clear methodology as to how such activities are to be recognized, delineated, and scrutinized. It is also important to clarify which is the most appropriate way to analyse the relationship between the factors and the system established here. One cannot study the implications of a new education system in relation to the social environment without considering how social relations are shaped in a society. These kinds of considerations cannot be reduced to simple quantitative measurements; interpretation is required. Indeed, Nath (1968) has argued that research using only one tool is insufficient for real understanding, because statistical reliability sacrifices human values. Therefore, it was decided to select tools of varying specifications

to deal with the aspects of this particular study: students' and professors' beliefs and behaviour shaped by the influence of the educational technologies setting. These factors entail the study of the relationship between the actors and the system or between the organisation and the society.

Research Instruments

Questionnaire

The new form of education: 'redesign' was conceptualised in a questionnaire written in Spanish. The questionnaire was designed to research information from students in two areas. The first area concerns information on the students' profile; the independent variable. This section can be called background information which enquires about students' basic demographic information. The second area of the questionnaire was divided into three sections which concentrate on the new form of education: redesign (dependent variable). The dependent variables are: (1) abilities (twelve items), (2) drawbacks of the redesign (five items), and (3) infrastructure (nine items) A five-point Likert scale (*1. Strongly disagree - 5. Strongly agree*), was used for these sections (Rossi, Wright *et al.,* 1983: 209). Because of space limitations in this paper, full details of the questionnaire construction cannot be provided here. Please contact the authors for further details. Finally, for the purpose of this paper descriptive statistics utilising SPSS software, were use for the analysis of the questionnaire.

Interviews

Professors' beliefs and behaviours are an amalgam of their past and present teaching experience. These areas can perhaps be best investigated through semi-structured interviews (e.g. Graves, 1973). Therefore, different sets of interviews were conducted among full-time professors in the academic department at the ITESM-Campus Monterrey. The objective of the semi-structured interviews is to complement the information gathered from the questionnaire. In this way, a holistic view of each of the redesign processes could be gained. The interview process was designed to analyse each person in two aspects (1) Background information: each person would be asked to provide additional information on any aspects of the organisation about which he/she is particularly knowledgeable. Before doing this, he/she will be asked to explain some background about himself/herself, specifically his/her current position and employment history, such as training, job content and promotion prospects. This background information is useful for putting into perspective what is said about the new form of education and it also provides some interesting material about professors' procedures and the ITESM-Campus Monterrey's current challenges. (2) Traditional vs. redesign educational strategies: following the background section, professors were asked to give an account of their experience of the educational transformation process. In this section the problems faced when professors integrated different didactic techniques and ICT in their teaching activities were fully discussed.

RESULTS

Data were collected by questionnaire from undergraduate students and interviews to academic staff at the ITESM-Campus. Monterrey (October - December 2003). The sample of students was selected from individuals who were at least in the second year of their degree course. The academic staff were full-time professors from the academic department of management. Two hundred and fifty undergraduate students answered a questionnaire and twenty members of the Academic staff were interviewed in order to draw a map of the educational system changes at the ITESM. The transformation in the education system at the ITESM-Campus Monterrey changed the way in which professors were concerned with the teaching process. At the early stages of this transformation process there were misconceptions of the effect of the redesign on the role of professors. The academic staff interviewed felt that the ICT infrastructure in the form of new technologies in the teaching process will displace the principal role of the lecture in the learning process. Indeed, one of the main concerns that many professors still have is how teaching with the help of the new infrastructures would affect their interactive and participatory approach to teaching. Professors were concerned that they were on the verge of creating electronic correspondence with students which was not part of the teaching philosophy. On the other hand, we found in the interviews that defenders of the traditional education system argue the fact that they were creating knowledge right in the classroom. They strongly believe that professors should be the central figure of the learning process. Indeed, they believe that controlling the process of knowledge creation is their essential role. However, defenders of the traditional education system stated that their on-site (classroom) classes were not totally scintillating experiences for everybody, but we found that in fact these professors have a fear of introducing new sources of alienation (educational technologies) into the professors' classroom, such as infrastructure which helped fuel many professors' initial worries. Moreover, these professors argue that they

have implemented the different didactic techniques that the redesign presents without the use of the infrastructure (ICT). This phenomenon was especially found among professors with more than fifteen years' work experience as full-time professors at the ITESM-Campus Monterrey. Thus, in order to diminish this natural rejection of the redesign it would be necessary to adapt this educational model to a participatory teaching and learning manner between professors at the ITESM.

Another reason for professors to be reluctant to venture into the world of transforming their course into the redesign environment using the ICT infrastructure such as lotus-notes and then blackboard 6.0 is the fact that the redesign courses may very well end up belonging to someone else. This leads to another consideration: it takes months to create a redesigned course. Professors put a great deal of time and effort into this transformation process. Then, what happens in reality is that any other professor who teaches the same course could adopt the redesigned version as her or his own work. Although there is recognition for the professor who did the work of transforming a 'traditional' course into a 'redesigned' one, at the end the copyrights of the redesign belong to the ITESM-Campus Monterrey. Additionally, at the first stage of this transformation process the professors were paid for the redesigned courses; however, this economic incentive is no longer given to the professors involved in redesign activities. On the other hand, professors believe that a redesigned course implies designing and implementing more activities that were not required before. For example, course management: up-dating the lotus-notes or blackboard, e-mail responses to students, among others activities. Therefore, professors believe that although ICT helps to manage a course, the profile of the professor has been changed without the direct awareness of the professor his or herself. Thus, this might imply a re-definition of the professors' profile. Indeed, 90% of the professors interviewed mentioned that the redesign concept was just a re-confirmation of what they have been doing in their courses for some years before this new form of education was officially implemented at the ITESM. However, these professors also mentioned that the 'redesign' has created stressful scenarios in both students and themselves. Professors, beside their daily teaching assignments (four courses per term- twelve teaching hours per week), need to take the academic preparation course for the redesign, as well as the technical course: lotus-notes & blackboard. With regards to the students, the redesign structure requires them to develop collaborative learning; therefore, they face the challenge of interacting and working on different projects and with different students through one semester; which implies at least six different teams and projects.

We found that the most likely danger with the implementation of the new form of teaching 'redesign' is that although the ITESM-Campus Monterrey has provided diverse training courses for professors in relation to the essence of the transformation teaching system, still many full-time professors do not share the same idealism of the 'redesign' with the ITESM-Campus Monterrey. This can be seen as some full-time professors interviewed design diverse activities which are not value-added activities for the students. Also, the technology platform such as lotus-notes or blackboard is never used as the tool being designed to enhance teaching performance. Rather these technologies are seeing as extra work for some professors. In addition to this, the ITESM-Campus Monterrey introduced (2003) blackboard that will displace the software lotus-notes by summer 2004. This technology change has created a feeling of betrayal in at least 50% of the professors interviewed. Furthermore, there is a feeling among the academic staff interviewed that the head of the school and the people that assess the ITESM are more worried about how many professors have started with the 'redesign' process or how many of them are teaching either utilising the infrastructure of lotus-notes or blackboard instead of being worried about ensuring the benefits and implications for society of the 'redesign' process. We can conclude from the interviews developed that there is no time for the professors to make them sensible to the redesign, to reflect and think about the new teaching strategies. Most of the professors interviewed felt that the managers of the ITESM should be more involved in the redesign process, in order to be fully committed with the professors in this new learning process scheme at the ITESM. Also, they mentioned that they feel dependent on ICT for their courses. We found that this 'problem' was more likely to be critical in the older professors who were reluctant to tackle the technology development, as discussed previously.

On the other hand, 90% of the professors interviewed believe that ICT infrastructure is an invaluable technology to organise the course in: scheduling the activities that both professors and students need to develop before and during the class. Professor and students can leave a track of the knowledge create in the ICT, either in lotus notes or blackboard. Another impact of the new form of education is that professors come to see that presence, in the sense of 'being present together', is not necessary for learning to occur even in a group situation. What is important is not presence itself but having been present and leaving a trace of that presence, which could be the individual and collaborative activities that the students develop in their redesigned courses. Indeed, we believe that both infrastructure and interpersonal skills learned through the different didactic techniques that the redesign presents are necessary for future human and social development. We are a long way from a perfect programme, but we feel that the progress of developing the programme and redesigned courses have added great excitement and energy into our classes and into both the faculty's and the students' lives. The

final evaluation of the success of using collaborative learning and technology in preparing students for the future will be found in the individual development and success our students demonstrate once they graduate and begin their professional employment or developing their own business activities.

The students' responses were directed at evaluating if they completely agree or disagree to some specific aspects of the redesigned courses. According to the questionnaire's responses, 70% of the students totally agree that redesigned courses have helped them to improve their abilities of: 1) self-learning; 2) research; 3) coordination; and 4) that their academic achievement has increased. With regards to the infrastructure factor, 76% of the students totally agree that blackboard and lotus-notes have been a key factor in the development for transforming education at the ITESM-Campus Monterrey. Additionally, these students believe that classroom equipment such as in-focus, videoconference, VCR, computer and Internet access are the cornerstone of infrastructure tools for the redesigned courses. Also, students stated in the questionnaires that they perceive themselves as being capable of thinking globally. Given the fact that the students are confronted with different educational technologies (didactic techniques and infrastructure ICT), they can keep up-date with local, national and international factors shaping their academic curricula. However, the questions to be raised are on the extent to which the 'redesign' has directly impacted the development of these abilities among students, or whether those abilities are developed in the students as a consequence of the technology constant change. On the other hand, students believe that a lot of time is spent on team-group projects. For example, per semester the students' academic curricula require them to take six different courses (forty-eight credits). This implies that the students will have six different projects and working-groups, which require regular meetings during the semester. This situation has led to the observation of tired and stressed students.

DISCUSSION AND CONCLUSIONS

The results present both agreement with and rejection of the redesign at the ITESM-Campus Monterrey. We believe that the problems being presented could be diminished if professors and students that have taken a redesign course work together in the redesign process of a new course. However, a fundamental form of action is to further develop the values, attitudes and awareness of both professors and students of the implications of the new educational model in their lives. We are living in an information society, one might say a knowledge society, which requires an education scheme where professors and students need to be aware of the environmental demands. Indeed, constant knowledge of the new development in their discipline of specialisation is required. We do not see that infrastructure such as ICT will displace the important role of the didactic techniques that professors develop in the learning process. Rather, we see these technologies in education as complementary tools which facilitate the learning process in the current knowledge-age society that we are living in. However, the question that might be raised could be: would it be possible to implement a new form of education, redesign, without the implementation of ICT tools? The ITESM-Campus Monterrey is a unique example where infrastructure and didactic technique are combined. However, there are several higher education institutions in Mexico that do not have the resources to make a turnaround in their infrastructure, according to technological development. But, it might be the case that these institutions could transform their didactic technique in line with the redesign concept (e.g. collaborative learning, case studies, problem-solving, etc.) Thus, can we call this change a new form of education? Or would it be necessary to implement ICT in the education process? We strongly believe that a new form of education such as redesign does not need to stress on a certain didactic technique or a certain type of infrastructure. Rather the new scheme of education that our fast-moving environment demands requires the re-thinking of every process that we develop in our lives in order to be congruent with the environment and to build a society that our world demands. Therefore, educational techniques are instruments that assist in the transformation process of our students that the business world and society look for. Thus, we can not claim primacy for either of the two perspectives; rather we believe that didactic techniques and infrastructure complement each other in the transformation of the education system, which in turn transforms our society. On the other hand, applying a new educational scheme with students who have not had any experience with the redesigned education system could be misleading. We discussed that traditionally Mexican students focus their work on those activities that have a direct impact on their grades. These students have limited knowledge of the educational infrastructure. Therefore, students are confronted for the first time in their lives by a new educational method that could have negative implications for their educational experience. For instance, stressing the use of technological infrastructure, handling different projects with different teams in the same term, instead of creating well-prepared students who could compete according to the business demands, would create unstable students. On the other hand, ITESM-Campus Monterrey faces the problem that there are professors who say that they redesigned a course but in fact they are teaching in the traditional way. Thus, the effort that professors, students and managers of the ITESM have put into the new form of teaching is simply damaged. Therefore, the transformation process in education should

present a smooth change in both students and professors. First they need to understand the importance of the new form of education, and then they should adopt the ICT tools to facilitate the implementation of a different didactic technique.

One of the major conclusions found from the students and academic staff is that the education system is a changing process which implies a transformation of the profiles in both academic staff and students. Indeed, after almost five years since the education system change started at the ITESM, a different learning-process environment can be perceived. Students appear to be more aware of the local, national and global factors which directly impact management and economic developments in their field of specialisation. This is seen in their contribution to their collaborative learning process and other didactic techniques, where they need to investigate other perspectives that can be found in other parts of the world on a particular situation being discussed in their courses using the ICT tool. On the other hand, the academic staff tends to be aware that they are no longer the protagonist of the learning process. Students also play an important role in their learning process which is supervised by the academic staff. These different profiles (students and professor), which are seen more at the ITESM still an on-going process that encounters different challenges: (1) adoption of the technological tools by the professor, and (2) change from traditional learning process by both students and professor. Nonetheless, the fact is that the traditional educational scheme does not match the actual business dynamic which students face in the labour-market. Thus, the collaborative learning approach to the education system and the use of a technological tool might be essential to students and academics in the present changing environment. Changes produce controversy and resistance at the level where they are operationalised and the ITESM is not the exception to this rule. Contradictions are found in both students and professors on the positive and negative aspects of the redesign process. In general, professors argue that technology tools will displace the role that lecturers have in the learning process. However, they also agree that lotus notes and blackboard 6.0 have helped them to accomplish effectiveness and efficiency in their work processes. On the other hand, 90% of the students view the technological learning tools as a complement to their integral education in the currently changing environment that they encounter. We believe that the transformation of the education system taking place at the ITESM (redesign) is an important education strategy for preparing our students according to the needs of the employers who eventually hire them, or for preparing our students who might start up their own business. This different way of organising the students' curricula challenges academics to create programmes that are dynamic, challenging and responsive to the people that we serve. Finally, we strongly believe that new forms of education that integrate new didactic techniques and infrastructures must be accessible to everyone. In this way we could break boundaries and build bridges between the developed and developing countries. The redesign concept presented in this paper could be the answer on the path to transforming the education system in Mexico.

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