

## 7. The change towards Tec's educational model

The change towards Tec's educational model is based in the development of professors. Organizing a learning environment that is coherent with the philosophy of the educational model requires a professor who has a broad cultural and pedagogical background. The Program for the Development of Teaching Abilities (PDHD for its acronym in Spanish) was created to facilitate the process. This program offers didactic resources and methodologies in which professors participate in a very systematic, continuous, and intensive way.

The program fulfills two specific objectives:

- ? Offer a series of courses, workshops, and activities for professors to acquire knowledge, abilities, and attitudes which are required to incorporate the educational model. Train professors in the appropriate didactic methodologies and techniques.
- ? Use a methodology centered in teaching in such a way that the professor applies the educational model, with the established characteristics in real situations and assumes the responsibilities of the new role. This is how change takes place during the training process in which the professor has a central role.

### **Theoretical considerations about change processes in education**

The Program for the Development of Teaching Abilities (PDHD) was defined analyzing the findings of studies about educational changes (Fullan and Hargreaves, 1992) which have helped to determine its characteristics and methodologies. The following are the results of these investigations:

- ? Educational change is not a process which can be technologically controlled; innovation is characterized by uncertainty about the results.
- ? Professors are noticeably independent in their teaching practice. This makes it difficult for them to accept external pressure unless they thoroughly know the reasons which justify this process and are convinced that this change will improve their actual teaching methodologies.
- ? Professors are product of their own academic experience and have adopted learned models and in order to understand alternative teaching-learning methodologies, they need to discuss, test, and redefine them.
- ? The professors' work needs to be organized according to the same principles as the students' so the latter can develop a democratic attitude.

These principles are: having a collaborative social environment, exchanging instead of supervising, receiving technical preparation, and having frequent meetings with other professors to discuss their work.

- ? In education, change processes require a collaboration culture. Professors normally work isolated and rarely share or publish their practice. This makes them depend on their own knowledge and performance. In an academic context where teaching is based in the transmission of information, this attitude in professors might be useful. However, continuous improvement and being open to innovations takes to uncertainty, mistakes, and therefore it is necessary to have other opinions to fortify personal initiatives.
- ? Interpersonal relations should be complemented by activities in which the professor, in an individual way, is aware of his/her own needs and desires. Autonomous work is a source of expression and personal creativity. This capacity is needed when changes in mental attitude are required. The groups' growth and learning generate through diversity and individual creativity. Considering all of this, reflection and internal processing must be part of a professional.

*As pressure from post-modernism is present, innovations multiply, old ideas and purposes start to disappear, the functions of professors are broaden and they are expected to form citizens to compete in a working market that is becoming more flexible and specialized for a society that is then more plural and diverse.*

*Barth, 1990*

- ? Professors do not carry out educational change just to learn methodologies and techniques theoretically. In order to domain the abilities and acquire the attitudes required by change, they need, besides knowledge, to practice continually. The professor's change normally follows a process of consecutive periods: knowledge, practice, improvement, and maintenance.

### **Characteristics of the Program for the Development of Teaching Abilities (PDHD)**

The PDHD was created with the following characteristics having as reference the last mentioned considerations and the basis of the learning principles in which this program is founded:

- ? Promotes motivating professors and to generate in them a commitment with the institution to contribute with their effort and their group the achievement of educational change, making special emphasis in collaboration and interpersonal support.
- ? Gives opportunities for the professor, individually or with a colleague, to develop his/her own educational project, through planning, design, and structure of a course which has the characteristics of the educational model.

During these activities the professor contributes with his/her experience, knowledge, personal attitude, and other personal characteristics.

- ? Offers opportunities for professors to collaborate, learn from each other, and improve their professionalism as a learning community. As the professor advances in the change process, s/he identifies strengths and weaknesses. S/he then contrasts them with those of other colleagues and participates in activities in which s/he can give and receive opinions for his/her personal growth and that of the group.
- ? This program is not based in a series of workshops in which a professor is expected to perform everything on his/her own but in real life experiences in which, as a change agent, constructs his/her own practice, acts like creator of the process, participates in an active and reflexive way and makes continuous improvements according to the obtained results. Participating for two days or one week in a workshop about the educational change and the new didactic methodologies and techniques does not prepare a professor to implement the changes that the educational model requires.
- ? Promotes professor's effort and everything that s/he does to be continually supported by a facilitator who acts like a critical partner in each phase of the process. The facilitator is normally a full-time professor in the Institute and has successfully implemented a course using the educational model in a similar discipline as the professor's. The facilitator's responsibility is to supervise the workshops in which the professor participates, be with the professor during all the process, and observe and give feedback.
- ? The PDHD program makes available for the professor, through an appropriate technological platform, workshops and activities in which other professors participated using effective teaching-learning models and methodologies. These workshops are organized in a collaborative working structure which gives the necessary time for professors to meet, opportunities for them to experiment in their own courses, and reflection, evaluation, and improvement cycles.
- ? Finally, professors count with all the necessary technological resources: electronic networks, personal computers, satellite, technological platforms, and in general, the necessary infrastructure to carry out their teaching practice.

Having this program for the development of professors towards educational change does not mean that all the professors start at a zero level. Many of these professors have worked using these methodologies, although they were not made public or explicitly recognized. What is expected to be achieved with the program is for all professors, considering the mission, to know what the educational model is and what it implies. And, according to their specific situation, reflect to identify their present teaching practice and what they need to do to carry out the required change. They should also know what learning their students acquire as they apply the new methodologies, and according to the educational purposes and intentions, make the necessary adjustments in those aspects they consider necessary and reaffirm the ones that fulfill the desired characteristics. With the development of

professors it is not expected to renounce, *a priori*, to those educational traditions which are effective only for certain achievements but to enrich the professor's experience starting from their previous experience.

### **Description and structure of PDHD**

The structure of the program has as main goal to develop an educational project through planning, design, implementation, and evaluation of a course with the characteristics of the educational model. The PDHD also incorporates courses and workshops which support the development of the project in each phase. This process includes activities which are divided in two options:

- ? *Option A*: for professors who develop a course using the educational model in a technological platform. Professors implement, evaluate, and prepare the necessary didactic documentation so other professors can use it as a model.
- ? *Option B*: for professors who adopt a course developed by a colleague and which was approved and published in a technological platform.

### **Option A**

The development of a course using Tec's educational model has an initial preparation and four phases which at the same time correspond to the phases of a project.

#### **Initial preparation: Efficient use of the technological platform**

All the redesigned courses are offered to students in a technological platform which could be LearningSpace, Blackboard, WebTec, or others. Students and professors work in this platform during all the semester. This is why the professor requires previous preparation in order to use this platform efficiently. In this preparation the professor acquires knowledge about the databases that integrate it, what type of information is put in each one, how they work, and the applications that are allowed.

#### **Phase 1: Mobilization towards change**

The objective of this phase is to inform, create awareness, and take the professor towards the implementation of Tec's educational model. If a professor does not know and accept the demands implied in the process of change, she/he will not easily initiate it. This phase is formed by short workshops and activities based on reflection, analysis, and group discussion about the following topics:

- ? The characteristics of higher education in the 21<sup>st</sup>. century. New approaches in education are analyzed and discussed as well as the solutions that Tec offers in this context.

- ? The educational model which is generated from this change, its principles, implications, and contrasts with the traditional model. This situation is supported by examples of courses developed and validated by other professors.
- ? The implications that this change has in the professor's new role, like tutoring abilities, educational orientation, and formation in values.
- ? Students' characteristics like emotional intelligence and social abilities.

Once a professor shows interest in starting the educational change, he/she formally registers in his/her campus to begin the project. He/she selects a course from the ones he/she teaches plus the didactic technique that will be used. He/she is assigned a facilitator and a technology tutor: The facilitator is more experienced on this process and generally teaches in the same area, he/she will be giving a critical evaluation during the whole process. The technology tutor provides support on the use of technological tools. The professor is also given a laptop and other resources to be able to work in the project and fulfill the requirements established.

From that moment on, the professor begins the process of educational change, which has three stages.

### **Stage 2: Structure and course design**

In this stage professors reflect on what they want to achieve with their students how they are doing it and how they will do it and what they need. In this stage they get trained on methodologies and didactic techniques that are promoted within the Tec community Project-Oriented Learning, Problem-Based Learning, Case Studies, and Collaborative Learning. Because of the diversity on knowledge and experience professors' have, this stage is composed by a series of required and optional activities according to the professors' needs.

The required activities are oriented towards the following objectives:

- ? To know and apply self and collaborative learning in classroom and virtual sessions.
- ? To know methodologies and didactic techniques that are used in the courses and to get trained on the appropriate technique for the content of the course and the students' development.
- ? To design and structure a course with the characteristics of an educational model using the most adequate didactic technique.

Also in this stage other optional workshops are incorporated so professors can participate to complete their formation:

- ? Resources and technological tools to support the teaching and learning processes: management of virtual groups, information science resources, multimedia, simulations, among others.

- ? Criteria and rubrics to evaluate the diversity of learning processes that are promoted in the different techniques, not only in individual activities, but also in group activities.
- ? The role of a professor as a facilitator, a tutor and an expert in the students' learning process.

These workshops vary depending on the demand and the professors' needs as they advance in the process, that is to say, the PDHD Program (Program for Development of Teaching Techniques) becomes flexible and under continuous development.

When a professor designs a course, either individually or collaboratively, he/she obtains a global vision, foresees all the process and makes decisions that he/she documents in the technological platform in an organized, structured and integrated form. In this process a professor shows his/her independence and creativity.

The elements and decisions that a professor incorporates in the design of his/her course are basically the following:

- ? To define the educational intentions that include abilities, attitudes and values that professors want to promote among students. Also the learning objectives, that the course program contains.
- ? To structure the contents of the course. To research, select and document difficult real life situations.
- ? To determine the experiences and activities where students participate to achieve learning. To organize these experiences according to the didactic techniques that will be used. The professor gives instructions to perform the activities and establishes the requirements to be fulfilled.
- ? To decide what activities will be done in the classroom or in the virtual sessions, as well as the technological resources that will be utilized.
- ? To estimate the time for each activity so they do not surpass the academic load established by the Tec's regulations so that activities are distributed in such a way that students are continuously busy.
- ? To establish the plan and the evaluation criteria for learning and to elaborate the instruments and rubrics needed to register results.
- ? To inform students of their responsibilities and what they are expected to achieve within the process; and the professors' role as a facilitator.
- ? To determine the policies and rules to be followed in the course, the behavior and attitudes expected which are also established within the educational intentions.
- ? To suggest and facilitate the resources of information and materials needed for the students to perform them successfully.
- ? To create a space to document his/her experience where he can incorporate relevant data when implementing the course so that it gets ready to be transferred and improved.

All these elements must go in accordance with the educational model. Before implementing the redesigned course, professors and facilitators apply evaluation criteria to fulfill the requirements.

The activity to design a course is fundamental in the process of change because the professor mentally builds the educational model and adjusts it to the specific context of his/her course. At the same time, it removes and contrasts its previous scheme about teaching and learning within the educational model. The activity of designing is not only about attending a course, but rather having a personal reflection about the construction and creation of the educational model without which it would be impossible to achieve it.

To design a course requires training and reflection time from the professor, because he needs to handle pedagogical concepts that generally a university professor has not been trained for. On the other hand, although professors have done their programs and plans prior to the course, these programs were not as rigorous as they are today considering that now they have to be posted in a technological platform.

Because the traditional educational model is based upon classroom sessions, the information of the course was transmitted orally to students and professors did not need time to make decisions since teaching was supported only by implicit knowledge.

A redesigned course, besides incorporating the educational model, has other advantages: it avoids improvisation, makes professors reflect on their professional practice, allows to contrast intentions with results and do research-action in the classroom incorporating the continuous improvement as a normal operation and the transition of oral tradition to information culture more appropriate to the new educational approach.

### **A redesigned course in a technological platform**

When placing a course in a technological platform, it is enriched and provides more advantages, for example:

- ? It allows professors to make public his/her teaching, so that it can be evaluated and recognized in the Institute. The course can be used as a resource in the training process to reach change in a faster way.
- ? It allows to have, in a natural way, access to other technological sources of information, like the Digital Library and Internet and it facilitates other technological sources and the work in virtual spaces or individual and group tasks.
- ? It makes information about a course and materials available to students.
- ? It allows students to control easily their process, to administer time, and to be able to know the agenda of the course.
- ? It promotes the information culture, not only for professors, but also for students. It also promotes the efficient management of new technologies.

- ? It allows professors to make adjustments easily according to the problems that come up during the process of implementing and informing students about these changes.

### **Stage 3: Implementation and guided practice**

The objective of this stage is for professors to develop the abilities and attitudes needed to implement and evaluate a course in accordance with the Educational Model. This is because the fact of having a redesigned course in platform does not guarantee its success when being implemented. The activities on this stage are made by professors and are based upon continuous reflection about the way the course is taught, the goals achieved and the obstacles faced. During the implementation of the course, the professors' way of teaching is guided by continuous tutoring from a facilitator from his Campus and it is integrated by activities such as the following:

- ? Peer coaching in the classroom by the facilitator, in order to know through a colleague, how he/she performs his/her new role and make comment about his/her results.
- ? Analysis of homework, assignments, projects and other ways of students' participation in order to know their progress, to evaluate the effectiveness of the plan established and make adjustments, as necessary.
- ? Interactive sessions with other professors in order to exchange experiences, ask and give opinions about how to solve problems and overcome obstacles that come up during the process, to standardize criteria and processes.

The results on this stage are incorporated into the didactic documentation of the course. This is a very effective way of promoting reflection and improvement; also it is a way of sharing with other professors the knowledge that is being built when implementing the educational model. When finishing this stage, the course goes through an evaluation process, approval and publication in order to be transferred.

### **Stage 4: Normal operation and continuous improvement**

In the previous stages, the professor has developed the abilities and attitudes in accordance to the profile established by the Mission: a professor who reflects and acts as a learning facilitator who uses methodologies and didactic techniques supporting the Educational Model. A professor who talks with his/her colleagues to exchange experiences and gets involved in improving continuously as well as in innovating education.

In this stage, professors are expected to consolidate and master the abilities mentioned above so that they are used in a natural way. Professors carry out three types of activities that characterize this new profile:



- ? To participate in updating processes and development in his/her area of specialty or in innovating education processes and educational technology.
- ? To share the knowledge and experience generated when implementing the Educational Model through activities such as participation in international, institutional or local forums; working in collaborative networks with other colleagues for continuous improvement and progress in the process; publication of articles and research.
- ? To put into practice the improvements of the course proposed at the end of the semester, to evaluate the results, to document them and continue incorporating permanently innovations and improvements to the course.

One important characteristic of this stage is that professors carry out the responsibility and engagement in this process working in a more independent way, because it is them who design the plan to be followed. At the end of the semester, a professor writes a final report about his/her experience. This report is analyzed along with his/her facilitator and together they do observations and reach conclusions.

At the end of this stage, professors fulfill the formal training process within the PDHD (Program for Development of Teaching Abilities) get certified in this program. Professors are expected to follow their new role as part of their everyday teaching, it is then when the goal of having a cultural change in teaching is reached. All of the above implies a change in the way of thinking and the way of carrying out the process of education so that the students' profile is reached.

### **Option b: The process of transference**

The process of transference is directed toward professors that adopt a course designed by a colleague who has participated in the option A from the PDHD (Program for Development of Teaching Abilities). The course to be adopted must be approved and published in a data base and available to be used by other professors that teach the same course within the same or different campuses. Generally, professors that adopt and adapt a course, teach part-time at Tec; these professors receive basic training which consists of two stages: *Initial preparation* and *Mobilization towards change* once they register in the PDHD (Program for Development of Teaching Abilities). Before adopting a course, the professor has to understand the Tec's educational model and its background, to handle the technological platform where the course has been redesigned and be aware of the responsibility he/she has when implementing the educational model.

In the process of transference, professors study the course he/she is going to adopt, its methodology and the didactic technique to be applied, the process of learning followed, the context in which it was applied, and the results of implementation that are located within the didactic documentation. As a result of this, the professor is able to adapt them to his/her own situation when necessary, and he/she is able to improve them, if the philosophy of the educational model is kept. In this process, the professor who adopts is supported by the facilitator who is

there with him/her during the following stages, which are very similar to Option A stages. Also the professor is in touch with the designer of the course, both of them and other professors that adopted the same course, form a collaborative network in order to exchange experiences and opinions, so that the course can be enriched through practical improvements.

The process of transference is a means of spreading experiences with the educational model. On one hand, this facilitates the professors' training, the progress in the implementation process and the quality of the courses; on the other hand, it makes experiences with positive results be kept, promoting this way collaborative network among professors from the same and different campuses (See Figure 7.1.).

### **The role of a facilitator in the process of development of professors**

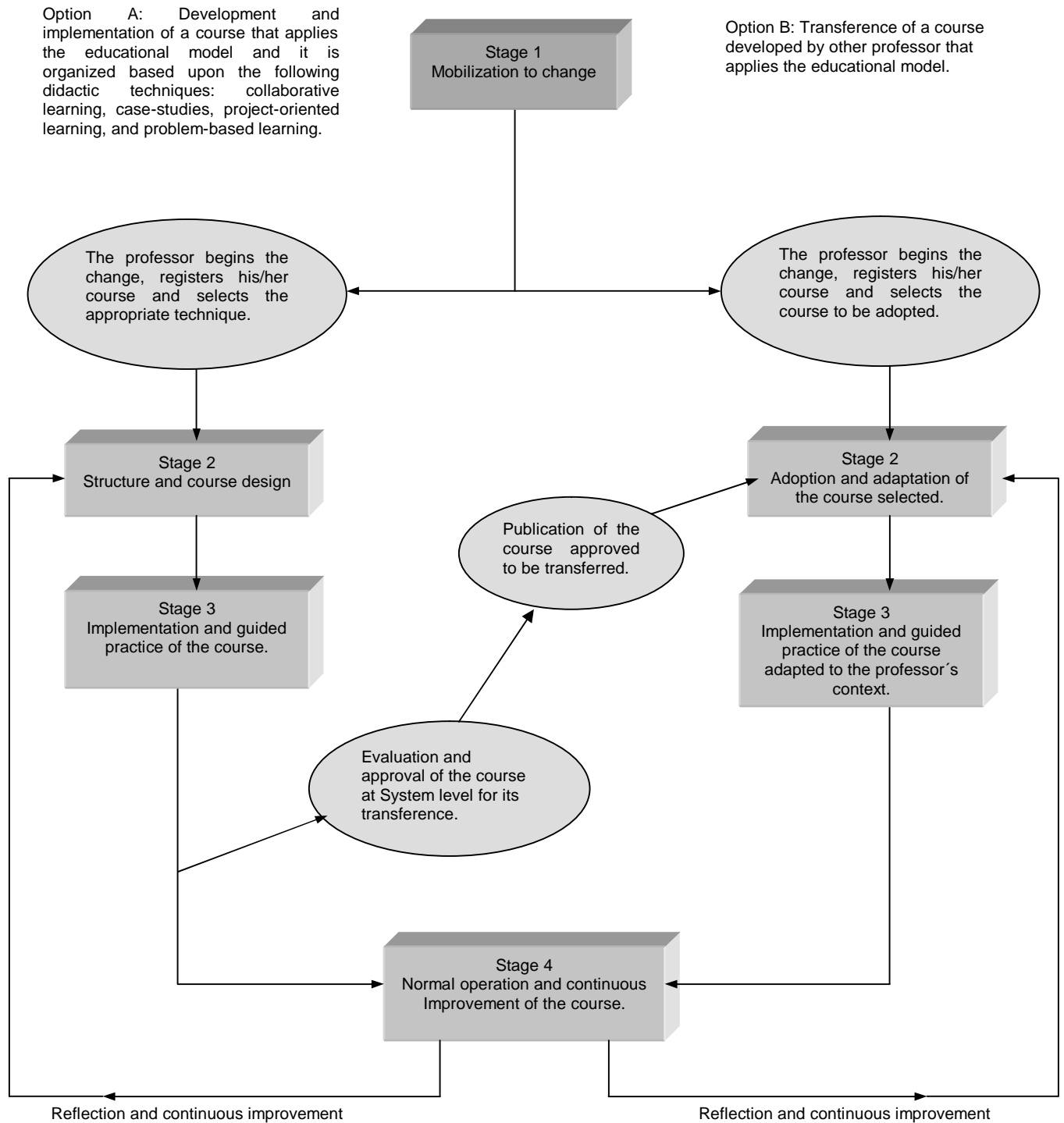
During the process of development of professors until the time they get certified in the PDHD (Program for Development of Teaching Abilities), he/she is accompanied by a facilitator that acts as a partner, he/she guides the reflection process, coordinates the professors' activities, offers feedback and evaluates the stage of design, implementation and improvement of the course.

The facilitator is a full time professor that has more experience in the process; has participated in all the stages of the PDHD (Program for Development of Teaching Abilities), has implemented a course in a computer platform and has acquired a didactic technique. This is done to set an example for the professors he/she is tutoring; also, he/she has received advanced training in a foreign university; not only in the mastering of a didactic technique, but also in abilities and attitudes required to play his/her role of facilitator of the educational change.

In this working structure, the facilitator has the following functions:

- ? To support training on didactic techniques in his/her campus to implement the educational model.
- ? To act as a promoter of the process and frequent working sessions either in classroom or virtual sessions in order to analyze and discuss topics related to the implementation of the didactic technique; and consequently the educational model.
- ? To be expert at the application of the didactic technique and evaluate the courses of those professors under his/her responsibility based upon established criteria.
- ? To supervise that the application of the didactic techniques is done without alterations and in accordance with the educational model.

Figure 7.1. Scheme of the PDHD (Program for Development of Teaching Abilities).



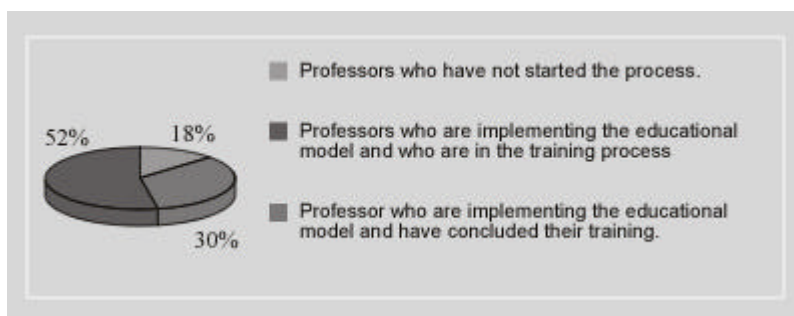
- ? Main relationships with foreign universities to keep up-dated and have joint activities like research, professor and student exchange programs, co-edition of articles, etc.
- ? Promote a systematic exchange of experiences among colleagues so the implementation of the educational model is continuous.
- ? Promote openness among professors to communicate their experiences, request help, document their findings, contribute to the knowledge-base of the System, and this way avoid isolation which stops the process towards change.
- ? Have campuses achieve advance in the implementation of the educational model with autonomy and quality.

At present, all the campuses have a working structure and the necessary resources for the implementation of the educational model. PDHD workshops are published in the platform of Blackboard to be transferred. There is a database where model courses which use a didactic technique. There are also enough experienced facilitators who have been certified in each didactic technique. These facilitators have been distributed in all the campuses in order to advance in the implementation of the educational model.

All the System continues working so all the courses, with no exception, fulfill the characteristics of the educational model. The following is the advance of the implementation up to June of 2002:

- ? Of the total of professor, thirty percent are implementing the educational model and have concluded their training and fifty-two percent are now

Figure 7.2 Present situation of professors in relation to the implementation of the educational model.



in their training process. This means that eight-two percent of the professors are working with the educational model and eighteen percent is about to start the process. (See Figure 7.2).

- ? Of the total class groups which are offered, twenty-nine percent apply the educational model with courses approved System wide and forty percent apply it although they are in process of being approved. This

means that seventy-nine percent of the class groups use the educational model and thirty-one percent use the traditional model. (See Figure 7.3).

### How to participate in the PDHD

The conditions of each campus and the professors' needs and preferences to receive training are varied. In order to attend all the variables, the workshops and activities which are offered can be in the classroom, on-line/classroom, on-line/satellite, or totally on-line. (See Table 7.1).

### How to make an educational change meaningful

The educational change is not maintained with the last mentioned activities. The following is required in order to achieve an effective result:

- ? Professors should participate in permanent development activities which respond to their needs and that are performed during their teaching practice and they should not be part of a list of complementary activities.
- ? Professors should continue to use technology to share resources and experiences as part of the professional development, to publish results and generate a share knowledge-base.
- ? Time should be given for change to take place and the necessary support should be offered so this change has the opportunity to grow.

Figure 7.3 Implementation of the educational model in class groups.

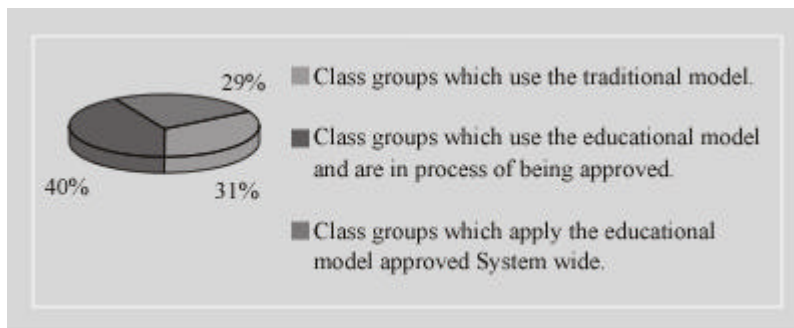


Table 7.1 Format for workshops offered in PDHD

Format	Description
<i>Classroom workshops</i>	These workshops are developed and taught in each campus. They respond to specific needs of the professors and are taught in classroom sessions by a facilitator who offers academic support to participants.
<i>On-line/classroom workshop</i>	These workshops use a common database for all the System campuses and its design includes activities which require a facilitator who is assigned in each campus.
<i>On-line/satellite workshops</i>	There are courses which are developed and published in a technological platform and are combined with satellite transmissions in which professors from all the campuses participate simultaneously. New workshops are normally offered in this format.
<i>Totally on-line workshops</i>	These workshops are published in a technological platform and are used and managed by each campus. These workshops count with a coordinator who gives academic support to participants and facilitates the process.

- ? Processes which are complex should not be simplified. Change can be stopped if the time dedicated for the development of professors is not enough and there are no additional activities to support it.
- ? The institution should continuously support and evaluate the process.
- ? Directors as well as other administrators should participate since change affects the organizational function of the institution and requires a solid infrastructure to be carried out.

Table 7.2 shows the comments of a professor about her experience in the implementation of the educational model.

### **Conditions for change: Institutional support**

The institutional support offered to professors is an essential factor to facilitate the conditions and opportunities where change can be accomplished and be maintained at a long-term. This change should be sustained with the agreements, politics, and norms established by the corresponding organisms. The following is a description of the support which each organization offers to achieve the implementation of the educational model.

## Support form the Academic Vice-rectory

This entity, together with the Systems' Academic Council, took the responsibility to develop and support the implementation of the educational model in the professors' practice. It was done through the following activities and functions.

- ? Define Tec's educational model and the pedagogical frame in which it is based, as well as the creation of the working structure to carry out the implementation of the model in the whole system.
- ? Establish the conditions, directions, guidelines and criteria for the implementation of the educational model and the processes to follow them up.
- ? Develop and promote training programs for professors' formation and development, and establish activities and mechanisms to keep them active and in continuous formation process.
- ? Provide information related to the educational model through electronic documents, to offer theoretical and technical support to the professor in a continuous and accessible way.

### Table 7.2 Professors testimony.

I have had to impulse the educational model since its origin. As a teacher I can say that I have leaned a lot during my training in the PDHD which I considered a process full of experiences. What I liked the most, among other things, was asking myself why and what for I did things and why I asked my students to do them. This educational model becomes sort of a life and culture style which allows us to change and learn all the time.

I have also learned from the process of being a facilitator of high school teachers and college professors. It is motivating to hear about professors experiences in the classroom and observe their creativity when they are trying to adapt their course to the educational model and to their needs. It is also interesting to see how they share ideas about their activities and make adaptations learning from each other with good bases and how they share the mistakes they had in the past to avoid making the same mistakes again. It is also interesting to observe how teachers change; frequently, they show surprise, doubt and even fear, however, when they have finished the redesign they comment openly that they are conscious that it is an important process they have just started and would like to continue.

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- ? Collect experiences of professors who have implemented the educational model and share it with other colleagues in order to use them as support resources.
- ? Investigate the world educational tendencies and the best experiences in educational innovation, as well as information about universities which are leaders in educational changes to be sure that the professors will have the most advanced training.
- ? Develop schemes for the didactic use of computer technology that would help professors develop situations and learning spaces and integrate them to their teaching practice.
- ? Create, publish and administer data bases where courses are registered and undated, and analyze and publish the results in order to improve them.
- ? Evaluate continuously the needs professors have to generate supporting mechanisms and make the necessary changes to the development process.
- ? Be a link between the campuses and the central system to coordinate the activities and guarantee the advance of the implementation of the educational model.
- ? Give feedback and work together with other entities of the Institution to make decisions and supporting actions required by the educational change.

### **Support form the Internationalization Vice-rectory**

In order to offer better training to the professors, it was decided to learn form the experience of universities which are leaders in educational innovation. At the same time, it was possible to encourage the professors' international formation, participating in workshops in foreign universities.

The internationalization Vice-rectory carried out the following activities to give support to this process:

- ? Give priority, within their projects, to professor training in foreign universities to learn teaching techniques and to participate in workshops oriented to the educational innovation.
- ? Create links and establish alliances with other foreign universities to facilitate teacher training activities and keep a long term relation with them to exchange experiences and assure the academic internationalization of the Institute.
- ? Cooperate with information, obtained from visiting foreign universities that could be used to give support to the educational model.

### **Support from the Virtual University**

The role of the Virtual University during the implementation process of the educational model has been very important, since it provides satellite spaces which



allow professors to communicate and interact with professors from other campuses. These virtual spaces have facilitated the following activities:

- ? Develop a common language related to the educational model throughout the System, work with the same orientation, reinforce the information offered through electronic means, clarify critical situations related to the implementation of the educational model and communicate the institutional guidelines.
- ? Carry out an interchange of experiences among professors from all campuses who work in the educational model to share their experiences and learn from each other.
- ? Allow professors and students from all campuses to participate on (a distance) courses which use the educational model in order to have them share their experience and working schemes.
- ? To maintain active all the professors and to give opportunity to recognize the advances of each campus in the process and the specific forms to promote this process, preventing in this way, that the experiences of each campus might be isolated, not recognized and might become weakened.
- ? Establish working sessions to unify criteria. In order to support the educational model, conferences and workshops given by professors from foreign universities are offered to all the professors of the System.
- ? Produce experiences about the use of information and communication technology as well as activities which are based on them.

### **Support from Information Technology Vice-rectory**

The main objective of this organization is to support the implementation of the educational model, offering technological tools. Some of their functions are the following:

- ? Investigate and offer better technological options in the market.
- ? Offer training to teachers to help them use the technological options of the educational model efficiently.
- ? Develop tools which adjust more to professors' needs.
- ? Create the required technological infrastructure: ports, networks, high-performance servers and other elements.
- ? Give continuous service to the technological needs and problems presented in the Campus.
- ? Work in a coordinated way with the Academic Vice-rectory to answer professors' technological needs.

### **Administrative support in the Campus**

In order to have a lasting and solid innovation, it is important to encourage changes in the functions of the director and in the organizational culture of the campuses. If the organizational processes are not adapted to the change requirements, they inhibit the working forms the innovation demands. When a professor takes the risk

to make changes, he/she needs intermediaries, not interferences. Directors should participate in the process as leaders and share with the professors the activities and acknowledge their needs and fears. They should also facilitate the resources and comprehend the structural changes required for the implementation of the model. In addition, directors should have periodic meetings to discuss about the changes and promote communication.

In order to achieve this goal, directors should assume new and different roles: The most important is to incorporate an educational leadership which differs from his/her administration role. (See Table 7.3)

Many directors of different campuses are carrying out efficient activities to support, advance and sustain the process. Some of the strategies used by the directors are to:

- ? Participate actively through out the process and analyze professors' workload considering that it is now more time consuming. In the new teaching model, professors carry out activities such as: searching for real-situational problems and publishing them for the students, planning the steps followed in the course carefully, checking continuously students' advance, communicating with colleagues, and training to update and improve permanently. All these activities demand from the professor more time and energy than the activities of the traditional model.

Table 7.3 Role of an administrative director (traditional role) and a of a director with leadership (new role) in the educational change.

Administrative role	Educational leader role
? It is based on control.	? It is based on confidence.
? It is focused on keeping the status.	? It is focused on improvement and success.
? It works in an isolated way.	? It works collaboratively.
? It emphasizes fulfillment and dependence.	? It emphasizes personal responsibility.
? It solves problems	? It helps to solve problems.

- ? Promote professors' meetings to analyze teaching and professor-training problems in the educational change. It also reactivates academics' participation incorporating colleagues' discussions about the implication of using teaching techniques in their courses.
- ? Facilitate the means to buy the necessary material and equipment to renew the classrooms and make them more dynamic using movable tables, ports to connect to the Internet, technological resources, appropriate infrastructure, networks and computers.

- ? Develop creative ways to implant the educational model with the professors' collaboration. It organizes local congresses where professors can show and exchange their experiences and direct a project in their campuses to take advantage of professors' efforts.
- ? Promote the appropriate professor training that will help them innovate and evaluate the effectiveness of the process. It will also help them guarantee the continuity of the educational change adjusting the process to the campuses' different styles, forms and the time each campus requires to respond.

## **Achievements**

The effort made in five years to install the educational model in the teaching practice has generated important experiences and knowledge. It has also led to meaningful achievements, in the inside of the Institution as well as in international environments where Tec has achieved acknowledgments as a university which is leader in educational innovation and in the use of technological resources.

During the process of the educational change, professors have been an active group which has required an organized workplace to carry out activities and share them. They have also required support from their campus to participate in these activities and different kind of rewards. Some of the achievements are shown below.

## **Professor collaborative working culture**

Professors' participation in the introduction process of the educational change has generated knowledge of the process which has been documented and made available for all the professors of the Institution. At present there are collaborative data bases and virtual groups such as the following:

- ? Problem, cases and project bank used by professors. These banks have been tested and validated. Each teaching tool includes the didactic documentation, settings and its correct use in the course. There are also data bases with approved and published courses which are available to be transferred.
- ? Committees to check the quality of problems, cases and projects to guarantee the quality of the courses where they are taught.
- ? Collaborative networks of professors who work together to unify criteria on learning methods, evaluation, activities and other interesting matters such as exchanging ideas about problems and solutions to implant their courses with good results.

This collaborative working culture which has been developed in the Institution is confirmed with the suggestions given by the professors in the polls:

- ? *Form multidiscipline teams which evaluate the courses together with the professors who developed them.*
- ? *Participate in collaborative teams with professors who teach the same subject.*
- ? *Introduce the observation method to give specific feedback to the professor.*
- ? *Keep in contact with experts to get feedback about the courses.*

### **Achievements in the implementation of the educational model**

Studies on the impact of the educational model in the classroom have been made every semester. These studies show the level of the model implementation. These are some of the achievements obtained which are described in the detail in the figure 7.4:

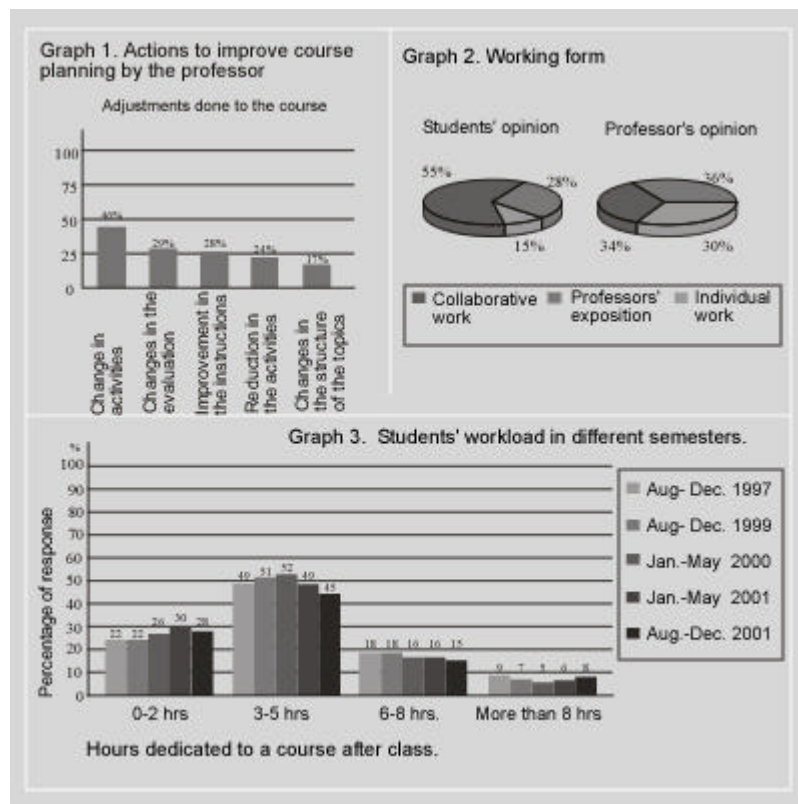
- ? Professors are more reflexive and focus their attention in students learning process. They make changes and adjustments to the process in order to obtain better results for the students and achieve the established goals.
- ? Students working form includes, in a balanced way, a high percentage of collaborative activities. Professors' exposition has diminished and students keep on working individually.
- ? Students' working load has increased in redesigned courses, and even though they consider it excessive, it is getting closer to what has been established by the Institution to encourage students' responsibility and working culture.
- ? The development of abilities, attitudes and values has increased in a high percentage. The most fomented HAV's (acronyms in Spanish, Abilities, Attitudes and Values) are: self-learning, collaborative learning, the ability to analyze, synthesize and evaluate responsibility, honesty and working culture.
- ? The use of technological tools has become a natural way of working which students like and use efficiently. According to some of the students' comment they consider them valuable because they allow them to do homework, discuss with their classmates about some topics, carry out projects and have access to informational resources, communicate with the professor and his/her classmates at a different time, construct models and role play.
- ? With respect to quality, most of the courses that offer this educational model are in the ranges of good and excellent.

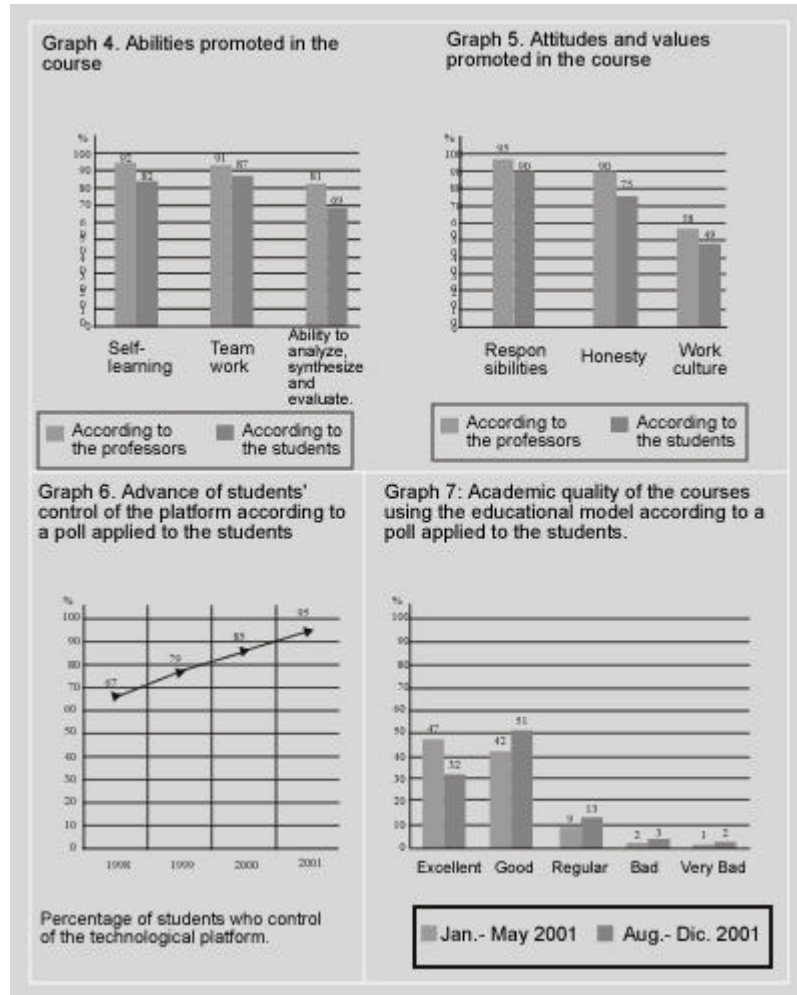
### **Tec in the university international context of the educational innovation**

Tec of Monterrey has always been in international forums and has been acknowledged for the academic formation offered to their students and the investigations done by the institution. In the last years, it has also encouraged the student and professor interchange with innovative universities that collaborate with the Institute. There is an interest in searching for joint investigations, collaboration in publications and academic programs, and more participation in congresses and international forums.

On the other hand, Tec has gained international acknowledgement as a university which is leader in educational innovations and in the use of computer technology as support. At present it participates in international associations that promote innovating teaching and learning methods. These innovations guarantee the achievements of goals through the internationalization.

Figure 7.4 Results of Tec's educational model





**Tec of Monterrey is associated member of the European Consortium of Innovative Universities (ECIU)**

Tec is member of the ECIU since June 2001. The founding institutions of the consortium have several characteristics in common, some of the most relevant are that all of them are academically strong in Engineering and Social Sciences. These institutions are young, enterprising and progressive and keep a close relationship with the industry and the regions where they are located. In addition, they develop and apply new methods for teaching, learning and investigating. They also assure an innovative culture within their boundaries, experiment new management ways and interchange useful experiences.

The strategic plan of this consortium in which Tec participates has as its principle to promote joint activities to strengthen the innovative nature of its members. This can be done cooperating in education to establish programs with good results, establish innovative technologies and flexible educational programs, students' progress and cooperation programs on the use of computer technology and telecommunication.

During its development, the consortium expects to form solid associations with the government, businesses and industries, with this it will be possible to promote the cooperation among scientific groups and strengthen spin-off companies which have international ranges. Likewise, it expects to offer life formation beyond its national borders and establish certification and validation criteria of the ECIU courses and loan interchange to generate resources to carry out joint programs and promote the growth of their operations and influence out of Europe.

### **Tec de Monterrey is a founder member of the Problem Based Learning Center (UCPBL)**

The Aalborg Universitet in Denmark, the Tec of Monterrey and the International Center for Engineering Education of the UNESCO (UICEE) are interested in establishing a engineering educational center as a satellite center of UICEE. The main goal of this center is to create and spread the mechanisms for engineering education, using the Problem Based Learning method. This will be done through a world network formed by different universities which are distributed all over the world. Tec of Monterrey is one of the universities who started the idea of funding this center, it will be a member of the Administrative committee together with the universities interested in this project. The figure 7.5 presents the strategic integration of the founding members of the center.

Figure 7.5 Universities that integrate the Problem and Project Based Learning Center.



## **Campus Guadalajara, head office of the International Congress of the Educational Innovation in Economics and Business Network (EDINEB)**

Tec of Monterrey participates with its professors expositions in the annual congresses organized by EDINEB. This year – 2002- Campus Guadalajara was the head office of the annual congress. It was the first time, since its foundation in 1993, that the congress was not carried out in Europe.

The international network EDINEB was founded to have a continuous interchange of experiences and knowledge in the economy and business area. Some of the activities done by this network are workshops to present experiences with innovations, publications, international conferences and other interchange form. The EDINEB plans to strengthen their members experience in key factors related to innovative teaching and learning methods, creation of knowledge, corporate training, course design and technology, and the development of educational platforms. The network is formed by members who belong to graduate schools, business schools, consulting firms, corporate and industrial training centers and others.

## **Tec of Monterrey, representative and sponsor of the Latina American Association of Cases (ALAC)**

Tec was invited to become a member of the North American Research Association (NACRA) as a representative of the Latin American Association of Cases (ALAC). The relevance of this association is that Tec will be able to promote not only case teaching, learning and investigation but it can also carry out projects with other universities and share the authorship of investigations and publications.

The initial effort has been to include the Institute professors that have been trained in the case method as members of the association. These professor will be producing cases form Mexican companies and organizations.

The importance in participating in the ALAC is because the economic relation between the United States and Mexico is growing and in the future, these countries will make important decisions which could be good case examples to be used by professors to improve the education in business administration and other areas.

On the other hand, Tec's coverage in Mexico and Latin America makes it institution the ideal head office of the ALAC. Professors, who are members, can use the association cases in their courses and validate their investigations, cases and teaching methods with other members of the association. They will also have the opportunity to work in projects with



professors from Mexico and Latin America who can be invited to enrich the interchanges.

*There is nothing more difficult to manage, risky to guide and uncertain to have success than to lead the introduction of a new order of things.* Macchiaveli

### **A retrospective regard of the educational change**

The change in the educational model did not happen in a moment, and it was not the work of a single person. It has extended through out the time and it has been group work. This is a comment of a professor (2002): *I think we are learning little by little about the educational model and the platform, and at the same time we are improving them. This is a process that takes time.*

The complexity of the educational model and the results of the studies done to the educational changes show that in order to have them operate normally, they have to go over certain stages. Using a retrospective look to Tec's experience, it is possible to identify four stages which Tec has passed during these five years of constant effort: the definition stage, the initiation stage, the implementation stage and the institutionalization stage.

#### **The definition stage**

This stage considers the time spent to figure out which direction the Institutions' efforts should have in these years. This process took shape in the mission 2005 in which the goals, directions, programs and strategies to carry out the educational model were established. The initial impulse towards the educational change was done by the Institute's Council and the team of rectors. This initial impulse was a good strategy since it assured the supply of resources needed in the process and opened a permanent dialogue which allowed to check continuously the fulfillment of the objectives, and at the same time it helped to feel more secure about the feasibility of the project, a confidence environment and a space where problems and solutions could be discussed. This stage was known and accepted by the Institution's personnel.

#### **Initiation stage**

This stage was carried out with the participation of the professors of all the campuses and of all the levels and disciplines who decided to be part of the process. The first part of the stage changed the professors' schemes and also the teaching schemes. In this stage, there were more barriers, resistance and obstacles, it was possible to advance living together with conflicts and constant effort and negotiations. These are some of the reasons that explain this situation:

- ? A great number of professors who have passed through educational innovative cycles showed indifference and considered the change

as the latest *educational fashion*. Others inferred it as a hidden message about something they were not doing correctly and those who had been working with professionalism and dedication were surprised about the change and asked themselves: *Why do we have to change if we are doing things the right way?*

- ? The educational change demands more from the professor. They have to participate intensively in training activities, in the didactic as well in the technological area. These activities alter their working pace and require time, disposition and support. In addition to this, there were fears about incorporating abilities, attitudes and value. They considered that professors' attention would divert from learning contents which are necessary for students' formation.
- ? There was no experience, neither models to follow and everybody had to learn through the process. The Program for the Development Teaching Abilities (PDHD) was being adjusted to the professor's needs, eliminating or reducing some of the activities that were not considered useful and other activities were incorporated. In this way, it was possible to identify the need to offer the professors more training in teaching methodologies and techniques, and give them a more specific orientation in their course design.
- ? There was a distrust environment when it was observed that the results did not occur as fast as they were expected and because the students did not have the desired conditions, there were technology failures and the school organization and spaces were not prepared for the new educational model. These situations were considered barriers and obstacles to implant the educational model, instead of an opportunity to improve it.
- ? An educational change which is so complex required time to be able to understand it completely. At the beginning, it was just seen partially which lead to define the educational model from isolated aspects which were given an absolute value. This erroneous opinion became an obstacle to comprehend the relevance of the whole change and also interfered in the communication of the participants. This partial perception of the educational model started a series of prejudgments and myths which are described in Figure 7.4.

Due to this situation, it was necessary to promote and keep in the professors a favorable attitude to the change. An important factor was to value and reward professors' efforts. It is difficult to have a professor value what he/she does if he/she is not given a reward, and if this is done, he/she takes risks and makes the necessary changes. During this process, this aspect was taken into account and professors were offered different incentives according to the specific context of each campus, for instance, there was a salary increase for the professors who were certified in the PDHD, the professors' workload was reduced in order to dedicate time to the process, and it was also included as an

indicator in the professors classification. For some other professors, the incentive was to keep their jobs in the Institution. Besides what has been mentioned before it can be assured that in these professors there were intrinsic reasons and personal interests in contributing to improve the education.

By the time this phase was finished , it was accepted the error as an experience to learn and to improve, it was fostered the interchange of experiences with positive results, it got to a more global understanding of which the educative change supposed, educative models were created with excellent results and the initial group became leader of the change.

### Application stage

It was in this stage where the implementation of the educational model was done. Professors' attitude was open to incorporate new methodologies and working forms. In this moment, there were educational models, and it became natural to use technology and appropriate infrastructure and the resistance disappeared.

During the application process professors have been an active group which has had to work collaboratively to negotiate and construct common meanings. They have also had to work to create organized spaces where they can carry out their activities and share them, and they have had to find support from their campuses to participate in these activities and in other responsibility.

Table 7.4 Ten myths about the educational model

Myths	Correct approach
<ol style="list-style-type: none"> <li>1. The educational change consists in letting the student learn by him/herself.</li> <li>2. In the redesigned courses professors do not teach anymore.</li> <li>3. In the redesigned courses, knowledge is not important; now it is more important to develop abilities, attitudes and values.</li> <li>4. The redesign means to work in teams.</li> <li>5. In the redesign, students evaluate themselves.</li> </ol>	<ol style="list-style-type: none"> <li>1. The redesign develops the ability to use the self-learning method under professors' guidance.</li> <li>2. In the redesign the professor teaches and facilitates the learning process.</li> <li>3. In the redesign, its main objective is to develop an ample, deep and relevant learning in the student and at the same time develop their abilities, attitudes and values.</li> <li>4. The redesign incorporates</li> </ol>

<ol style="list-style-type: none"> <li>6. The redesign is the incorporation of technology to the education.</li> <li>7. The redesign takes us to work virtually and eliminates the human interaction.</li> <li>8. The redesign is a fashion.</li> <li>9. Redesign is to put on paper every single detail done by the student.</li> <li>10. The redesign standardizes everything and eliminates professor's creativity.</li> </ol>	<p>collaborative learning activities.</p> <ol style="list-style-type: none"> <li>5. In the redesign, the student evaluates his/her learning process to make improvements.</li> <li>6. The redesign uses a technological platform to support the teaching processes.</li> <li>7. The redesign takes advantage of the technology to increase the human interaction.</li> <li>8. The redesign is an world-wide educational change which is the result of the new social and technological context.</li> <li>9. The redesign is, above all, a restatement the professor does about his/her teaching activities. The professor documents the results of this reflection and the experiences he/has had in the praxis of the redesigned course.</li> <li>10. The redesign is an educational proposal which each professor creates individually, as a result of his/her reflection, taking into account the context of the campus, the students and their social environment.</li> </ol>
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The campus directors, division directors and department directors participated more actively and assumed the leadership of the process.

### **Institutionalization stage**

After five years of having stated the educational change, it can be assured that the Tec of Monterrey has entered an institutionalization stage, although, it is done at different levels, according to each campus. It is possible to get to this stage when

the educational model is not an innovation anymore and the institution assimilates it as a structure. It considers the collective approval and the global comprehension of the change. It is distinguished because all the entities of the Institution are engaged in the process, efforts are coordinated, the processes are defined, the required infrastructure is created as well as a working structure. In addition, all the campuses have human, academic and technological resources to work independently. At this level, it is possible to develop a strategic plan and control risks. In this stage, professors use a common language which allows them to share ideas and experiences.

The director's role in this process is very important because he/she directs the plan and incorporates the innovation to the campuses operation. To assume this leadership implies to pay attention to the ideas, experiences and contents each professor has and it is through the exploration of the different experiences, ideas, values and abilities that directors and professors can negotiate their point of view of these changes and its implications and carry out the implementation successfully. (See Figure 7.6)

The institutionalization is not a final stage because it will always be innovative and it is based in a continuous improvement process.

It is expected that in the year 2005, the institution will be defined as a university where the educational models is applied with quality to all the courses.

Figure 7.6 Stages in the changing process of Tec's new educational model.

