

# Measuring Lean and Effective Educational Administration of Curricula in México

**M. G. López-Molina**  
**Universidad Iberoamericana, Puebla**  
**Puebla, México**

**B. Reyes-Guerra**  
**Tecnológico de Monterrey, Campus Puebla**  
**Puebla, México**

**Pablo Nuño**  
**UPAEP**  
**Puebla, México**

## **Abstract**

In Puebla México, there are more than two hundred officially recognized higher education institutions, enrolling more than forty thousand students. This educational explosion has produced a very difficult condition to assure quality of education, in a social environment where the economical factor is the main criteria for decisions for most institutions.

Education quality rests mainly on part time professors' competence for facilitating curricula. Professors teach in different colleges, therefore the integral quality of educational curricula depends mainly on the college's execution, innovation, communication and competitiveness capacities. A model including these four dimensions has been developed as a research vehicle.

Most curricula administrators believe that their decisions have a direct impact on the educational act, when in fact most of the time they have sustainability in mind; our research shows that the significance of such decisions is not perceived as pertinent. Pertinence has to do with the significance of the educational act for the learning process whereas sustainability ensures the economical health of the institution.

This work is based on a multiple criteria decision model, using data obtained from different colleges, and proposes a decision control panel that graphically shows the impact of the decision, allowing the curricula administrators to understand its influence on the educational act, therefore assuring a lean and effective education.

## **Educational context in Puebla**

The State of Puebla is the second federal entity in regard to the number of private colleges in Mexico. It has become the recipient of students of the Mexican southeastern states and Central American countries, mainly due to the cultural tradition and economical development throughout the twentieth century of the capital city, named after the state.

In particular, in the city of Puebla, with about 2 million inhabitants, located 80 miles southeast of Mexico City, something astonishing has been happening with regard to education within the last fifteen years. Many entrepreneurs viewed an opportunity in the educational industry as a profitable business, resulting in the opening of more than 200 private higher education institutions, with an enrollment of more than 45,000 students in the city of Puebla in 2007.

It is clear from the above situation that, even though there is a market for an educational industry, both in terms of school enrolment and employee hiring, the quality of education is being jeopardized due to the constant financial worries of most educational administrators, therefore producing a complicated situation for sustainable development when trying to balance educational quality and financial health.

A vast majority of the higher education institutions are family owned operations and most of the directors are well intentioned professionals that care about the quality of the learning process at their schools. However, their main concern usually spins around the financial sustainability of the operation and it is very difficult for them to understand that a decision might be perceived only as administrative with little or negative impact on the educational act. “Administrators, faculty, and staff must avoid the trap of viewing higher education as a special case where Lean does not apply”, Emiliani (2005).

It is important to remark that there are excellent small colleges next to schools with questionable quality, so it is believed that a lean perspective in handling small private higher education institutions is imperative and possible if proper and assertive controls and reports are conveyed to decision makers to harmonically balance educational pertinence and financial sustainability. Such perspective is the core issue of our research.

### **Implications for social development**

At the end of last century the formal higher education in Mexico became important for youngsters because it represented a sure and sustainable way of having an income, as well as being a fast method of climbing the social ladder.

Puebla is located in a strategic position because it is in the continental midway of the Atlantic and Pacific oceans which is important for the European - Asian commercial trade. Puebla is an important settlement that connects Central America with Northern Mexico, the United States and Canada. Puebla is considered to be the driver of the economy between the Puebla - Panama corridor due to its location and the importance of the automotive cluster industry, manufacturing sector and service driven industries.

Historically, Puebla has been a multicultural melting pot combining indigenous cultures with Spanish, Lebanese, Italian, German, French and recently Asian cultures. The community is rich in traditions and at the same time flexible in tolerating differences. The overall social, educational, geopolitical and economical context of the State of Puebla could become an excellent opportunity to catapult the economy of the country with the aid of lean higher education institutions.

Globalization, information and communication technologies as well as industry automation are factors that have accelerated social change which have created the need for entrepreneurship and enterprising in baby boomers, X and Y generations, therefore imposing education as the main leverage for social growth and development. This is demanding a completely different kind of higher education institution for the developing third world.

## **Lean Educational Enterprise Framework**

The educational change should be based on lean principles and practices and their application in higher education. The lean message will have to be conveyed to small higher education institutions since less add up to more. In other words, they will have to reduce decision times, costs and organizational layers in order to empower employees and students to increment productivity, quality and satisfaction and have a long term competitive success.

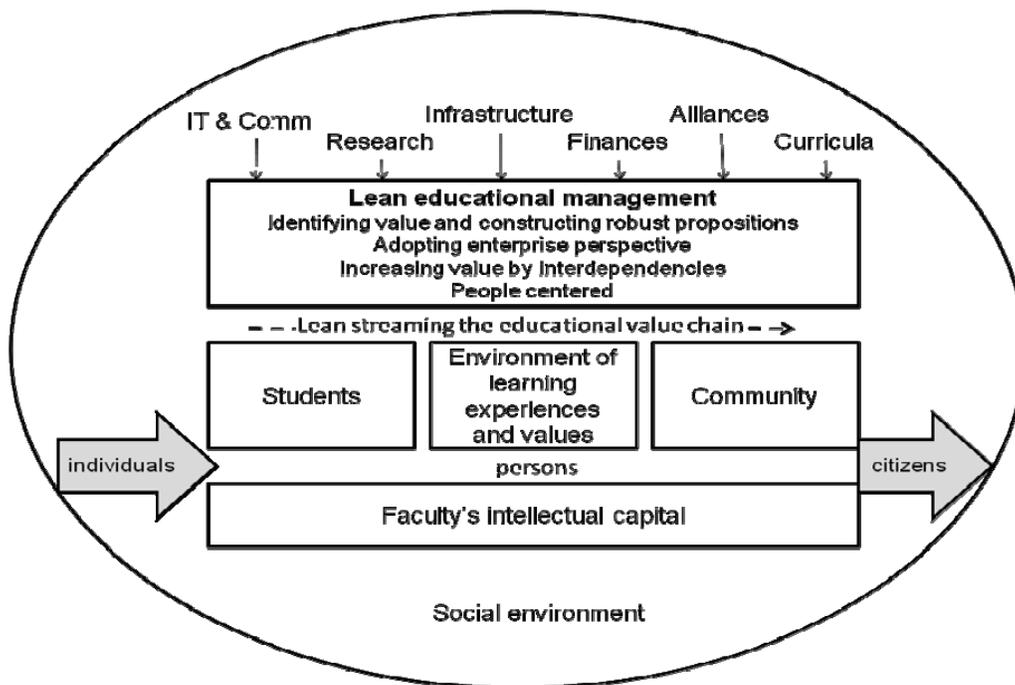
The lean principle of creating value by doing the job right and by doing the right job should be reflected in education by having an emphasis in learning rather than in teaching, and by using the prosumer concept (a customer who participates in his own service or order fulfillment). This means that the content and learning experiences should have an important priority and significance for students, therefore the program should be flexible enough so that learning is attained by the lean principle of pull rather than by pushing content. The lean concepts applied in this work are summarized in Figure 1.

In lean management, value can be delivered only after identifying the stakeholder's value and constructing robust value propositions. Stakeholders in higher education are students, alumni, trustees, employees, employers, and society in general, since all of them will benefit in terms of the entrepreneurship built by the construction of value added activities chosen by the apprentice himself. This is what is called an extended lean enterprise.

We are adopting the lean enterprise definition by Lean Aerospace Initiative 2001 "A lean enterprise is an integrated entity which efficiently creates value for its multiple stakeholders by employing lean principles and practices." This can only be achieved by adopting holistic enterprise perspective in which the student interests in his or her plan of study are aligned with society needs.

The previous principles demand special emphasis in linking the educational program with the strategic interests of companies and government. In other words, the educational administrators should address the interdependencies across enterprise levels to increase lean value. The center of decisions should be people, not just processes; therefore the organizational infrastructure should revolve around dialog and networking.

Creativity and innovation as educational outcomes will have to coincide with efficient management to induce the learning community to become strategic and socially compromised innovators.



**Figure 1. Lean Educational Enterprise Framework**

The main lean components of the educational enterprise framework consist of the lean educational management, the educational value chain, the faculty's intellectual capital and supporting elements which include information and communication technologies, research, infrastructure, finance, alliances and curricula. All of them embedded in the social environment.

The educational value chain is viewed as composed by the apprentice, situated in an educational environment, interacting socially with purposely designed learning experiences and transcendental values. We conceive lean streaming the value chain as the basis of an assertive outcome to social environment including flexible, interdisciplinary and innovative curricula in order to be responsive to change and established effective relations.

By developing a lean curricula in this way, a student, acting as a prosumer, could adapt his/hers plan of study according to the skills, preferences and market needs to suit his/hers particular situation with the aid of an adviser. If a student desires to combine mechatronics and medicine which in the past could seem very rare, nowadays it is important to make it possible by having a flexible curriculum. The school's infrastructure, like library and labs is perceived as a necessary support to the educational act.

In our lean educational enterprise framework, the financial component should be standardized and is essential for sustainability. For developing countries the tuition and fees are very sensitive due to the low income per capita and few scholarships in the country. A

little increase could mean a lot less students. Lean management should be attained also by indexing infrastructure operations to guarantee five “s” in processes.

A fundamental component of the framework has to do with valuable applied research which should be designed, developed and implemented in an interdisciplinary way in order to achieve integral innovative solutions to today complex problems. Facing research from a single perspective might miss critical strategic issues guiding to misleading solutions.

In a global world, national and international alliances are critical for the success of any educational endeavor. Besides the traditional student exchange programs where the student is the basic recipient of the experience, the framework considers necessary a much closer collaboration between institutions, which could be accomplished by having dual degrees programs. These programs provide student participants from each institution with an opportunity to study in and benefit from the academic and cultural environment of the other institution. For each degree, the student will have a “home” institution that awards the degree, and a “host” institution at which the student studies abroad, taking courses in partial fulfillment of the “host” institution degree requirements. This fosters international understanding, academic cooperation and interdependences which provides the means for new value propositions across the educational value chains.

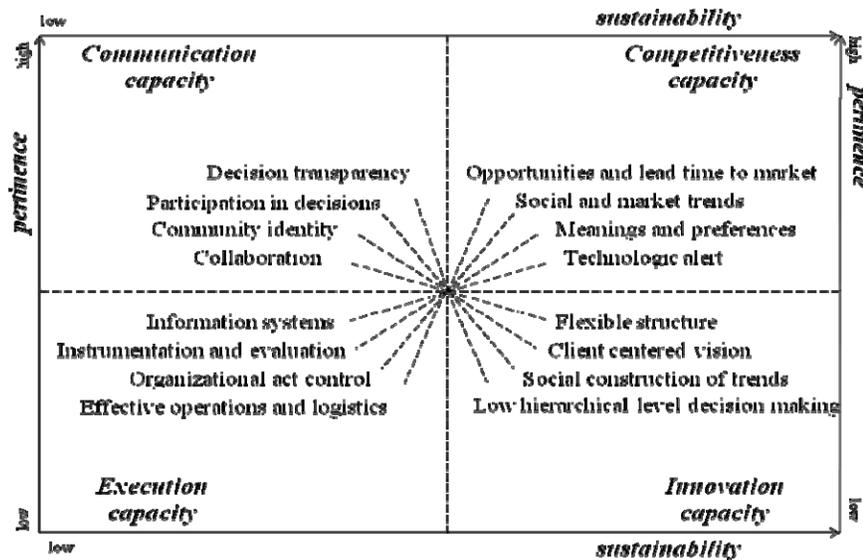
It is convenient to have a network of higher education institutions, to facilitate the cooperation between them. In the context described earlier, about the educational situation in Puebla, the bottleneck in the system is the qualified faculty available for a given course. Frequently, some colleges share the same professor for a similar class. The lean educational enterprise framework considers information and communication technologies to facilitate and streamline the delivery of these courses, without jeopardizing quality.

The evaluation of the lean educational enterprise framework is accomplished by the use of the lean educational management model described in the next section.

### **Lean Educational Management Model**

In colleges in Puebla, education quality rests mainly on the part time professors for facilitating curricula. Lean principles are scarcely used by these institutions, even though their main concern is in financial sustainability and quality is rarely used as a decision factor.

In order to provide a simple change management approach to drive them into the lean management concepts, a model is designed using four dimensions that are conceptually related to the lean principles: execution, innovation, communication and competitiveness capacities. Execution is related to minimal waste and assertive educational value activities. Innovation is related to respect to people and value propositions in learning environments. Communication is the basis for significance negotiations, enterprise perspective and consensual ethics. Finally, competitiveness is related to the capacity of addressing interdependencies across enterprise levels, peers and employers to increase lean value. The lean educational management model shown in figure 2 considers these dimensions as the basis of the research vehicle.



**Figure 2. Lean Educational Management Model**

The school owners-administrators main concern is the financial sustainability and since the intellectual capital is supplied by the academic community, most of the leeway resides in the structural capital of the institution. The structural capital is conceived to have two perspectives: pertinence of the programs and sustainability, which will be the basis of analysis for the four dimensions.

Pertinence refers to the significant acceptance of the academic programs and services delivered by the institution required by all stakeholders, including students, faculty, hiring entities, and society in general. Sustainability is related to the assurance of the financial recurrence needed to assure the quality of the institutional deliverance.

The lean educational management model uses the pertinence and the sustainability perspectives because they interact with the four dimensions of the educational act. It is of vital importance to discriminate whether decisions are perceived to have an administrative or an educational perspective in order to develop a proper analysis for decision making.

The first dimension is the execution capacity which is the threshold that any institution needs in order to have a quality certified educational act without losing sight of the sustainability of the program. The execution capacity has both educational and administrative perspectives that should not be confused.

In order to guarantee pertinence, while keeping the program sustainable, it is imperative that the institution develops the will and the ability to communicate with the internal and the external community. This communication capacity, the second dimension, has to be based in a strong belief of consensual ethics; communication allows the sharing and conciliation of meanings permitting a multi perspective vision in a synergic tending community, therefore building community identity.

The third dimension, innovation capacity, complements the execution dimension of the institution in order to attain sustainability and at the same time assuring pertinence. Innovation refers to the ability of creating new ways of influencing learning in harmony with today way of living. It should include the ability of breaking paradigms to provide better, faster and more significant services in both the educational and administrative aspects. As an example, flexible curricula suited for each student has resulted in a very successful strategy for some colleges.

The competitiveness capacity is the fourth dimension of the model, with a contribution both to pertinence and sustainability, which demands an educational administrator to be aware of tendencies in other recognized institutions and to have prospective information in terms of demography expectations and financial capacity of markets. As an example, it is clear that aging societies will demand geriatric education as well as entrepreneurs training.

Every dimension is composed of several attributes and characteristics, shown as spokes in each dimension, in order to evaluate the perception that the community has on decisions. These spokes are the result of inquiries with the community; therefore it could vary from institution to institution and from time to time. The main attributes and characteristics appear in figure 2.

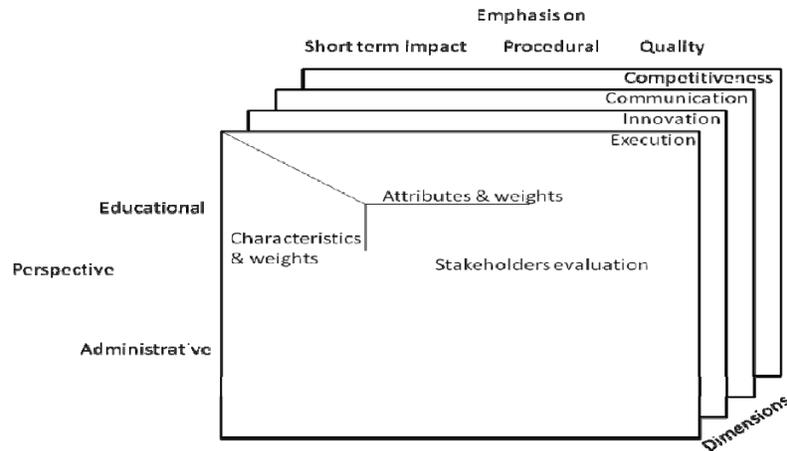
Execution, communication, innovation and competitiveness are the main dimensions that should guide decisions in higher education institutions with the purpose of assuring quality and the continuous flow of experience. This in turn, will feed the efficiency and effectiveness of the educational act contributing to the alignment of practices, processes and the construction of trends according to Bossidy L., Ram C. (2002).

The lean educational management model effectiveness resides in the ability of the owners-administrators to balance the administrative and educational decisions by reinforcing and developing these four dimensions. Attaining the appropriate balance represents by itself a continuous improvement context, providing an organizational atmosphere centered in the student learning processes.

## **Model Operationalization**

In order to measure performance in institutions and compare across higher education, the lean concepts should be divulged and the four dimension model implemented as a standardized tool to integrate educational industry information.

A matrix relating characteristics and attributes is used to concentrate the evaluations of the community. A simplified version of the matrix is shown in figure 3.



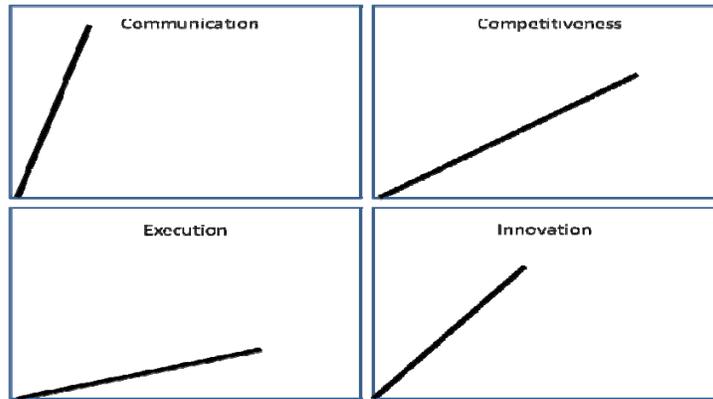
**Figure 3. Characteristics - Attributes Matrix**

A stakeholder is asked to fill out a questionnaire designed to weight the attributes of each dimension and the characteristics for each perspective that will serve the purpose of analyzing the whole decision making process to provide value propositions. The results can differ from time to time and for each institution since they reflect the intrinsic strategies, priorities and expectations. Each attribute and characteristic has been divided into items that are relevant for the educational act.

Additionally, the community is asked periodically to evaluate the college performance for each item which is ranked by the community on a scale based on lean performance according to its assertiveness in terms of stakeholder value, enterprise perspective and interrelations.

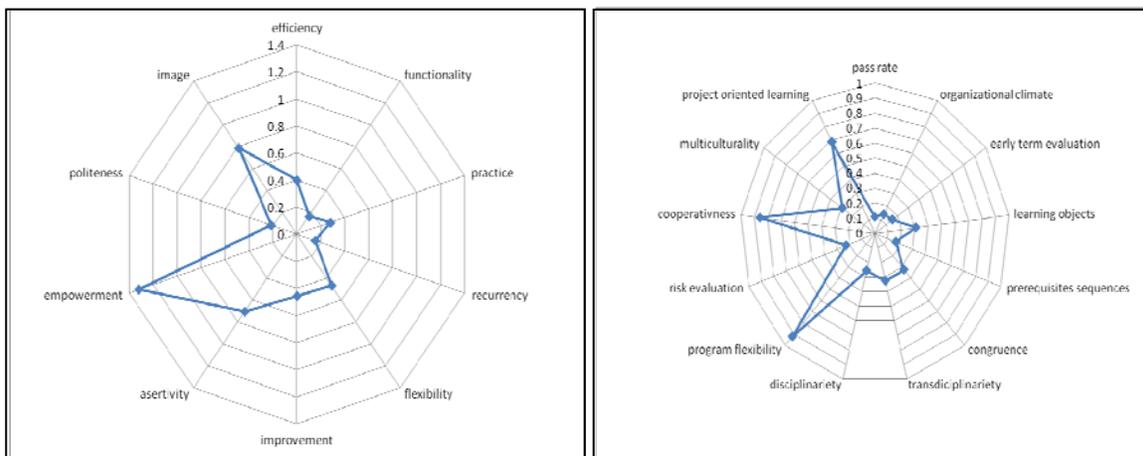
An educational act control panel has been designed in order to provide an integral insight of how the owners-administrator strategies are perceived in terms of value. The slopes of the graphs for each dimension are shown in figure 4 and correspond to the administrative or educational emphasis. A line at 45 degrees would show that administration and educational perspective are in balance. If the line has a vertical tendency, it reflects educational emphasis with less focus on administrative issues. A horizontal tendency shows the opposite.

The analysis of the four dimension lines will allow the decision makers to offline “dialog” and have a method to respect people and reflect the community perception of the educational act; therefore being able to design or test new educational value proposition strategies that could maintain the operational health as well as a learning apprentice community. This communication trend will allow the stability of the community reinforcing its identity, meanings and its social learning capacity, according to Wenger, E. (1998).



**Figure 4. Educational Act Control Panel**

An algorithm based on Zeleny (1982), is then used to determine the prime emphasis of decisions, such as being centered on the short term, procedures, or quality issues. This algorithm diagnoses the resulting emphasis of the community’s perception or it can be used to evaluate possible strategies in terms of its leanness. An example of resulting trends is shown in figure 5.



**Figure 5. Alternative Educational Strategies**

The figure in the left reflects the long term administrative perspective of a given strategy, and shows a distinctive tendency towards empowerment and image, while the figure in the right, which corresponds to educational perspective, shows a long term trend in program flexibility, teamwork and project oriented learning.

### **Final discussion**

Institutions will have to include lean principles in order to be flexible, offering continuously learning experiences that are pertinent in a dynamic technological and financial environment. Continuous improvement and evaluation, based on the community perception, could help diagnose the trend of decisions using this research tool. The integral nature of the diagnosis provides an important insight that could help the decision makers to

comprehend the trend imposed on the educational act. It also provides the criteria development so quality depends on each and every level of the organization. The weighting of decision characteristics permits the evaluation of possible strategies, allowing the community to lean manage the strategic importance of education as the basis for the construction of future.

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