

Student's Perception and Expectation towards the Creation and Implementation of a Technology Management Laboratory at the Metropolitan Technology Institute MTI

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Abstract

The purpose of this study is to examine expectations and perceived needs of students of the Management Sciences Department at MTI Metropolitan Technology Institute towards the creation and implementation of a technology management laboratory. The methodological design of this laboratory is exploratory and cross curricular-type. It is carried on through a quantitative methodology, applied through printed surveys to 217 students of Management and Technology Management of MTI. Amongst the main results, the study shows student's low knowledge of the use of software on the management field and their high motivation to acquire knowledge in the fields of Information and Communications Technology, those oriented to support managerial and administrative processes. Additionally, students express the need to receive greater qualification in the following subjects: business creation, negotiation, decision making process, research training and technological management.

Keywords

information and communications technology, Laboratory of Technology Management, college education, management

1 Theoretical Framework

Knowledge can be understood as an essential, intangible good consolidated as a mechanism to foster sustainable competitive advantages, which are gathered and fluent inside out the organization; allowing, by means of knowledge management, to generate, use, share and improve research and innovation processes. Within this framework, higher education institutions are the basis of professional development by providing students with an integral formation capable of spanning knowledge, competences and abilities which contribute to increase productivity levels required by society (Ramírez et al., 2009), like problem solving ability (Billédi, 2005).

Therefore, higher education institutions are considered the foundation of education function as well as the responsible entity for maintaining culture and identity, favouring social and economic development of a country. Currently, new needs are arising inside these organizations. Strategies and knowledge for problem solving are required (Billédi, 2005); this is why the role of the universities is relevant as knowledge-producers, enabling conditions for the new economy dynamics (Martínez, 2013). Also, the relationship between the university and the enterprise has become a topic of significant interest for students of technology worldwide (Henk et al., 2001), because in several cases, resources required to take part in scientific research (those being crucial for the success of the researchers) derive from the interaction with the industry (Gaughan and Corley, 2010).

Considering this context, traditional institutions must conceive scaffolding changes beyond their curriculum: special schedules, access without restrictions, and offer quality education (Donini and Donini, 2003). The previous consideration responds to the globalization process and the continuously evolving technology within the enterprise environment characterized by dynamism and complexity (García, 2013).

Based on all the prior, studies involving college professors have intended to determine the relationship between the act of teaching and doing research, their mutual benefits and consequences. These studies show perspectives that consider conducting research a positive contribution to the role of teaching in terms of methodology and the identification of new topics

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of interest. However, other studies conclude that institutions where conducting research is an active process, less quality of teaching could be expected, a negative or inexistent correlation between teaching and research. Nevertheless, efforts must be carried on to integrate teaching and research particularly among college professors because they have a defining role in the preparation of future integral professionals, with theoretical and practical tools to perform on the working, business, investigative and academic fields (Segura, 2008; Coffman, 2012). Hronszky (2004) highlights the need for the real practice on higher education, to improve adaptation to a complex and changing environment.

Alternatively, university research centers are important institutional resources to enhance the development of scientific research and promote technical and human resources. These centers may or may not have formal relationships with the industry (however, research centers might facilitate interaction between universities and industry (Henk et al., 2001)), and on the other hand, their function focus on institutional agreements (Gaughan and Corley, 2010; Cornelissen et al., 2011). Thus with these institutional relationship and interactions, networks are created targeting a more significant integration between knowledge and practice of the teachers. Research centers are useful for basic and multidisciplinary research as well. Due to their diverse activities, they tend to have complex financial flows, diverse sources of funding, and in general their impacts tend to comprising commercial, educational and social results (Gaughan and Corley, 2010).

Likewise, the affiliation to a university research center is considered an improvement that can contribute to both researchers and teacher's functions because this knowledge alignment does not often occur in a traditional academic environment. On the other hand, other studies have found that these centers inspire better results among the academic members by increasing the productivity of publications, industry associations, collaboration, network creation and technology exchange (Sabharwal and Hu, 2013).

Research centers and institutes are created in response not only to changing needs and university structures, but also to the desire of gathering diverse background researchers and ideologies in an effort to solve complex social and scientific problems that surpass disciplinary borders. These centers enable teachers to develop even more their research programs within the college structure considering space, resources, and also additional financial opportunities. Besides, research centers could help institutions to attract more quality graduate students and improve under graduate student quality education in general (Sabharwal and Hu, 2013).

It has also been accepted that research, as a source of knowledge, is the foundation for sustainable development. Nevertheless, at this point it could be asked ¿What sort of university research allows reaching sustainable development? In order to

answer this question, some elements have been identified that should be strengthen: keeping long term basic investigation and its link to social objectives; involving global, national and local institutions in investigation systems; engaging government, private and academic sectors in collaborative research; integrating disciplinary knowledge with interdisciplinary approach, local focus, and problem based applications (Waas et al., 2010).

These elements mentioned above urge institutions to think of spaces where knowledge could be generated based on research results, provided with proper interdisciplinary equipment that fit social and business needs. These spaces that may also drift real problem solving are the laboratories build up in such institutions.

To this respect, Błach, Wiczorek-Kosmala and Gorczyńska (2012) state that team work allows integration of diverse points of view; each individual plays an important role within the group and concepts feedback gets more valuable every time, besides it must be considered that in business companies reality workers do not perform tasks isolated, on the contrary, they work together to fulfill organizational goals. This working method merges concept with practice, but if communication inside the group is deficient, becomes a disadvantage because the expected student's competences development cannot be proved.

Among the academic programs offered in Colombia, highlighting Management, facilities are required in which classes, practice, research groups and social projection of the subjects can be carried on in a proper way, allowing to put in context the diverse and multidisciplinary complexities of a productive environment. A complex society and a set of interactions and uncertainty that emerges forcing to look for different paths (González and Jaramillo, 2012). Thus, these learning facilities stimulate even more holistic and dynamic nature of learning styles through the interaction between the student and the environment (Kolb and Kolb, 2008).

Large organizations use their research laboratories to complement the operative excellence with the scientific experience while they foster a more solid business thinking. Consequently, college student's practice in a laboratory is necessary to get in touch with mainstream management fields in order to prepare future professionals to face the challenges required by current social demands (Keighley and Sewing, 2009; Ramírez et al., 2009).

Different work fields of talented and experienced professors are required though, along with the participation of students by means of experiencing real life learning and the construction of more interactive experience-simulated learning. There are some keys to success: a creative and energetic staff accountable for keeping up motivation, patience, and commitment of the teachers, as well as personalized sessions to generate new ideas (Mitchell, 2004; Watts, 2011).

Within the context of Research Centers, particularly in the area of management learning, Experiential Learning Theory (ELT) has been widely used (Kolb and Kolb, 2008). For more than 30 years business and managerial simulations have been used and since

then, the amount and variety of real business situation games have significantly increased; In relation to the previous, some research have found that the incorporation of simulations to Management Programs contributes effectively to the acquisition of learning of these topics (Wolfe and Castroviovanni, 2006).

The Metropolitan Technology Institute by means of its Management Programs must improve its curriculum processes and get current with social demands by means of its teaching mission, research and extension programs. For this matter, it is necessary the creation of a new laboratory of Technology Management, equipped with the infrastructure, resources and required tools to improve the development of technical, scientific and professional competences which would allow the Institute to be on par with the requirements of the current world, characterized by its complexity.

This laboratory is articulated with the MTI Development Plan 2012-2015 to facilitate validation and incorporation of practical knowledge given in each academic program related to diverse productive sectors; all the prior attempting to improve the articulation within mission processes of the institution (ITM, 2012).

The need for implementing a comprehensive reform of management programs at a national level has been identified aiming to face the challenges of globalization and to develop flexibility in the curriculums by articulating the development of knowledge with the action as the means of consolidating the paths between knowing how and doing (Clopatofsky, 2007).

It is worth pointing out that in the CONPES 3527 several needs are highlighted: promote pedagogic innovation and use of new Information and Communication Technologies (ICT) for the development of working competences; update technical and technological capabilities of institutions (laboratories and learning methodologies); develop human resources training, as well as creation, dissemination and application of knowledge and intensive use of Information and Communication Technologies (ICT) in the learning processes (DNP, 2008).

All the above clearly correlates to one of the Institution's mission, research development in universities and technical development' research centers through financing research projects in addition to institutional strengthening of Research and Technological development Centers whether they are public, private, institutional or autonomous (Colciencias, 2008).

Ultimately, at a local level, the Local Development Plan of Medellin 2012-2015, "Medellin home for a life time", outlines: "Competitiveness for economic development with equity", an advance for Medellin in the improvement of competitive advantages and immersion on globalization processes, promoting and developing initiatives and knowledge-based new businesses with high growth potential and differentiation, strengthening the Regional System of Innovation and Entrepreneurship to increase local productivity (Alcaldía de Medellín, 2012). The Laboratory of Technology Management will greatly contribute in the fields previously mentioned, providing professionals prepared with

technical, investigative and professional competences, whom can take active part in the Regional System of Innovation and entrepreneurship, while positioning MTI as an institution committed to technology in the productive and social system.

2 Research Methodology

The following article is the result of an exploratory, across curriculum, quantitative field research. Initially, a literature review about the characteristics and benefits of a laboratory of Technology Management in the education context was conducted. Based on this literature review, a survey was designed as a quantitative methodology instrument to gather information of the target population under study: current students of Management and Technological management at The Management Department of the Metropolitan Technology Institute of Medellin MTI.

The ultimate aim of research is examining acceptance and perception of students of Management and Technology Management of MTI, Medellin, towards the implementation of a technology management laboratory. This information facilitates identification of expectations and needs of students facing the creation of a management laboratory that would be a tangible good corresponding to the services offered currently and the needs and expectations of future users.

Information was gathered out of a non-probability sampling by criterion between August and October of 2014. The survey, which was filled out by 217 students of the target population under study, had 26 questions and was a written document completed at MTI campus. In addition, the survey was composed by dichotomous questions, multiple-choice questions with only one answer and on Likert scale. After the verification of the quality of the data collected, 202 surveys were chosen to form the sample from which the analysis of results is conducted through basic statistical calculation.

3 Findings

This report contains a detailed statistical analysis of the information gathered with the survey on students of Administrative Management and Technological Management at MTI Metropolitan Technology Institute of Medellin. The first question inquired about the previous ideas that the surveyed have about what a technology laboratory is. It was observed that 80% of the surveyed do not know what an administrative laboratory is.

After knowing students previous knowledge on this matters, they received contextualized information about the relevance and convenience of having a technology laboratory of virtual and technological tools, this aiming to display the conception that a laboratory responds to the need of strengthening human resources development counting on technical, research and professional competences to be connected to the business field and the Regional system of innovation and entrepreneurship. The main goal of the laboratory is providing graduate students of MTI with a proper academic space that responds to current

Table 1 Perceived Level of knowledge

	Perceived level of knowledge									
	M(%)	R(%)	TM(%)	F(%)	HR	D (%)	ICT(%)	N(%)	E(%)	
Higher	2,5	1,0	1,5	3,5	7,0	7,0	3,5	4,5	8,5	
High	23,5	15,0	24,0	17,5	47,0	49,5	32	25	32	
Medium	57,5	55,0	50,0	48,0	34,5	31,5	36,5	48	45	
Low	15,0	21,5	16,0	23,0	7,5	9,5	17,5	20	10,5	
Lower	0,5	4,0	4,0	3,5	1,5	0,0	4	1,5	3,0	
Dk/Na	0,0	0,5	0,5	0,5	1,0	0,5	4	0,0	0,5	

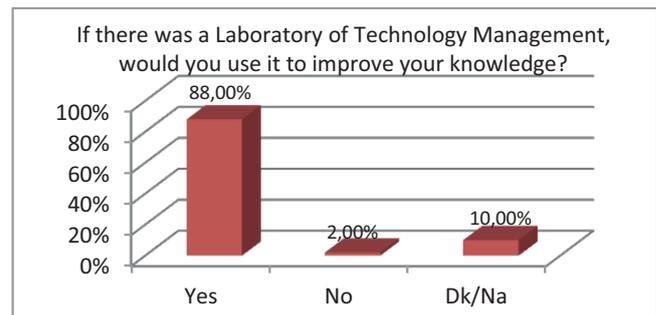
M: Marketing R: Research TM: Technology Management F: Finances HR: Human Resources D: Decisions
 ICT: Information and Communications Technology N: Negotiation E: Entrepreneur

social and business demands in areas such as finances, management and ICT in business context, through the application of knowledge, team work, interdisciplinarity, and the generation of greater research, professional and working capacities which contribute to mission processes of teaching and community extension of the Metropolitan Technology Institute MTI.

The creation of student’s permanent qualification programs and teacher’s updating in applied ICT for administrative functions and technological management in business field, are among the specific aims of the laboratory implementation. Furthermore, reinforcement of teaching-learning processes of the syllabus of the Faculty of Economic and administrative Sciences is also pursued at MTI, through the use of modeling and simulation processes of administrative and financial management. The target audience of the laboratory is the community of graduate students of Administrative Sciences Department and Finances Department (6737 students, constituting 30.1% of MTI population). Besides it is also an aim of this study the integration of teachers and researchers of MTI to work or join research groups on the items concerning this laboratory.

It’s projected to offer qualification services to business and academic field outside the MTI in a second stage of the laboratory, in areas such as economy of innovation, strategic innovation management, technological management, technological surveillance, knowledge management, competitive intelligence and technological perspective and transfer. After providing a clear overview of the purposes and aims of the laboratory, and resolving possible doubts of students, the survey was applied. It was observed that after being contextualized about the nature and aims of a laboratory, 88% of the surveyed affirm that if there was a technology management laboratory they would be willing to use it.

Additionally, software packages are used in these labs and 51.5% of the surveyed consider they have the abilities needed to learn how to use the software found in the laboratory of Technology Management. The prior shows that there is a high motivation among students surveyed towards the use of a lab, in spite of having had no previous contact with any technology management



Dk/Na: Don't Know / No Answer

Fig. 1 Use of a Laboratory of Technology Management.

laboratory. On the other hand, it is observed that the surveyed perceive the need of using specialized software packages as tools to improve their performance as future professionals.

Aiming to have clarity about types of software, technology and tools to respond to the expectations and needs of the target population, they were inquired about their perception towards the knowledge acquired in relation to technological management (Table 1). This information is useful to prioritize tools acquisitions oriented to knowledge areas where greater weaknesses have been identified. Consequently, Table 1 reflects student’s knowledge level in diverse strategic subjects of business management, marketing, research, technological management, finances, human resources, decision making, use of ICT, negotiation and entrepreneurial topics). The results show that the students surveyed have a high knowledge of decision-making and human resources topics with a percent of 49.5% and 47% respectively. 23% of the surveyed consider they have low knowledge of finances and 21.5% express that their competence in research is low.

In relation with the above, McCormick (2009), states that evaluation of financial programs is carried on through two processes; the first is a concept feedback through tests and knowledge assessment; the second tends to context applied learning through problem solving and practical activities. This last method can certainly measure the learning level students have, because it displays accurately the financial and analytical

competences students develop for a positive performance in a working environment (Noguera et al., 2011) With the creation of a Technology management laboratory students would have the possibility to simulate financial processes of the business world deepening in the dynamic behavior of the variables involved and could also improve their competences.

On the other hand, 50% and 58% of the surveyed consider that the knowledge they have acquired of technology, research and marketing is medium. This question intended to learn about the main qualification needs that the laboratory must undertake in order to improve student's capabilities. Therefore, based on the results obtained, it can be stated that the main challenge of the laboratory will be the qualification in research and technological management which could be overcome by means of diverse technological tools that through digital means, can strengthen the research abilities of the Metropolitan Technology Institute (MTI) students. This idea is supported in a statement by Tang & Austin (2009), who argued that accelerated growth of information and communication technology has provided a wealth of information and has provoked changes in the teaching-learning process of almost all disciplines.

Student's perception towards the advantages of the creation of the lab at MTI was also noted in the survey, this question was multiple-choice. The results obtained are shown in Table 2.

Table 2 Advantages of the creation of a lab at MTI

Item	Yes	No
Connection with business field	70,50%	29,00%
Technological learning	67,00%	32,50%
Management training	62,50%	37,00%
Scientific training	35,50%	64,00%
Social development	34,50%	65,00%
Institutional recognition	33,00%	66,50%
General culture	31,00%	68,50%

Table 2 illustrates that the most relevant advantages of the creation of a Laboratory of Technology Management are the following: connection to the real world (70%), technological learning (67%) and management training (62.50%). In contrast, the answers of the students surveyed led to identify general culture knowledge as a less representative advantage in the creation of a Laboratory of Technology Management (31%).

These results are consistent with the previously stated perception of the students of the need to count on more technological tools to support business, administrative and management processes. It is also observed the need to reinforce the use of ICT in subjects of the syllabus of the programs of Administrative and Technological Management aiming to enhance student's profile.

The survey applied was also useful to inquire about the possible benefits that can be obtained from a Laboratory of Technology

Management. Table 2 shows some of the aspects perceived by students as advantages of the implementation of such lab.

Table 3 Benefits of having a Laboratory of Technology Management

Items	Yes	No
Reinforce administrative and management knowledge	87,00%	12,50%
Devote time to activities that improve knowledge	72,50%	27,00%
Improve working opportunities	69,50%	30,00%
Practice knowledge learned in class	62,00%	37,50%
Foster entrepreneurship	56,00%	43,50%
Understand management processes affecting society	47,50%	52,00%
Other	0,50%	99,00%

According to Table 3, there is a contrast observed among the answers of the students surveyed, which on one hand, consider that "Reinforcing administrative and management knowledge" is a strong advantage for the construction of a laboratory; and on the other hand consider "Understanding management processes affecting society" not as important in the pursuit of a goal (52% of these answers were negative). Likewise, a high trend is noted in thinking that there is a great advantage in "Devoting time to activities that improve knowledge" with 72.50% positive and also 69.50% in "Improving working opportunities". It is important to highlight, facing these results, that students see the laboratory as an opportunity not only to practice what has been learned and to improve their working profile, but also as a resource that grants them to get greater knowledge to start-up businesses and correlate subjects' learning with real day to day business problems companies face, because as it is affirmed by Noguera et al. (2011), laboratories become promoters of more creative and dynamic graduates with a greater capacity to understand business problems of the working environment.

In relation to the level of acceptance of a Laboratory of Technology Management, as it is seen in the Fig 2, students of Administrative and Technological Management have a Significantly High 48% and High 41% acceptance towards the creation of a laboratory. In the same way, it is observed that the occasional lack of knowledge of administrative laboratories is a consequence of the scarce information provided by the institution through college directors and teachers. Students consider that the level of information provided has been Low 35%, Medium 30.50% and Significantly Low 27.50%.

At this point it is suggested that the institution implement and publicize strategies to the students. By this means they would assume that laboratories promote the development of analytical competences and decision making abilities required in a professional career (Leff, 2008). The prior will create competitive advantage above other professionals and would make the MTI more visible in the city.

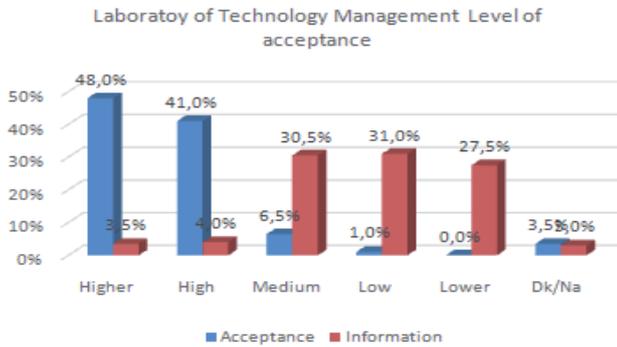


Fig. 2 Laboratory of Technology Management Level of acceptance.

Table 4 Relevant aspects for the creation of a Laboratory of Technology Management (%)

Relevant aspects for the creation of a Laboratory of Technology Management	HA (%)	A (%)	N (%)	D (%)	HD (%)	DkNa (%)
Has my career given me enough abilities to manage administrative software?	5	26	33,5	26,5	8	1
Would a Laboratory of Technology Management improve research processes going on at MTI?	32	56	8,5	0,5	0	3
Would students see a Lab as an opportunity to apply their knowledge?	50	40,5	4,5	1,5	0	2
Do you consider that the resources of a Laboratory of Technology Management would be difficult to handle?	3	8,5	46,5	25	7,5	8,5
Would a laboratory improve the learning level of the students at MTI?	51	37	8,5	0,5	0	3
Do you consider that MTI counts on the infrastructure to build a Laboratory of Technology Management?	48	38,5	9,5	1,5	0,5	2
Would the student see a lab as an opportunity to improve decision making processes?	43	41,5	10	0	0,5	5

HA: Highly agree A: Agree N: Neutral D: Disagree
HD: Highly disagree Dk/Na: Don't Know / No Answer

Furthermore, results show that the students surveyed do not know the utility of a Laboratory of Technology Management. However, when asked if they would be interested in the implementation of one at the Metropolitan Technology Institute

MTI, 66% of students responded very interested, 26.50% were interested and only 5% of respondents had neutral positions.

The results of Table 4 show that there is a positive attitude of the students of the Metropolitan Technology Institute MTI towards the benefits of the creation of a Laboratory of Technology Management, because 88.0% of the surveyed consider the lab as an option to improve the learning quality of the students, 91% think the lab is as an opportunity to apply their knowledge, 88% consider it as a means to improve research processes at MTI and 86.5% think that MTI counts on the infrastructure to build and implement a Laboratory of Technology Management. Nevertheless, it is noted that 34% of the students surveyed consider that their curriculum has not provided them with enough abilities for administrative software management, this being other fact to be analyzed in detail. Such situation states the need to create a Laboratory of Technology Management that contributes to improve this particular aspect in the curriculum of the Administrative Sciences Programs.

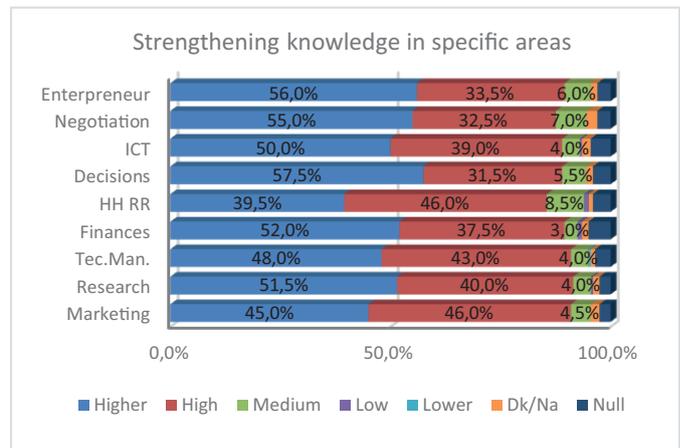


Fig. 3 Strengthening knowledge in specific areas.

Finally, Figure 3 is shown in contrast to Table 1 because Table 1 inquired about the perceive knowledge level in each of the subjects asked, while Graph 3 inquired about the interest to strengthen knowledge in specific subjects. Such contrast turns into a fundamental resource to contrast students' perceived capacities with their desire to strengthen knowledge in administrative science subjects, the previous finding will allow MTI to offer services and qualification in the laboratory in order to respond to the expectations of its users. Framing the prior, Fig. 3 shows that on average 50.5% of the students surveyed consider Very important to strengthen the knowledge of each of the areas surveyed: Marketing, Research, Technological Management, Finances, Human Resources, Decision Making, Use of ICT, Negotiation and Entrepreneurship. 46% of the students surveyed consider Important to reinforce the areas of Marketing and Human Resources. Is it observed in the study that the needs of learning and practicing can be addressed with the implementation of diverse software simulations that allow students to be immerse in a business context leading them to make decisions

close to reality and assess their possible consequences strengthening their analytical and administrative abilities.

Besides, both apprentices and graduates would have the chance to adapt easily to the working environment, condition that would improve the reputation and external appreciation of the MTI teaching quality (Noguera et al., 2011).

4 Conclusions

Despite the lack of knowledge of the utility and purpose of a laboratory of Technology Management, a strong interest in the creation of one was observed along with the advantages and benefits for the institution and its students. It would be a building for learning and simulations development, result-based research intended to solve real day to day business problems that companies face.

Active participation of teachers and college directors is required due to their experience, talent and management in the creation of facilities like laboratories of Technology Management, where students can develop abilities to respond to companies' real life, improve across curriculum processes and adapt to current social demands.

Currently, there are few institutions that have adequate facilities for entrepreneurial programs, research groups, or specialized rooms where complex problem solving situations can be simulated, situations that graduates of Management Sciences must face daily in the business world.

Students surveyed perceive that laboratory as an added value and competitive advantage for MTI because it generates a singular image if it is in the city, therefore it would improve competitiveness of graduates contributing to bridge the gap between theory and practice.

Designing and implementing strategies to publicize the usefulness of a management laboratory among the academic community is a main need. Students must recognize the competitive advantages for them and for the institution for seizing the available resources.

Making alliances with the business sector is required aiming to establish corporative relationships that allow students to put into action the processes learned; it is also pursued through this mechanism positioning the syllabus of the careers and the institution as well.

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