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Change in Educational Models for Facing Challenges to Lead Students into a New Way of Learning

Iliana Rodríguez Santibáñez and Gustavo A. López Montiel

Abstract

Contemporary societies face challenges that come from competition, dynamism, and change, where people and students, in particular, embrace attitudes and practices that are different from those that their parents and teachers share. Change in educational models for facing those challenges implies a different know-how and also different abilities that teachers have to develop, in order for them to lead students into new way for learning. What kind of transformational and integrative leadership is needed for professors to create conditions and abilities that will help their students to face the challenges for the future in a developing country? In this chapter, we aim to provide proof of how the most important private university in Mexico, the Tecnológico de Monterrey, has changed not only an educational model but also an inspiring and transforming leadership-oriented model for teachers for change. Projects and new teaching abilities are needed, but also a sense where the professor gets a more flexible role, contributing for creating and working with scientific knowledge.

Keywords: education, challenges, transformational leadership, innovation, abilities, knowledge

1. Introduction

In the modern world, an acceleration of the history is produced as part of advancement and technological innovation. Different business models of technological basis, which main asset is knowledge, have arisen to generate and satisfy new consumption habits (Uber, Airbnb, Apple, Amazon, Facebook, Google, etc.,) up to political changes, product from the pressure reached by movements in the social networks (the Arab Spring or the Jasmine Revolution in 2010).

In the educational field, technological innovation represents different challenges, since it is in this field where changes are generated for the future, those that accelerate history and the progress of people.

A first challenge in the educational models is that in this field the change is slower; for the generation of new knowledge, rational or scientific explanations are sought; based on the experimentation and in the scientific knowledge, rationality is sough as opposed to traditionalism [1].

Rationality implies not only the generation of knowledge but the skills, in order to be useful and innovative in the daily life. The reason for changing the mentality from traditional to innovative, is to assess the change and the opportunity of progress for a society. Which is the main challenge of any education model.

The most notable example of change through an innovative mentality in the educational model is the one accomplished by countries such as Singapore, Taiwan, and South Korea, which have incorporated other institutions in addition to those of the state, to participate in the process of training of skills in the students. With this they have accomplished in a generation what other developed countries have done in three generations [2].

The scientific knowledge seeks explanations to find solutions, for which another challenge is that the professors and students, whether digital migrants (baby boomers and X generations) or digital natives (millennial and Z generations), understand that the technological innovation, which is the product of this knowledge, must stop being a threat for the first ones and an end for the second ones.

The technological innovation and the training of skills in the students are the way of progress. Contrary to the traditional mentality, the mentality of technological innovation assesses the change because it assesses the progress [1].

The change in the educational model will come from the leadership assumed by the professors as well as by the students. A true transforming and integral leadership [3] can expose students to their own reality, and make them responsible of their situation and motivate them to resolve increasingly difficult. This leadership will rule out the false leaderships that prevent them from seeing the reality, since the true leadership faces people with the reality of what is happening and allows them to adequately approach the change and the values, habits, practices, and priorities to deal with the threat faced by persons day by day [3]. The traditional definition of "showing the change" or "making people follow you" is overcome since they are not sufficient in a complex world such as ours [3].

In this chapter, the challenge assumed by one of the most important private universities in Mexico, such as Tecnológico de Monterrey, is presented, to face the change and defy the traditional education model, through a new innovative educational model, the Tec21 model, that seeks to transcend through the bloom of the human being.

2. From encyclopedism to the digital era

For John Locke in *An Essay on Human Understanding*, Francis Bacon in his *Novum Organum* and his aphorism on the interpretation of nature and the kingdom of man, and Descartes and his *Discourse on the Method*, knowledge has several appreciations in accordance to the philosophical positions held. However, although these thinkers maintain philosophical differences, as well as those held by the classical philosophers such Aristotle, Plato, or Socrates, the common aspect among them is the direct or indirect search from the different valuations of reality, to accomplish a method for the development of knowledge.

Knowledge is mainly facilitated or transferred to students through traditional education models, forged since ancient times, the Romanticism, Humanism, the Baroque, and the Enlightenment period up to the contemporary education. But it is specifically during the Enlightenment that the encyclopedism of the eighteenth century is born with intellectuals such as Denis Diderot and Jean d'Alembert, who accomplished the systematization of knowledge through the encyclopedia. It is the first attempt to compile knowledge in an orderly manner. The second attempt of

large compilation of information and knowledge, arrived with the Internet through multiple platforms and technologies that allows us to have several times more information at hand.

However, after more than 400 years, the educational model had to evolve before the digital era, which generates in similarity the encyclopedism, an infinite basis of knowledge and information.

Since the conformation of the lecture halls or classrooms, up to the teacher's role, who at times is the center of the class, the axis around which the students acquire a knowledge, the educational model faces new forms of learning by the skills developed by new generations.

With the birth of tablets and cell phones, currently the information is at the reach of all within seconds through mLearning or mobile learning [4] or education "on the go." The digital libraries advance in the digitalization of books and materials useful for the generation of new knowledge, trying to disclose the current knowledge and allowing access to more persons. The limits of learning are expanded at any time and in any place.

Professors are currently obliged to transform their traditional techniques and to go from the blackboard to the projection or creation of interactive or multimedia contents and to maximize the use of tablets and cell phones inside and outside the classroom, to accomplish the objectives of learning through the development of skills not only in the use of technological tools but from other skills such as information literacy (IL) that imply a set of rational skills to locate, evaluate, and use effectively the information needed. The IL forms skills related to critical thinking. Currently, several programs in universities and colleges in the USA, England, and Australia have included IL and technology as formal processes in their educational models (they have credits or certifications within their programs) [5].

Including the digital social networks, information is maintained that can motivate creative processes and generate new knowledge. Networks, such as Twitter and Instagram, are playing a significant role in education. More and more professors seek an advantage from these networks outside the classroom, to reinforce the learning of their students, considering that with this their motivation, participation, and level of achievements in their learning will be increased [6].

This represents a challenge in the educational models, since not only innovation is considered for the use of technologies but the didactics, pedagogic changes, or reform and the teaching-learning processes.

3. The innovation as a transformer process in the educational model

The educational innovation involves an absolute transformation of the behaviors and supplies of the teaching process. The change of methods, contents, and materials is impacted by the historical context of the epoch; the twenty-first century is the one with the greatest exploitation of the great scientific and technological advances, developed as of the second half of the twentieth century.

Currently, four types of innovation can be identified and could influence the educational models: (1) Disruptive innovation that impacts the entire educational context. Its impact allows a lineal evolution of teaching-learning process, method, or technique. The structure of the educational context is totality modified, changing the actors that participate in this process, from those that manage an educational model to those who perform it and live directly (professors and students). (2) Revolutionary innovation that reveals new applications of knowledge under a fundamental change in the teaching-learning process and in the existing practices.

It does not modify a context in educational matters, because it is created for the first time, with this type of innovations. (3) Incremental innovation, unlike the previous, departs from a previous structure. It increases or improves the existing processes, methods, or strategies. (4) Innovation for the continuous improvement impacts through partial changes any of the elements of educational innovation, without altering in a relevant manner the process [7].

3.1 Measurement of innovation in an educational model

Educational innovation comprises different aspects of the educational model, for which it is necessary to identify the total or partial process, in which the innovation will be carried out, and what are the advancements achieved with its implementation.

A challenge for the educational institutions is the design of frameworks of reference or of performance, focused on the evaluation of the projects of educational innovation that measure the impact and promote in the process of teaching-learning the specific actions for an effective transformation of the educational model.

It is not only evaluating but identifying the result, through specific instruments during the implementation, development, and execution of the educational model. Then the forms of specific evaluation will come.

An institution that has generated a framework for an innovative educational model with these characteristics is Tecnológico de Monterrey, which is positioned on the top 50 best private universities of the world and number 1 in Mexico in the QS World University Ranking [8].

Initially for the evaluation of innovation projects, the academic community of Tecnológico de Monterrey created the "i Scale" together with an international counselor which was Pearson Education. The first intention of the focus of this collaboration was to create a common vocabulary in educational innovation matters, which would allow to discuss, support, and improve the efforts of innovation in the teaching-learning process. This i Scale also covers the innovations in the teaching techniques and methods up to projects that imply the inclusion of new technologies [9].

The i Scale has four main elements: (1) the reference framework with the criteria and the theory construction that supports it, (2) the methodology and the rubrics for the evaluation of projects, (3) the example instruments to obtain evidence from the established criteria, and (4) the technological platform that enables all of the previous elements.

The reference framework departs from five criteria and sub-criteria that allow knowing and evaluating in conjunction the criteria. The sub-criteria is formulated as questions to know the status of the project and their relationship to the criteria; the evidence presented for each answer are a concrete form of measuring the progress on each one of the key areas of the reference framework. The five criteria fixed in this model are the results of learning, the nature of innovation, the potential of growth, the institutional alignment, and the financial feasibility [9].

The methodology used to evaluate the projects is qualitative, through the presentation of the evidence by its authors, for its subsequent discussion in a group or collaborative manner that leads to justified answers of the decision, on each of the criteria mentioned.

This takes consideration the design of roles in the evaluation of the i Scale, where three actors involved participate: (1) the author or responsible of the innovation, (2) the members of the team, and (3) the evaluator peer. To evaluate, this methodology uses a scale of four colors that indicate the advancements based on the evidence shown in the project that pursuant to these determine the

code of color (red, amber-red, amber-green, and green). The evaluation system is positive or constructive, since it does not qualify but clarifies the areas of opportunity, indicating on what part is required to improve to achieve an effective innovation [9].

This methodology of the i Scale is useful to measure the achievements of an innovation project but also to generate other frameworks that allow to measure the innovative educational models. It cannot advance toward a paradigmatic change of the education if the bases are not given for its follow-up, continuity, and evolution.

4. The educational model Tec21 of Tecnológico de Monterrey

Tecnológico de Monterrey was created in 1943 in a convulsive time in the national and international level. In the national level, Mexico maintained complex conditions provoked by the aftermath from the political and social adjustment after the Mexican Revolution of 1910, while the international level was stilling living the Second World War.

In that environment, a group of businesspersons, headed by Engineer Eugenio Garza Sada, initiated an educational project that sought to foster the development of qualified staff to satisfy the demands from the Mexican industrial sector. Such initiative allowed the birth of a nonprofit organization of superior research and teaching, to motivate professional and technological studies of its alumni. These were the basis for the subsequent creation of Instituto Tecnológico y de Estudios Superiores de Monterrey, known as Tecnológico de Monterrey, today a leader educational institution in Mexico and Latin America.

Tecnológico de Monterrey was the first university in Mexico to have an Internet node on October 12, 1988, when the first Internet connection was achieved from Mexico, between the Monterrey campus and the School of Medicine of the University of Texas, at San Antonio [10].

Its educational model anticipated to other models by using satellite signals to transmit in real-time courses and conferences, through the virtual university and education at distance programs. It designed courses with multimedia resources in digital platforms such as Lotus LearningSpace, Blackboard, BlackBerry (mobile telephones), and other innovations applied to its educational model, having today in some courses tele-presence with holographic effect. This institution, with study programs of high school, professional, and postgraduate, bets on the use of new technologies as learning tools, own characteristics of its educational model.

In the last decade, it was advanced toward the Tec21 model in force in August 2019 and seeks the training of proficiencies of graduation, solid and integral, that help the students to resolve in a creative and strategic manner the challenges of the present and the future.

This model is based on a syllabus formed by three types of training units: (1) the courses, (2) the blocks, and (3) the Tec Weeks. In a block the student faces a challenge linked with reality, to involve their 100% in their learning, through the interest and motivation. The model allows some of the training units previously mentioned to have a team of at least three professors that work collaboratively, to ease its learning and evaluation through the proficiencies achieved. In some parts of this process (the challenges), trainer partners participate (guests from the business sector, public or private) that follow up the solution of the challenge or problem raised [11]. A challenge is an experience designed to present to the student a defiant situation of the environment to accomplish specific objectives of learning.

From there the importance of professors and their links with trainer partners is to bring closer students to reality, with the possibility of generating a professional experience from different learning spaces.

The model keeps four characteristics: it is defiant, flexible, and memorable and has an inspiring faculty.

Searching for solutions to different problems in real environments, will allow students to think about the opportunities and alternatives to apply their knowledge and proficiency to resolve them. With each challenge during their career, it is expected that the student forge abilities to lead and launch. It is also expected to generate conscience and commitment, to accomplish greater conscience and commitment with the construction of a better world.

The flexibility of the Tec21 model rests in the possibility that the student lives a flexible educational experience because their program of studies will reflect their interests. A mentor will guide them in a personalized manner since their registration up to the time of graduating. They will also have the support from specialized counselors to take advantage of their study program, in accordance to their capacities and interests or personal and professional passion. He (she) will not be alone; the educational model is designed to accompany them in their student career. The memorable characteristic is that the student will be accompanied by an area that will include in its student development recreational, cultural, and sports activities that seek the equilibrium and practice of healthy lifestyles. The intention is to explode the talents of the students [12].

The fourth characteristic of the Tec21 model is having an inspiring faculty, to have leader professors that transform lives. The existence of the transformational leadership should be shared between executives and professors, to generate an integrated form of leadership and impact in the school performance that should be measured to know the quality of the didactic or pedagogical techniques to be able to know the achievement of the students [12].

The professor is a transformer leader when he (she) inspires the change and has influence through their example, in the behaviors or activities of their students and colleagues, with which they attain assertiveness for the collaborative work toward a common goal.

In the Tec21 model of Tecnológico de Monterrey, this transformer leadership departs from the experience and knowledge of the professor that allows them to create challenging activities that foster the development of skills in the students, not only disciplinary but transversal.

The disciplinary proficiencies respond to the knowledge, skills, behaviors, and values necessary for the professional development, acquired under specific knowledge, while the transversal proficiencies are developed along the process of training of the student during its entire career, giving them useful skills in their life and influencing the quality of the exercise of the profession. The type of transversal proficiencies obeys the generational profile of the students and the employments of the future, those required to face new realities.

These transversal abilities will allow the students a more solid projection in their personal and professional life; they are the result of maturity and transition of those abilities observed in other syllabus of this institution and allow to observe new transversal abilities such as the following: (1) The self-knowledge and management that implies personal and professional well-being, after the emotional and intellectual responsible reflection, generate in the students greater self-esteem. (2) The innovative entrepreneurship to give innovative and versatile solutions in changing environments and with a social impact. (3) The social intelligence to create effective environments of collaboration and negotiation in multicultural contexts. There is revaluation of the multiculturalism and appreciation to other cultures.

(4) The ethical and citizen commitment focused on the common well-being, the ethical consciousness, and the social responsibility. (5) The reasoning to face the complexity integrates different types of reasoning in the analysis, before the problems. (6) The communication: the student uses different languages, resources, and communication strategies, in accordance to the context and in an effective manner, in its interaction in professional and personal networks. (7) Digital transformation optimizes solutions to the problematics of its professional field with the intelligent incorporation of digital technologies of avant-garde [12].

The disciplinary as well as the transversal skills not only require the good disposition and interest of the students in this Tec21 Educational Model but fundamentally professors that compose an inspiring faculty, through four essential characteristics: (1) Inspiring: the professor is respected and admired by his(her) students and colleagues and motivates and demands the student to make their best effort and to comply with their commitments; he (she) is a positive influence inside and outside the classroom. (2) Updated: the professor is constantly renewing their disciplinary knowledge and participates actively in academic and professional activities, to enrich their teaching practice with new contents, methods, and pedagogy techniques. (3) Linked: the professor participates actively and formally in its professional field, enriching its teaching activity and transmitting to its students the application of its knowledge in real contexts. (4) Innovative: the professor creates and implements strategies or original and varied pedagogics resources, which renew in a flexible manner in accordance to the profile of its students, with the purpose of facilitating them on their learning. (5) User of information technologies: the professor effectively incorporates the use of technology as a tool for the implementation, evaluation, and improvement of the teaching-learning process, in accordance to the context and the resources available in its field [12].

The challenge is not only for the students but also for the professors that regardless of the generation and resistances that they could have, they should add to the change which is the constant of this century.

Now then, in the i Scale as reference framework for the evaluation of projects of educational innovation, the actor participants in the process of implementation and evaluation were observed which are necessary for the measurement of the effectiveness of an innovation project. In the case of Tec21 Educational Model, mechanisms are also created for its implementation, follow-up, and academic quality assurance.

For purposes of implementation, follow-up, and improvement, mechanisms are created enablers of the Tec21 Educational Model that are formed by the academic communities of professors in permanent dialog, interacting by careers or areas of knowledge. The educational innovation drives processes for the improvement of didactic techniques and the performance of institutional initiatives that foster aspects that complement the Tec21 Educational Model. Other relevant mechanisms for the performance of this model are the educational spaces that without a doubt break the traditional model of passing from the professor in front to the professor among the students.

An environment of horizontal communication is created instead of a vertical one, and the dialogue and the fertile discussion is propitiated. This is accomplished through lecture halls or classrooms, with movable or not fixed furniture that allow to order the classroom in accordance to the activity developed. The link with the environment is another enabler mechanism that allows the interaction of the student with companies, institutions, and organizations, through the design of projects. This allows the students an experiential knowledge, similar to the one generated in the professional field. The students will have the opportunity of peeking into the work life, as part of their training process [12].

The Tec21 Educational Model breaks paradigms and defies professors and students, to teach and learn differently, in the search of new horizons for the application of its skills and knowledge, oriented to resolve challenges or complex real problematics.

The scope of this new model will be measurable in two moments: first during the progress achieved by the students throughout their studies and then after graduating from the university and creating and inserting successfully in innovative or highly productive sectors for the country.

It is important to say that every educational model has limits. Being aware of those limits is important in order to know what we can do and what we cannot do with it. Competencies are relevant because they are complex in terms of the mixture between conscious knowledge and its instrumentation to solve real problems, by using values and intentions as guidance. The most important limit is that a model based on competencies is not compatible with the most current educational models that work around the world, and that sets the standards for education and its relationship with the economy. Such a model requires strong educational objects that create significant knowledge but also scenarios for its instrumentation. If we are not careful with projects, activities, feedback, and proper evaluation tools, we can fail in the intentions set up as the most important goals in the model.

5. Conclusion

The change in the educational models to face the challenges to lead students to a new form of learning is strongly linked to apparently external aspects, such as the use of technological tools, the sociological characteristics of the generations of students of this century, the space where the educational model is developed, and the context in which they are developed.

A new educational model should consider the scope desired to achieve, as of the type of innovation required to implement. For it the design of the framework of performance, or methodology, is necessary to assure the objectives of any educational model desiring to develop.

It is important to make a change in the education traditional model, recovering from the same the best experiences, to make way for new and innovative educational models.

This new educational model should prepare the students for the currents acts, but also before realities not yet known, and which prospective indicates that the digital era soon will be surpassed by artificial intelligence.

The professors should be adapted rapidly to the changes suffered by the educational models in greater or lesser extent. Professors are the central axis in the learning of a student, for which they should be ready for change. They have to anticipate unexpected situations through the prior preparation and especially to be open to the dialogue between colleagues of other disciplines.

The assertive communication and the emotional intelligence are skills, in many cases, natural in a professor, but when they are not, their development should be procured.

The transformer leadership of the professor in the change of educational model will come from the leadership assumed by the professors as well as by the students.

This type of leaderships faces students with the reality, but in a directed or guided manner by the professor, giving them trust in regard to the future, making them more responsible of their situation upon making them aware of the need of resolving increasingly difficult challenges, to achieve the common well-being.

The case of the Educational Model of Tec21 of Tecnológico de Monterrey in Mexico shows an institution that historically has learned to successfully adopt to the changes rapidly and has assumed the challenge of surpassing traditional education models, by innovative models, to guarantee a sustainable educational model and of quality, based on the acknowledgement that the best is yet to come.

Acknowledgements

Conflict of interest

The authors declare no conflict of interest.

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