

Report

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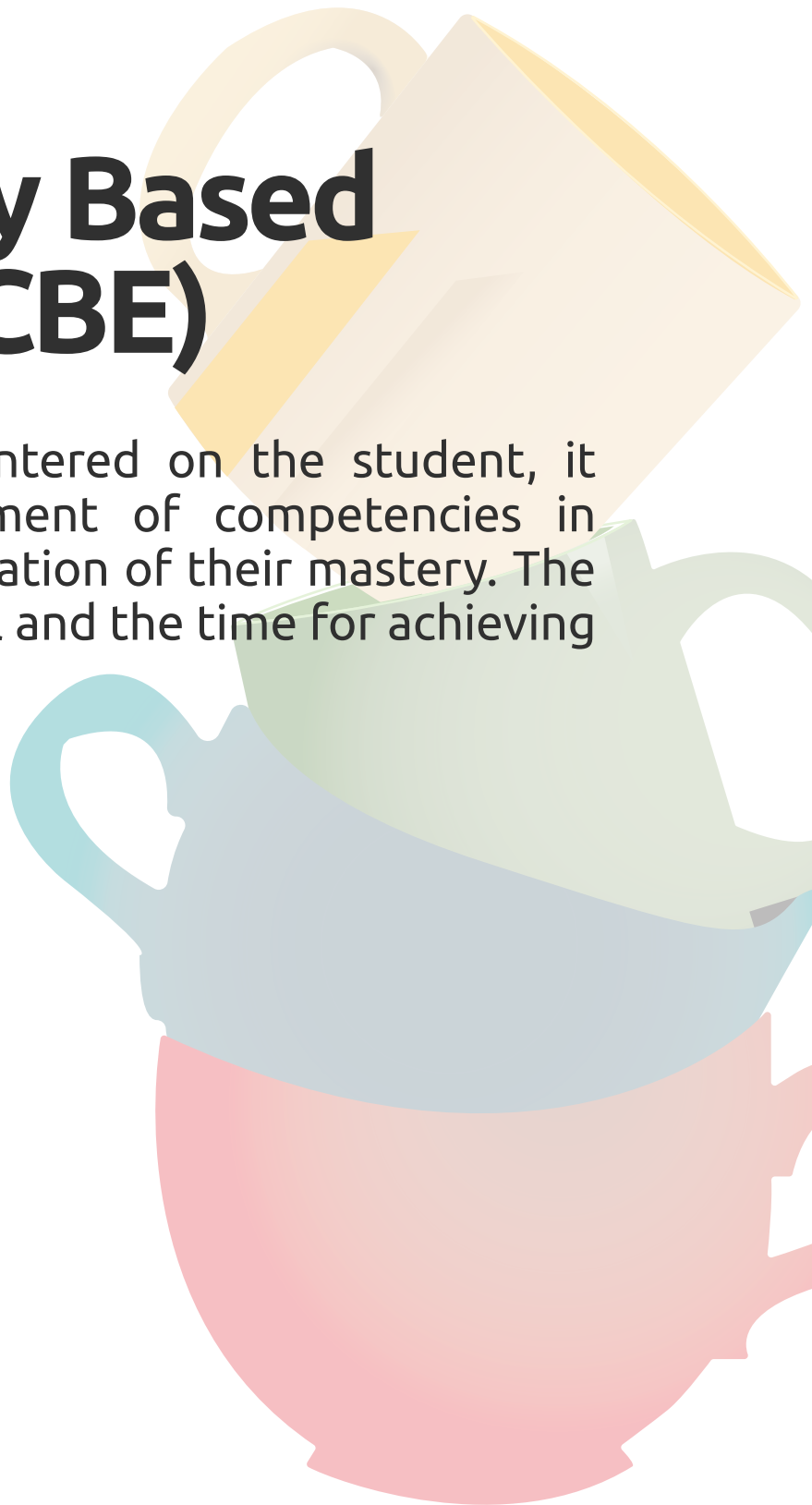
Competency Based Education

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Competency Based Education (CBE)

An educational model centered on the student, it focuses on the development of competencies in students and on demonstration of their mastery. The learning outcome is central and the time for achieving it is variable.



Introduction: Competency Based Education

The term competency has been used since 1970 in the work environment, generally associating it with the development of the skills required by a professional for performing their work. Nevertheless, it was only in 1980 when the term began to be utilized in the educational environment, and as of 1990, models began to be designed for implementing competencies at different educational levels, until all levels were encompassed. In recent years this concept has acquired greater relevance within the educational environment, due to its great potential for transforming and making the learning process more efficient.

Competency Based Education (CBE) is a model that can be implemented at any educational level and training programs or non-formal education. In the educational context, the term competence is very broad, since it encompasses life experiences, capabilities, values and attitudes. At this point, it is important to mention that this report will address the trend by focusing on higher education.

In contrast with the traditional model, CBE is not based on the credit hour-based system for obtaining degrees or certifications. Rather, it is a more holistic approach to education, which incorporates the idea that education arises from different life experiences with a systematic approach to knowing and the development of skills, and which is determined by means of specific functions and tasks (Argudín, 2006). This model is based on demonstrating mastery of the knowledge, skills, attitudes and values which comprise a specific competence. Time is variable and the learning outcome is the focus, in contrast with the traditional model where time is fixed (school cycles) and outcomes are variable. (Everhart, Sandeen, Seymour & Yoshino, 2014).

CBE contains clearly defined competencies to be developed in the student and measurable learning objectives are established. Overall, instruction becomes a guide and orientation for students, who use the tools and the support from the teacher to progress through contents until they have demonstrated mastery, skills or other competencies. In this manner, students move forward when they have attained the learning objectives at the level defined by the institution (EDUCAUSE, 2014).

This educational model is focused on the success of students, in the demonstration of learning and in attaining the defined level of competence (Everhart, 2014c; Everhart, Sandeen, Seymour & Yoshino, 2014).

Currently, education offered by the great majority of institutions of higher education is based on exposing contents to the students, fulfillment of classroom hours and the demonstration of knowledge through exams. This traditional model can result somewhat artificial and distant from reality in the workplace that must later be faced by the graduates (Conchado & Carot, 2013). For this reason, many institutions seek new educational strategies or approaches to allow ensuring competent and capable graduates able to perform in any work or personal environment. Nevertheless, implementing or adopting CBE entails important curricular, didactic and evaluative implications (Gómez in Salas, 2005), among which, worthy of mention, such as:

▲ **Curricular Implications.** Review of educational purposes, means to evaluate curriculum relevance and restructure the contents of study plans. Designing a curriculum by competencies implies to build it on thematic cores to which several disciplines are integrated. For example, understanding cellular organization and functioning only requires a competence that encloses the

CBE
is a model



**Centered on
the student**



**Focused on
mastery of
competencies**



**Based on
learning
outcomes**

appropriate disciplines (biology and chemistry) and not to study these separately.

▲ **Didactic Implications.** A change is necessary to approaches centered on the student and to the learning process which involves students in the active construction of knowledge. Where student and teacher work together to assess and achieve significant learning. As for example: the German Seminar¹ and Problem Based Learning.

▲ **Implications in Assessment.** Assessment is one of the most complex points in EBC since it can imply a radical change in the educational system; essentially, it implies moving from an assessment based on achievements to an assessment by processes, assessing not only the result, but rather the entire learning process.

Adoption of the trend

Since the 1970's decade, the term competence began to be introduced into the educational environment as part of an objective assessment of learning. This approach emerged as response to the inadequate relationship that existed between education programs and the needs of the labor market. In this context, the OECD DeSeCo (1997) project emerged, whose objectives were to provide a conceptual framework for the identification of key competencies, strengthen international assessments and cooperate with the general objectives of the educational systems. Later, the European Tuning project emerged (2000), which emphasized the structures and contents of higher education, and whose purpose was to promote a college education based on competencies (Suirá, 2010).

The European Commission continued supporting the development of key competencies in European countries (European Commission/EACEA/Eurydice, 2012). Other alternatives were later developed in Latin America, with highlights on the Tuning Latino Americano (2004-2007) project and the 6x4 UEALC (2003-2007) project. Countries such as England, Canada, Australia, the United States of America as well as the European Union became pioneers in the implementation of education through competencies, as a useful tool for improving the efficiency and quality of education (Argudín, 2006).

In Mexico, the topic of competencies is relatively recent. For somewhat more than a decade, different governmental policies have been implemented with a view to boosting

driving Competency Based Education. The official policy is finalized in 1994 with the Project for the Modernization of Technical Education and Training (PMETYC), which was focused on professional training assigned to the institutions of the Technological Education Subsystem, as for example: the CONALEP and the Instituto Politécnico Nacional. One year later, within the PMETYC, the Work Competency Normalization and Certification Board (CONOCER) was created with representatives from the public, private and social sectors. CONOCER is based on the model of the United Kingdom of Great Britain. It is comprised by five levels of rating and operation by means of normalization committees and certifying bodies which work independently boost to achieve quality assurance. In 2004, the educational model of the Technological Universities was implemented, whose approach is to serve the needs of the different productive sectors and society. (Coordinación General de Universidades Tecnológicas, 2008).

In 2008 the Tecnológico de Monterrey created a body for the certification of work competencies based on the CONOCER program. This certification body attends the need for professionalizing key functions within organizations. Services offered include the design of competencies standards, training for the preparation of competencies certification and assessment of competencies.

Today, academic leaders in Mexico and around world are keeping a close watch on CBE, due to the growing pressure for more flexible and accessible higher education.

We find ourselves at a time where there is a large gap between what the labor market requires and what traditional education is providing. A recent study performed in the US by the Lumina Foundation jointly with Gallup showed that 96 percent of academic officers score their institution as effective in preparing their students for the labor market, nevertheless only 14 percent of citizens surveyed agree, and surprisingly only 11 percent of the business leaders confirm that graduates have the skills and competencies which their businesses require (Lumina Foundation, 2014). Situation that is not very different from what is observed in the rest of the world. Another study, on the scarcity of talent, showed that for the third consecutive year, Japanese employers report the highest level of scarcity of talent and four out of five employers have difficulties in filling work positions. This is general problem throughout the world; Peruvian, Indian, Brazilian, Turkish and Argentinean employers also reported an acute scarcity and during the last 12 months, the situation has become more serious in 10 countries, above all in Latin America (Manpower Group, 2014).

¹ German pedagogical proposal for redesigning the teaching-learning processes where the teacher ceases to be the main character and the student has a more active role. The teacher does not instruct, but rather teaches how to learn (Garzón, 2013).

As well as the disconnection with the needs of the labor market, higher education also faces other important challenges such as: high costs, recognition of prior learning, the need for agility in obtaining degrees or certifications and questionings about its sense and value. The world is ever more complex and changing; this generates a demand for better learning results in schools (Spady, 1994), making many universities and educational institutions adopt models or techniques based on competencies. Expectations are that during the next decade this trend will be very common in most institutions (Merisotis 2012).

A competence is the integration of knowledge, skills, attitudes, and values which allow a person to develop effectively in different contexts and perform a function, activity or task in a proper way.

Competencies

There are a great variety of definitions of competence, bodies such as UNESCO and ANUIES and authors such as Tobón, Argudín, Chomsky, Boyatzis, and Marelli among many others, have their proposals. This term is under constant review and each perspective has its own approach, a definition that concretely integrates what is a competence today is proposed in this document:

A competence is the integration of knowledge, skills, attitudes and values which allow a person to develop effectively in different contexts and perform a function, activity or task in a proper way. Competencies facilitate the development of a comprehensive education since they bring together all the dimensions of the human being: knowing, knowing how to do, knowing how to be, and being (Blanco, 2009).

Characteristics of competencies

Competencies are clearly defined and are objectively measurable, they have an inherent meaning and an objective value, different from credit-hours or Carnegie² units (Wellman y Ehrlich, in Klein-Collins, 2012).

² Unit developed in 1906 as a measure of the amount of time a student has studied a subject (Carnegie Foundation, 2014).

The design of competencies must be considered as a process for curricular adjustment or reengineering based on the learning outcomes required.

Learning outcomes are established at the level of institution, program and student and the latter comprise the profile of the graduate. In particular, learning outcomes at the level of the student can become as granular as the competencies themselves and that is why both terms are used indistinctly (Everhart, Sandeen, Seymour and Yoshino, 2014).

KNOWLEDGE

SKILLS

ATTITUDES

VALUES

The difference lies in that learning outcomes are defined in terms of the level of knowledge or skills which a student will attain at the end of the educational process, as a consequence of their participation in given educational experiences. In contrast, competencies describe what must be learned, as well as the performance level expected to be achieved by the students (Ewell in Klein-Collins, 2012).

In March 2011, the Council of Chief State School Officers in the United States, jointly with the iNACOL brought together 100 leaders in education with the objective of strengthening the definition of competencies in the educational context and establishing the key characteristics which must be taken into account for the design of these. The following is the consensus arrived at after the exercise:

- El progreso depende de la demostración de dominio o maestría
- Los objetivos de aprendizaje son explícitos, cuantificables y transferibles
- La evaluación como experiencia de aprendizaje significativa y positiva
- La instrucción es diferenciada y con apoyo oportuno
- Los resultados de aprendizaje incluyen aplicación y creación de conocimiento



Types of competencies

Different classification of competencies can be found in the literature, and there is no definite consensus on this issue among authors. Additionally, researchers bring forward new proposals as the trend evolves, making arriving to a general scheme all the more complicated. Beginning with a prior analysis and considering different classification such as those of Tobón, the Tuning Project, SEMS, among others, the following presents the three great groups of competencies which can contribute a more practical perspective before this conceptual difficulty.

Generic Competencies

Key competencies that allow understanding the world, promoting self-learning, developing harmonious relations and participating efficiently social and professional life (Tobón, 2009). They are not linked to a specific field of knowledge or professional activity; they facilitate the acquisition of other competencies and increase employability (SEMS, 2008). They are related with the acquisition of ethical values and with the emotional intelligence that will allow an individual to adapt to different contexts. (Lozano & Herrera, 2011).

Disciplinary Competencies

Competencies which express the knowledge, skills and attitudes considered to be the minimum necessary in each disciplinary field. These encompass both the capabilities which all students must acquire, independently of the study plan and its academic path, as well as, those which are specific to a determined occupation or profession (SEMS, 2008). These competencies have a high degree of specialization, as well as specific educational processes generally performed in technical and higher education programs (Lozano & Herrera, 2011).

Work and professional competencies

Competencies related to the field of industry, a particular use of the competencies approach applied to work life and those capabilities developed by an individual with or without formal higher education studies, only requires short duration training for performing their functions. These competencies focus, on the one hand, on technical, operational or production skills and on the other, on those carrying out university studies in a certain scientific or technological discipline, where higher order processes are developed, such as decision making, critical and creative thinking as well as complex problem solving (Lozano & Herrera, 2011).

Benefits of Competency Based Education

Adoption of this model has generated different benefits which positively impact not only on the institution itself, but also on its environment, society and the labor market. The following page presents the most relevant benefits of CBE.

BENEFITS OF CBE

1 **Focus on the needs of society and the working world**

The CBE model concentrates on connecting the student's education and learning with the labor market to answer the needs of a society in permanent transformation, as well as to also answer to the needs of the productive sector (Tuning, 2007).

2 **Recognition of prior learnings**

Most of the programs based on competencies allow the students to use prior knowledge acquired outside of a classroom, with the purpose of accelerating their educational process (Degree Prospects, 2015). This allows students to select the areas where they need to improve without need for following a strict program.

3 **Flexibility and accessibility**

The CBE model focuses on learning and not on the time invested for completing credits; so that students do not have to follow academic programs with rigid content, nor over predefined periods of time such as semesters, quarters, etc. (Degree Prospects, 2015). It also offers a more efficient and potentially cheaper path for obtaining academic degrees, new competencies and greater employability (Blot in PR, N., 2014c; Everhart, 2014e).

4 **Self-management of learning**

The CBE model allows improving the capacity of students for recognizing, managing and continuously build their own competencies (Everhart, 2014e). It also allows students to assess and improve their performance, interpret situations, resolve issues and perform innovative actions. (Tuning, 2007).

5 **Transparency in the capabilities of the graduates**

The CBE model allows effectively communicating what the students know and can do (Klein-Collins, 2012). This provides employers with greater understanding of the learning outcomes of students (Everhart, 2014e). The model includes mechanisms which demonstrate the achievements of competencies and assume that learning is acquired simply because the student took a number and series of courses.

6 **Comprehensive and transversal training**

CBE seeks to prepare students in a comprehensive manner developing competencies that will be useful in a general context such as access to employment and the exercise responsible citizenship; by means of competencies such as: logical thinking, self-learning, management of non-verbal communication and language, creativity, empathy, as well as ethical behavior (Tuning, 2007).

7 **Development of new competencies**

CBE drives the continuous pedagogical and professional development of the faculty (Tuning, 2007). An essential item is the redefinition and expansion of the role of teachers in students' learning (Anderson, 2013). Adoption of this model in an institution would create a new generation of teachers prepared to stand out in learning environments where students are involved in the development of deeper learning competencies (Cator, Schneider & Vander Ark, 2014).

General CBE model

Curricular planning is an essential part in the educational environment, since the creation of an effective and efficient educational scenario depends on it. This process defines the educational background that students will build and decisions are made for writing the curriculum, based on different levels of concretion, achieving sequence and relationship between them (Ruíz, 2009).

A broad variety of models for curricular planning can be found in the literature, for example the proposals by: Tobón, Argudín, Ruíz, Cázares & Cuevas, Bellocchio, among others. The terminology and the structure of the processes vary in accordance with each author; nevertheless, in essence the bases coincide and make reference to the same processes. In practice these models are used as processes guideline, and generally, the institutions customize them according to their own needs and characteristics. The following is a guide to the general structure of curricular planning that brings together the analysis of these proposals and gathers the main processes. Curricular planning is comprised of two general processes, macrodesign and microdesign:

Macrodesign

This process captures a specific educational policy into the curriculum, seeking alignment with the country's educational policy. This process is structured in two levels:

▲ **Level 1.** This level analyzes the country's educational model, which is determined by sociocultural, political and economic factors. The pedagogical models which encompass said model are also analyzed. Intervention in this level is given by international organisms, educational philosophers, parliaments and ministerial commissions. The characteristics that the general pedagogical model will have are defined in this level, and a determined curricular model is also chosen.

▲ **Level 2.** Applies to the choice of the institution around which the traits of the pedagogical model to be followed: professional areas, conception of each cycle or period, profiling of media such as books, modules, contents, etc. This level has the participation of teams of experts such as: psychologists, pedagogues, sociologists, educators, etc.

These two levels must be defined in general terms, if they go into too much detail, this leaves a very narrow margin for performance in the following levels.

Microdesign

This axis focuses on the teaching-learning processes and how these processes are expressed in the design of educational policy. Microdesign covers the docents decision levels, which are detailed in three levels:

▲ **Level 3.** Curricular design stage; the participants in this process are teams of experts, advisory board, departments and teams of teachers. This is the most important stage of curricular planning. A special section is contained in this document for addressing the subject in greater detail.

▲ **Level 4.** Frequently identified as the academic level of the curriculum, this is where the modules are defined using a deductive process. This stage peaks with the formulation of the study programs or with the programs by modules, depending on the format selected from the curricular point of view.

▲ **Level 5.** In this process, the teachers contextualize the program's proposals by modules to the reality of the classroom, allowing the concretion of the curriculum at a practical level. For this, the activities and means that can be employed for achieving what must be learned and what must be assessed are suggested in the program. At this point it is important to point out that the guidelines and suggestions of the program must be generic, taking into account that the docent must adapt it to their concrete reality; this is what academic freedom truly is, the means by which the docent adjusts teaching to the reality their environment.

Curricular Process

This process is comprised of three stages: design, development and management of curricula.

▲ **Curricular Design.** This stage is decisive and constitutes the backbone of the entire curricular process, given that within it, the reference framework is identified and characterized and the competencies to be achieved in the educational proposal are determined. A sociocultural reference framework is taken as a base on which the curriculum is supported. This reference framework allows establishing the bases of a profile by analyzing the professional and work environment, as well as a characterization of the functions of the future graduate in the working world. This analysis, jointly with the reference framework, is what establishes the bases at this stage of curricular design.

Curriculum designers must resort to different strategies that can serve for the development of this stage. The following can be highlighted: diagnostic testing, interviews to employers and graduates, research on the subject and, mainly, the consultation of how these designs have performed in different parts of the world, so as to have referents for comparison that allowed them to search for a proposal with its own identity and not a simple extrapolation of ideas, conceived in other sociocultural contexts.

▲ **Curricular Development.** Contents that must be taught are defined in this stage, which has always been the base concern of the curriculum. Selection of contents must not be made based on the table of contents of a textbook, or on an inventory of contents, but rather it must answer to a process that weaves together three structural elements, which serve as a source for determining the contents, these elements are:

- Definition of the evidences required
- Structuring of knowledge
- Construction of modules

▲ **Curricular Management.** This stage has the objectives of defining the specific didactic through the integration of three fundamental elements:

- The activities in the form of a didactic sequence
- The curricular materials or support resources to the educational process
- The assessment of competencies

Curricular management peaks with an integrating product which encompasses the performance or expected learning outcome and itemized in:

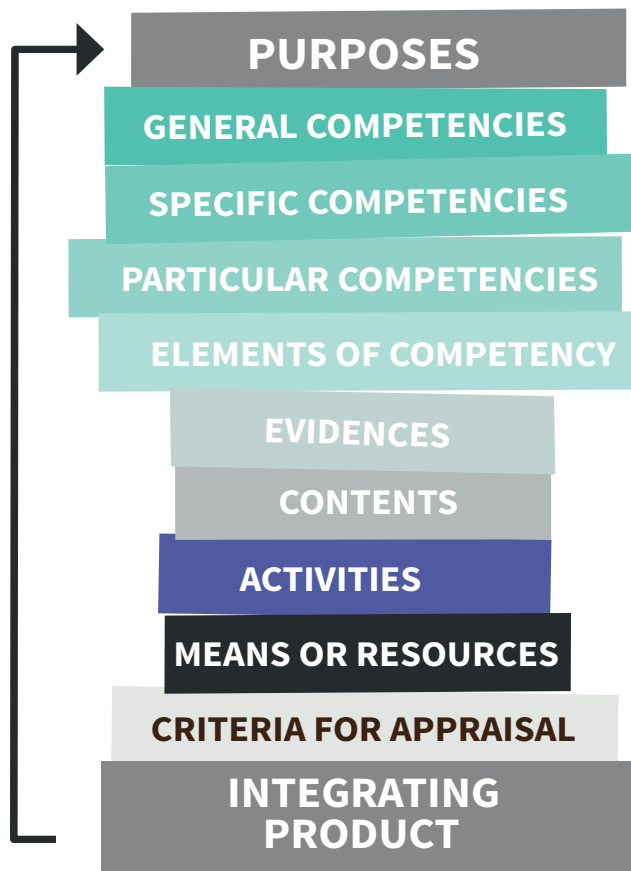
- Evidence of performance
- Evidence of knowledge
- Evidence of product

Finally the curricular process is embodied in an analytic by competencies program. The following image represents a graphic scheme of the process that is followed for the formulation of an analytic program within the formation of competencies:

Assessment of competencies

The assessment is an integral part of the teaching-learning processes, is an essential tool for improving

the quality of education, it can take different shapes and use different instruments or methods. In CBE



Educating in competencies. Three essential methodological processes. Magalys Ruiz, 2009, p. 129).

in particular, it becomes a crucial dimension since competencies imply more than the development of skills. Being competent implies convergence between knowledge, skills and values, not only the sum of these (Argudín, 2006). The assessment determines what the student will perform and is based on demonstrating that they effectively are capable of doing so, it is centered on the process and the outcomes, and not on the storage of information, as could typically be observed in traditional models.

It is important to have a good design of assessment systems or mechanisms, and likewise, make a good design of the competencies. Educational assessments are key for ensuring that students arrive, at an appropriate rhythm, to where they have to go; performance assessments are necessary for demonstrating mastery and the summative are crucial for quality control (Sturgis, 2012).

According to Tobón (2010), the competency assessment in the educational context has the end purpose of teachers' training, promoting, certification and improvement. And it must be carried out at the beginning, during, and at the end of the educational process:

▲ **Training.** Providing feedback to students and teachers, as to how competencies are being developed,



the achievements and aspects to improve.

▲ **Promotion.** Determining the degree of development of competencies to know if students can be promoted to another level.

▲ **Certification.** Validate if they possess competencies in a determined area in accordance with established criteria³.

▲ **Improvement of teachers.** Improve the quality of the didactic and pedagogical processes. In general, it must serve for improving courses, assessment methodology and training programs (Zabalza in Tobón, 2010).

And, according to Argudín (2006) in order to perform a comprehensive assessment of a competence it is necessary to:

- Define criteria for performance and results.
- Gather and compare evidence with the specific outcomes.
- Validar si se ha llegado o no al nivel esperado de la competencia.
- Prepare a development plan for the areas of opportunity.
- Assess the result or end product.

The assessment of prior learning is an important process within CBE, since any action that focuses on the development of competencies must take into account prior learnings as a base, as well as the type and level of competencies which students already possess. Prior learning is the term that is used to describe learning that a person acquires outside of a given academic environment (Tobón, 2010).

The result of this assessment is the accreditation, certification or revalidation of the prior learnings, by means of the application of different mechanisms (Klein-Collins, 2012) such as:

the review of the records as well as reports from other teachers. In this manner, if a student is able to accredit a competence, they may seek higher levels of mastery.

Evidence of learning

Another essential element of CBE is the demonstration of competencies, this is, for a student to demonstrate that they can effectively perform a specific function or task

at an established level. For this, students must provide sufficient evidence for validating their competence. These evidences require a meticulous pedagogical design so as to create opportunities the student requires the review of the records as well as reports from other teachers to demonstrate what they are capable of doing.

Assessment tools

The evidences of learning in curricular design will be translated into assessment mechanisms which can be tests, portfolios, projects, or activities which allow the student to demonstrate their performance level and obtain significant feedback for improving (Argudín, 2006). Other assessment techniques exist, such as observation, focused interviews, field journal and execution tests (Tobón, 2010). The assessment rubric and the portfolio of evidences are two instruments which in recent years have had broad use, due to their outcomes with high impact on assessment. The following is a brief description of these instruments.

Assessment rubrics

The rubrics are double entry tables that link competencies criteria with levels of mastery and integrate the evidences that students must contribute during the process. A rubric configured by means of the indicated levels of mastery is in turn, a learning map, because it points out the progressive challenges to be achieved by students in a subject or formative module. It likewise shows the more relevant achievements and aspects to improve during the process.

Portafolio de evidencias

The portfolio of evidences consist of an organization of students' evidences in a given educational cycle (Valencia in Tobón, 2010). A complete portfolio can include numerous school certificates, personal logbooks, awards, samples of school-work, personal curriculum and their outcomes in actual performances, which are compared against the grades received during the course; evidence of academic ability as for example, the letter of recommendation from a teacher, among others. At the end of their studies, students may fully observe how their education contributed in their educational formation and recognize the skills which they have developed (Argudín, 2006).

³ This appraisal is not given in reductionist terms about being competent or not being competent. Tobón establishes that while the behavioral and functionalist approach tends to assess students in these two categories, it is necessary to establish nuances with learning maps which describe the different proficiency levels which can be attained, this under a social-formative approach.

Important clarifications

Competence vs. objective vs. learning outcome

It is frequently observed that these three terms are used indistinctly or in a contradictory manner in the literature. Therefore, it is important to identify the basic characteristics which must be considered in declaring a competence, a learning objective and outcome (Hartel & Foegeding, 2004).

▲ **Competence.** It is a general statement detailing the knowledge desired, the skills and dexterities of a student, and their application at the end of a course, a training process or program.

▲ **Learning objectives.** A very general statement of the main goals of the course or program. The objectives are related with the intentions of the teacher. They are often general statements which indicate the fundamental contents, the approach, the direction and purposes which are behind the subject or the program from the point of view of the teacher. The objectives, by being purposes or intentions are less susceptible of being measured.

▲ **Learning outcome.** A very specific statement which describes exactly and in a measurable manner what the student is going to be capable of doing. They are directly related with the student and with their achievements. They are assessable and frequently observable. A competence can have several learning outcomes, so that typically a course or program contains more outcomes than competencies.

It is worthwhile to point out that the competencies, objectives and learning outcomes are utilized to describe learning achieved by students, either at the individual level of the courses, or at the level of the program as a whole.

The following presents an example of the statement of a competence, its objective and learning outcomes:

Competence

The student is capable of using mass and energy balance for a given feeding process.

Learning Objective

Understand the extent of the importance of mass balances in processing systems.

Learning outcomes

- Describe the general principles of mass balances in stationary state systems.
- Draw and use process flow charts, identifying flow streams, for mass balance problems.
- Solve mass balance problems associated with food processing operations.
- Design and solve mass balances for complex flow process systems, including problems in mixing lots, multiple stage flow problems, multiple input and output problems, recycling flows and multiple components, and processes where chemical reactions take place.

Examples taken from Hartel, R. W. & Foegeding, E. A. (2004).

Compatibility with the traditional model

Competency Based Education does not need to be a dramatic or disruptive change, since its implementation is different in each institution, depending on its characteristics and needs. Each educational institution adapts the model to its mission, vision and values. It is possible to incorporate CBE processes into the existing structure of courses and study plans. For example, CBE offers the possibility of combining traditional courses and integrative learning experiences around competencies (Klein-Collins, 2012).

The role of the teacher in CBE



The new role of the teacher

Today, institutions of higher education require highly competent academic staff for the performance of their teaching functions, capable of answering to the challenges posed by the educational and social environment (Inciarte & González, 2009, p.41). When the teacher performs in a new teaching-learning environment based on competencies, their functions will change, so that it is necessary to redefine their professional task as well as the competencies which they must possess (Argudín, 2006).

Until recently, the professionalization of the teachers, their performance, what they said, did and thought were the most important. Today, the teacher must break-away from that idea, remove themselves from that error and admit that what is most important is learning by the students, what they do, think, say, plan and organize, with the assistance, orientation and mediation of the teacher (Inciarte & González, 2009). In this manner, the role of the teacher transforms towards a facilitator and mediator of learning.

The teacher as a facilitator must (Argudín, 2006):

- Organize learning as a construction of competencies by the students.
- Design the development of the subjects based on activities performed by the students.
- Design strategies for stating teaching and learning as research.
- Design activities addressed to the use of models, simulation of experiments, and working in different scenarios.
- Guide the student's activities, making it possible for them to acquire a comprehensive role with respect to the task and become interested in it.
- Opportunely facilitate the necessary information for students to contrast the validity of their work.
- Establish new forms of organization that support interactions between the classroom, the institution and the external environment.
- Design and introduce new forms of assessment, based on the result and performance.

A mediator must be considered as a person who fosters the students in discovering themselves as responsible human beings, with an ethical sense and with the value of knowing the implications of one's own existence and reason for being as present entities (Inciarte & González, 2009).

Role of the teacher in the curricular process

The teacher possesses a rich trove of knowledge about curricular operation, many times greater than that of the expert who designed it, since they are the one who in reality live, suffer and also enjoy it. It is the teacher who has more to contribute to the curriculum (González, 1995). Due to this, it is necessary to attempt to find ways that allow collaborative work between teachers and curriculum designers, for addressing the specific issues of curricular operation, and certainly it is at this point where teachers, with their practical knowledge, have a great deal to give (González, 1995).

A way of enriching curricular design from the teacher's practical contribution is for them to analyze the congruence between the curriculum's intentionality and its operation. The purpose is to find the discrepancies between theory and practice and in this manner being able to design alternative teaching strategies which contribute to a more intentioned curricular operation. This exalts the action of the teacher, at the same time giving them a leading role (González, 1995).

New teachers' competencies

Currently, competencies in an educational environment not only imply new performances and learnings for students, but also in the teacher, who must now analyze and redirect their professional practice in such a way in that they must build their own competencies and as a consequence, build knowledge of and with their learners (Lozano & Herrera, 2011).

Teacher competencies are developed when teachers observe the social, political and economic context in which they are immersed, in such a way that it allows them to analyze and redirect their professional practice for establishing which are the cognitive and behavioral capabilities they must have when performing (Lozano & Herrera, 2011). There are different classification of the teacher competencies, such as those proposed by Frade (2009), Perrenoud (2007), SEP (2010), among others. Nevertheless they all converge on the central

pivotal points of their definition.

Tobón (2010) presents the proposal realized by the Instituto CIFE of the competencies that teachers must have; this proposal took experiences in training and assessment of more than 5000 docentes in Latin America, belonging to different educational levels as a base. According with these studies, the essential competencies which a teacher must have are the following:

▲ **Teamwork.** Carry out cooperative projects and activities for attaining the institutional goals with respect to the formation of students, in accordance with the educational model and the action plans of the academic programs.

▲ **Communication.** Assertively communicate in verbal and written form with the community, colleagues and students, for significantly mediating the comprehensive human form and promoting cooperation, in accordance with the requirements of the educational situations and institutional functioning.

▲ **Planning educational process.** Planning the didactic processes so that students can be formed in a comprehensive manner, with competencies established in the graduate profile, in accordance with the academic cycle and the corresponding period of study.

▲ **Learning assessment.** Assess students' learning to determine the achievements and the aspects to improve, in accordance with established competencies and determined pedagogical and methodological referents.

▲ **Mediation of learning.** Focus the learning, teaching and assessment processes so that students develop the competencies of the graduating profile, in accordance with the established criteria and evidences.

▲ **Curricular Management.** Participate in curricular management beginning with the docente, research and extension teams, so as to arrive at academic quality, in accordance with the roles defined in the educational model and an action plan.

▲ **Content development.** Create educational materials for mediating students' learning, in accordance with specific learning purposes.

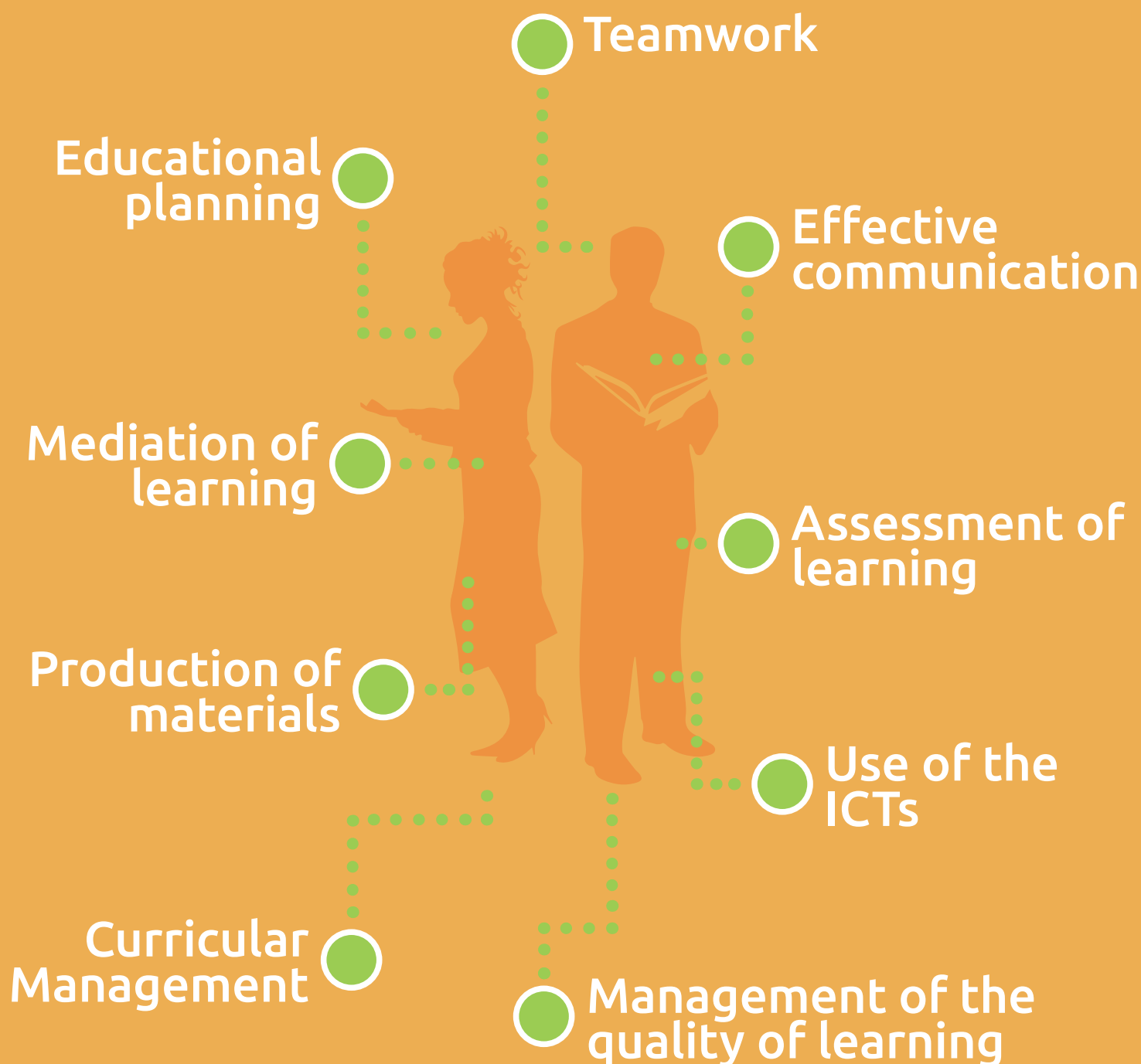
▲ **Information and communication technologies.** Apply information and communication technologies so that students develop significant learning and graduate profile competencies, in accordance with the possibilities of the environment and the educational goals.

▲ **Management of the quality of learning.** Manage the quality of the learning process to facilitate comprehensive human information of the students, based on metacognitive reflection, research of the docente practice and ethical commitment.

It is important to point out that docente competencies require continuous improvement. This implies continuously reviewing the work plan, the actions undertaken, the needs of students, the orientation provided and the mediation of resources. In this manner, each teacher becomes an autonomous professional who day-to-day builds their aptitude by means of the search for excellence and the development of competencies (Tobón, 2010).



➤ NEW TEACHER COMPETENCIES



Relevance of CBE for the Tecnológico de Monterrey

Competency Based Education is not a new trend, nevertheless in recent years it has been given special attention due to the fact that several universities have been able to develop more personalized, flexible and affordable educational programs under this approach. With this model, students work at their own rhythm until they demonstrate mastery of the necessary competencies in the area of study.

Among some of the factors that are driving interest in CBE, is the questioning that some persons are making about the usefulness of acquiring an academic degree, as well as its cost. Currently, there is more scrutiny on the added value offered by a university degree, since 53.6 percent of the graduates at the professional level in the United States do not necessarily access the work positions for which they prepared after obtaining a degree. This is why considering the return of investment for higher education, as well as the opportunities for employment at the end of studies is more critical every day (Weise in Mcguire, 2014).

There are other additional conditions that have propitiated a new rise of CBE; among them are: the time it takes to finalize an academic degree, the interest of employers in having a clearer idea of what is a person knows and can do in the workplace, the benefits that a person who is working can obtain by returning to university (Tate, Lee, Morris, Kadlec, Fain & Laitinen, 2014). Competencies-based programs allow students to obtain credentials by demonstrating their competencies (Bushway & Everhart, 2014). Historically the grades certificate (transcript, report card) has been the official record of what a student has learned in the university, but does not show employers the student's competencies for performing in a given position (Clawson, 2014).

Competency Based Education is being gradually implemented in the Tecnológico de Monterrey. Currently, there is a strong influence of teaching by objectives and the study plans, which is a clear sample of this orientation. Nevertheless, initiatives such as "week i", "semester i", and new competency-based curricula, will gradually increase. There is a long road to be travelled in this area and the pace must be stepped up, since institutions, above all in Europe, already have 25 years of progress in this subject (Olmos, 2014).

Perspective of the leaders of the institution



PAULINO BERNOT
Vice-President
for High School

"CBE is important for the Prepa TEC because it contributes to the education of a high school student, and in the educational formation of a human

being that lives and experiences a maturity process that is essential to their existence, demanding the acquisition of certain competencies of a formative nature and not only disciplinary, which allows them to prospect a life and career plan with greater precision and vision. Currently, the process is about to begin for declaring formative competencies such as self-management, self-knowledge, resilience, critical thinking, decision making and verbal and written communication. Additionally, the disciplinary competencies will be defined in the area of study." (P. Bernot, personal communication, november 26, 2014).



DAVID GARZA
Vice-President for
Undergraduate
Studies

With the Tec21 educational model we will focus on enhancing the skills of the current generations for developing the

competencies required for facing the challenges of the 21st century. Some of these competencies are: cultural sensitivity, problem solving, teamwork, critical thinking, innovative thinking, ethics, citizenship and social responsibility, oral and written communication, leadership and mastery of the language. (Garza, 2014).



ARTURO MOLINA
Vice-President
for Research,
Graduate Studies,
and Continuing
Education

“Educational formation based on competencies allows a person to develop their maximum potential and adapt to changes in the environment.

In the Tec we want to be important actors in the development of the potential of persons and institutions by means of their education and development of talent. The soft competencies which we consider will be most valued over the next 10 years in the context of Postgraduate and Continuous Education, are creativity and innovation, problem solving capacity and critical thinking, communication and culture, collaboration and cooperation and citizenship commitment.” (A. Molina, personal communication, december 9, 2014).

According to teachers of the Tecnológico de Monterrey some of the core benefits of CBE are the following:

- Students learn by means of concrete experiences, linked to their immediate reality.
- Students develop capacity for conceptualizing their practice in such a manner that comprehension of theories and techniques is greater.
- Allows the development of the necessary behaviors and skills for social, citizenship and professional formation, as well as measuring and improving them over time .
- A more tangible relationship is established with the needs of the work sector with qualified human talent.
- Allows endowing students with competencies required by their profession and industry for a better work insertion.

Also the following challenges of the EBC model were identified:

- Show evidence of the student’s competencies by means of formal records that make possible to track, foster and provide continuity during their stay in the Prepa TEC .
- Design a process which demonstrates that the competencies have been learned, developed and applied by the person.
- Provide teachers with training in competencies based education and differentiate it from the training by objectives system.
- Consider CBE as a comprehensive training strategy, since its current approach, is not appropriately valued .

Integration of the competencies based educational model

Integration of the competencies based educational model CBE can be very valuable for all the parties involved in the learning process: for example students take greater control and can broaden their learning outlook for their entire lives. The docents on the other hand, can grow professionally by articulating the learning outcomes in their areas of specialization and integrating them into enriching learning experiences. On the other hand, academic leaders provide attractive study plans which advance in knowledge and produce graduates which can demonstrate what they have learned. And lastly, institutional leaders focus on new ways for identifying barriers to success and the achievement of better results (Everhart, 2014e).

On the other hand, the curricular design based on competencies, would not only aid in demonstrating the quality of the programs, but would also support students in the transition from one institution to another. Sally M. Johnstone, Peter Ewell, and Karen Paulson (2002) in their article [*Student Learning as Academic Currency*](#), argue that the framework of competencies will allow learning in itself to become a species of currency, a clearly defined unit which represents an equal value throughout different institutions and educational systems, either by means of transfer and articulation policies or by means of assessment of prior learnings.

On the other hand Competency Based Education capitalizes the potential of on-line learning, reducing the time and cost for obtaining certificates during the development of professional life. This educational model is centered on learning and mastering of knowledge, instead of scores or grades; this leads to emphasize on the learning assessment. Students in competencies based programs have new opportunities for learning at their own rhythm, with a great clarity of the learning objectives and their achievement (EDUCAUSE, 2014).

Competency Based Education will be a way of ensuring the qualities of future generations of professional, since in the current educational system, with on-line teaching options such as Coursera or edX, it is necessary to have instruments and strategies which allow ensuring that knowledge, behaviors and skills, have truly been generated in students during their training process. And it will be the students with the best certified competencies who will stand out (O. Olmos, personal communication, december 2, 2014).

CBE in the Tecnológico de Monterrey

Different initiatives exist in the Tecnológico de Monterrey on the exploration and implementation of the competencies based educational model. The following is a list of some experiences and efforts which have been performed related to this subject.

Carreras de la Escuela de Medicina y Ciencias de la Salud



▲ In 1998, with the leadership of Dr. Martín Hernández, director of the Ignacio A. Santos School of Medicine, a study was made on the feasibility of designing new study plans based on competencies. This analysis allowed the process to begin in the year 2000, for the definition of the profile of the graduate from this program on medicine by competencies. Lastly, the course curriculum for 2001 was designed by competencies, and afterwards in 2003 the rest of the majors were included under this model.

School of Engineering and Information Technologies Monterrey Campus

▲ In 2006 the profile of competencies for graduates of this School was drafted. Dr. Fernando Jaimes led the transformation of the curriculum of the majors in the Engineering area towards the model of competencies, with the participation of Dr. David Garza and Dr. María Elena Morín. The main task was to define the graduation competencies of the students, both generic as well as disciplinary ones belonging to each of the majors. The objective was to have a solid profile of the competencies of the graduates and which also meet the accrediting agencies requirements.

Vice-rector of High School Education in the Monterrey Campus

▲ In 2007, MSc. Bertha Dávila led a project for drafting the profile by competencies for Senior High School graduates in Monterrey. The purpose of the project was to identify the elements needed by a Senior High School student to continue with their studies in professional.

▲ Afterwards, the study plans for all the senior high schools were reformulated.

▲ In 2009, the participation of the teachers in the docents training program in The National Baccalaureate System (SNB) began. Training was provided to 90 percent of tenured teachers, based on the PROFORDERMS guidelines, driven by the SNB.

Escuela de Graduados en Educación (EGE) del Tecnológico de Monterrey



▲ In 2012, with the leadership of Dr. José Escamilla, a project for the renewal of the study plans of the master's in Education, Educational technology and Administration of educational institutions was initiated. Participants in this project were:

- The postgraduate cloister
- Internal guest teachers
- External guest teachers

▲ Among the outcomes obtained were: the definition of the graduate profile for each program, as well as the definition of disciplinary competencies and sub-competencies and transversal competencies common to all the programs.

Model based on competencies for the educational model of the Tecnológico de Monterrey



▲ In 2011, with the leadership of professors Dr. Ricardo Swain and Mtra. Verónica Pedrero a competencies model was implemented in the State of Mexico Campus which allows measuring the development of competencies of the students at the beginning, mid-major and at the end of their major. It also allows feedback in an effective manner to the academic and co-curricular areas involved in the education of the students.

▲ For this project, a work team was assembled for each one of the majors offered in the campus, in charge of generating the activities for measuring the development of competencies in students by means of an Assessment Center exercise that includes an assessment of their development at mid-major and at the end of their major.

▲ The outcomes derived from the peer reviewed exercises that are performed by teachers and industry colleagues have allowed to feedback in an effective manner on the activities of the teachers as well as

the offering of co-curricular activities that benefit the students..

Professorship of transversal competencies for a society based on knowledge

▲ In 2011, this chair was created with the leadership Dr. Ricardo Valenzuela having the general objective to promote the generation, dissemination and knowledge transfer of competencies, by means of activities and research projects. Two large research lines were used: (1) the education of students and teachers for the development of transversal competencies and (2) assessment of transversal competencies, both in scenarios of formal education as well as those of non-formal and informal education. In June 2014 this professorship was substituted by the strategic research focus groups that were created by the Vice-rectory of Research, Postgraduates and Continuous Education (VIPEC).

School of Languages of the Tecnológico de Monterrey



▲ The new study plans for German, French and English classes in the School of Languages is based on competencies, aligned to the Common European Framework. Four competencies were defined that are required for mastering a language: speak, write, read, and listen (each one of them sustained by the 5th which is Grammar). Mastery levels were defined for languages as well as certifications for each one of those levels. It is not possible to become certified if the 4 competencies are not mastered.

Global Learning: developing intercultural competencies in teachers and students

▲ This program begins in 2014 with the purpose of strengthening intercultural competencies of students and teachers, and propitiate international collaborative work. Currently 33 teachers from different Senior High Schools in the Tecnológico de Monterrey are participating.



▲ The Global Learning program is led by María José Pineda in the Senior High School Vice-rectory. Professor Angélica Santana is the leader of this program's base course (Connective Multicultural Learning). There is also didactic and technological support from the Vice-rector of Educational Innovation, with the participation of: Vladimir Burgos, Laura Zepeda, Guillermina Rivera and Lucía Margarita Caballero.

▲ The main benefits of this program are:

- Enrichment of intercultural competencies in students and teachers.
- Develop the formation of global citizens in students and teachers.
- Contribute to experiential learning by the student through the generation of projects with educational institutions in several countries.

e-Portfolio a developmental space on the Web

▲ In 2002 Dr. Jesús Meza proposed the creation of the student's electronic Portfolio which included three main sections: Personal, Academic and Professional. The purpose is educate the student by making reflections on their more significant and important learnings of their major, focusing on their learning and not on their scores. In this manner, a profile

and a record of the student are created during their stay in the school, which contains their academic and extra-academic activities, contributing to personal and professional development in a comprehensive manner (Buentello y Mendoza, 2005).

Face to Faith - Awareness of the Multiculturality

▲ The program began in the Cumbres Campus in 2010. María José García, Director of Internationalization of the Monterrey Senior High Schools, jointly with María Emilia Espejo have been the pioneers of the program. Currently, 17 campuses are participating with more than 30 teachers collaborating at different times.

▲ The objective is to enhance in the students the multicultural competencies



that allow them to understand, comprehend and establish relationships in different cultural contexts. These competencies are developed through the use of technology and strategic partners such as Face to Faith, which is an organization that promotes the connection among youths from different cultures and regions so that they may learn with, about and among each other.

Assessment of academic programs based on graduation competencies

▲ In 2008 the Tecnológico de Monterrey began, under the leadership of Dr. José Rafael López Islas, director of Institutional Effectiveness of the Academic Office (today Office of Academic Standards), the project for the definition and assessment of graduation competencies in all the professional undergraduate programs given by the Tecnológico de Monterrey. This project has the objective of systematically

assessing the learning outcomes of the academic programs. The project seeks to ensure that the students develop the graduation competencies defined in the graduate profile, as well as promote continuous improvement as part of the follow up to academic quality, and additionally comply with the criteria of the international accreditation agencies.

▲ For supporting each stage of the project, the System for Managing Assessment of Academic Programs (Spanish acronym SAEP) was developed internally, which allows performing the assessment process in all the programs, as well consulting the graduating profiles for all majors, assessment outcomes and commitments for continuous improvement. The SAEP system also facilitates teachers' assessment of the graduation competencies of students and documentation of resulting evidences.

This documentation is fundamental for successfully going through the accreditation processes by external, national and international agencies.

The following shows some of the more relevant data:

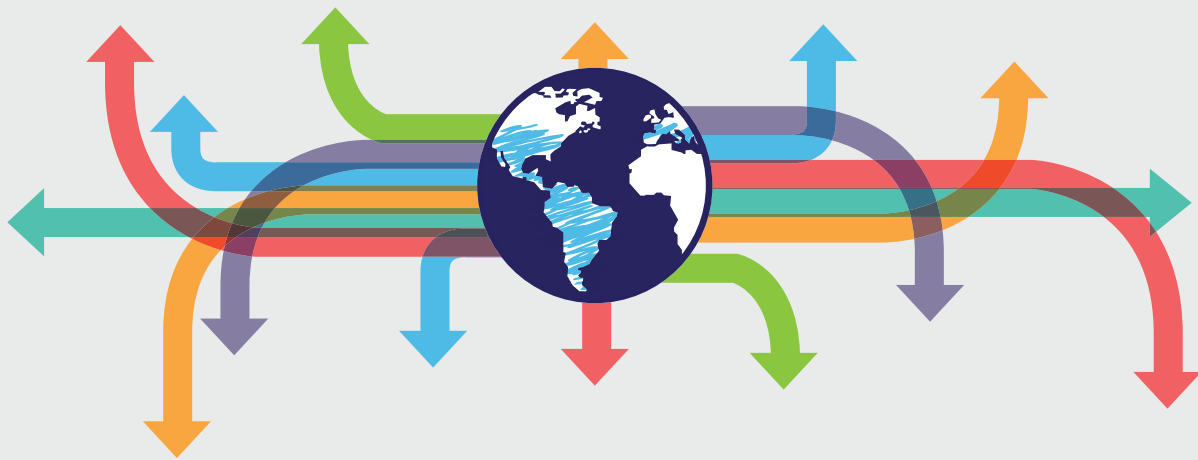
- Participation has been obtained from 100% of the academic programs in all the campus.
- Taking only the 2014 cycle, 1,668 graduating competencies were assessed, of which 1,541 closed the improvement cycle, this is, they established concrete improvement actions and plans.
- The graduation competencies assessed are part of the graduating profiles for 208 programs-campus, of

the 224 currently offered.

- Assessment of the programs includes the participation of program and department directors, as well as all the teachers that teach courses from the sixth semester and above.
- The project has allowed facilitating the accreditation process of the businesses programs before the AACBS and the engineering programs before ABET, as well as the process of institutional accreditation before SACS and FIMPES.



Relevant cases of CBE in other educational institutions



Western Governors University

The institution was founded in 1997 with an approach based on competencies, currently their programs belong to areas of education, businesses, information technologies and nursing. Tuition cost is 2890 USD for six months. On average a student finalizes their studies in 2 and half years. According to the Harris survey, 97 percent of employers said that work performance of graduates was equal to or better than other employees. Likewise, 80 percent of students that took the Collegiate Learning Assessment had higher scores in the areas of critical thinking, writing and high order skills (Jacobs, 2014). Another research also found that the 79 percent retention rate is higher than those of other four year public universities. Additionally 97 percent of WGU graduates stated that they were satisfied or very satisfied with their learning experience (Affordabledegreesonline Blog, 2014).

Universidad Autónoma de Chihuahua

Beginning in 1998, incorporates the learning centered competencies educational model in each one of its educational programs throughout their 15 academic units. Their foundation is structured based on its four components: Philosophical, Conceptual, Psycho-pedagogical and Methodological (UACH, 2008).

Instituto Politécnico Nacional

In 2004 they defined their new model applied at the three levels, undergraduate, masters and permanent education. At the undergraduate level they seek to provide the basic general competencies for professional performance and complementary competencies for research and the development of knowledge. The Postgraduate level provides specialized complementary competencies for professional performance and broad competencies for the generation, development and application of knowledge with different degrees of depth (IPN, 2004).

University of Turku

In 2003, a special division is created within the University called Brahea Center that is in charge of recognition of prior learnings, curricular development based on competencies, employability of the student, as well as social interaction between universities and society (University of Turku, 2014).

StraighterLine

Accrediting institution founded in 2009 with a model based on competencies with on-line courses. It does not grant academic degrees but is a partner with universities such as Western Governors, the University of Phoenix, and the University of Brandman, among others, where studies can be transferred and accredited for obtaining a degree.

The monthly membership is 99 USD and allows students to take as many courses as is possible for them (Dumbauld, 2014).

Universidad Tecmilenio

The implementation of the CBE model began at the beginning of 2011. This model involves a total of 34,187 students at the three levels senior high school, professional and executive modality, by means of 854 courses. The development of competencies is evaluated/assessed by means of evidences; the teacher uses the support of assessment rubrics, which are known by the students from the beginning of the course. Evidences are the proof that they did or did not acquire the competencies defined in the course and normally there are three evidences, one in each partial period. Students' performance is measured by means of employability on the day of graduation (students with full time employment). Currently, the rate of employability of its students is 83 percent in professional semester programs and 93 percent in executive programs. The implementation of this model has allowed them to identify that the roles in the teaching-learning processes are better defined since students have become more responsible for their own learning since they know in advance what they will learn in the course and how they will be assessed. Likewise teachers have more clarity on what the students will develop in the course and the criteria with which the evidences will be assessed.

Southern New Hampshire University

Since 2012 has an undergraduate program based on competencies with duration of three years. According to the national academic progress outcomes, the first three generations showed higher progress than that of those students enrolled in four year programs. Additionally the percentages of retention and graduates were higher than the national average. For example, the percentage of graduation in 2010 was 78.5 percent compared with 39.2 percent of another institution similar to SNHU (Skolnik, 2012).

Sophia Pathways

In 2012, they launched their curricula based on competencies, currently certified before the American Council on Education (ACE) for obtaining credits transferable to more than 2000 universities. They offer on-line courses based on competencies at a lower price than other universities, for example, a student can finalize a course in 60 days at a cost of around 650 USD.

Brandman University

Since 2013 offers a BA in business administration based on competencies completely on-line with four different specialties. Each specialty has an average of 60 competencies for each area of specialization. For the implementation of this model they interviewed 1000 prospect students, the USA department of employment and business leaders to ensure that the final assessments were relevant to the current working world. The cost of this program is 5400 USD annually or 2700 USD for a period of six months; also, it is accredited by the Western Association of Schools and Colleges (WASC) (Christensen, 2014).

Northern Arizona University

In 2013 they began their personalized learning program based on competencies in the majors of liberal arts, information technologies and management of small companies. With this program, students can complete their degrees more rapidly, (ELI, 2014), which has a cost of 2500 USD per semester. (Book, 2014). In the process for the implementation of CBE it was identified that it is more convenient to create a different and independent unit for managing the administrative processes and supporting the students (Book, 2014).

Patten University

Since 2013 offers on-line programs at low cost based on competencies, where the student studies at their own rhythm using an adaptive learning platform and with decent support during the course as long as the student requires it. The cost is 350 USD monthly at the undergraduate level and 520 USD monthly for postgraduate students (Fain, 2013).

The University of Wisconsin Flexible Option (UW Flex)

In 2013 they launched their education program based on competencies with direct assessment. They offer degrees and certifications for which specific competencies by discipline are defined. Students progress by demonstrating knowledge mastery and skills by means of rigorous assessments; they can work at their own rhythm, by means of flexible hours and they are provided support for helping them to ensure success, by means of an optimal mix of resources, persons and technology. The university manages an "all you can learn" scheme in three months for a cost of 2,250 USD (Brower, 2014).

Capella University's FlexPath

In 2013 the United States Department of Education approved the on-line CBE program, designed for adults mainly in the areas of business administration and health management. Students progress at their own rhythm until they demonstrate command of their knowledge and teachers provide feedback in 48 hrs. or less. It has a cost of 2,200 USD for three months and students can take for the same price all the courses they want (Capella Edu, 2014).

The University of Michigan

■ In 2013 they developed an education program for health professionals based on competencies. There are no classes or exams since it is based on an individualized learning plan and evidence of their professional practice for developing 12 competencies is assessed. Students receive support for the realization of their professional activities with guidance, support and mentoring. It is expected that students publish the outcomes of their work in peer reviewed magazines, as part of the program to ensure that their experience can be shared with other professional health educators (The Regents of the University of Michigan, 2013).

Purdue University

■ Purdue University began a degree competencies program in September 2014. The College of Technology program allows students to advance at their own rhythm as they show mastery in specific skills, in place of measuring performance with calendar intervals or class periods. In this manner, competencies will indicate to employers what the graduates can do, instead of considering "letter grades" as an indicator of academic achievement.

To drive the degree program in competencies, at the beginning of that year, the President of Purdue University, Mitchell Daniels, announced 500,000 dollar grants. The first one would be assigned to the first program or department in creating a three year degree, and another for the first one to create degree by competencies. Recognition for the three year degree program was for the Brian Lamb School of Communications. Students will graduate with the same degree; but with one more concentrations that reflect their interests and passions.

Rasmussen College

■ In 2014 they incorporated the Flex Choice model into their academic program for the business, graphic design, accounting, children's education and information technologies areas. The courses are based on competencies and students can advance at their own rhythm, once that they have demonstrated command of the skills and concepts. Additionally, it allows them to save up to 14,000 USD in comparison with the traditional program and even conclude their studies six months sooner (Werthman, 2014).

University of Texas System

■ In 2015 they will launch their CBE program from senior high school to postgraduate levels for the sciences, technology, engineering, mathematics and medical sciences areas. These will be offered in on-line and hybrid formats. The state of Texas has a deficit of employees in these areas so the institution partnered with industry to ensure that study plans align with the needed skills (LaCoste-Caputo, 2014).

Where is this trend heading?

Today, students demand more direct connections with employers, in this manner learning and work are becoming two inseparable concepts. According to a McKinsey study, the skills that are needed in the working world have quickly increased from 178 in September of 2009 to 924 in June of 2012. (Christensen & Weise, 2014).



Estimates are that by 2020, 65 percent of jobs in United States will require a university degree.

This is why universities are under pressure for reducing their costs and finishing time so that graduates can join working life sooner (Wade 2014). According to a report by the [College Board](#) over a period of 40 years of continuous work, a person that has a university degree at the undergraduate level earns 65 percent more than a person with a high school diploma (Baum, MA & Payea, 2013), so that obtaining a professional degree remains attractive (at least in the United States).

More and more universities and companies are offering educational programs based on competencies by means of degrees and/or certifications (Weise in Everson, 2014). An example of this is the alliance between Starbucks and the University of Seattle, which allows employees to obtain university credits for their job training (Quinton, 2013). Also, the University of Texas offers courses based on competencies aligned to what industry needs. This can increase the number of professionals ready to enter into market areas with high labor demand (LaCoste-Caputo & Adler 2014).

In June 2014, [Wakefield Research](#) applied a survey to 500 university students about trends in higher education, and the outcomes identified two main trends: The first is that students perceive the university as an important milestone to be realized so as to have a satisfactory career in their professional life, nevertheless the cost of university is perceived as a great challenge and 44 percent of students aged 18-23 years believe they will be unable to pay off their student loans debt before turning 50. Also, most students decided to change their decision to attend university due to its high cost (eCampusNews, 2014).

The second trend identified in this survey is the proliferation of on-line learning and the use of digital components in learning. 68 percent of students said that the availability of on-line courses will be an important factor in their educational experience, additionally 42 percent of the students said that they obtain better grades in on-line courses in comparison with instructor-led courses (eCampusNews, 2014).

> CBE and micro-credentials

Currently a title or an academic degree are the standard credentials offered by universities, but they do not measure all the knowledge that a person acquires because learning never stops. CBE proposes a new approach based on micro-credentials that certify the academic and professional learning that a person acquires throughout their life (Blake in Degreed, 2014).

In a traditional program, barring some exceptions, students do not receive credit for what they know since they are obligated to learn within a system with fixed periods, and their progress is linked to a course curriculum where mastery of learning is not assessed. (Mazoue 2014). Assessment by competencies addresses the acquisition of credentials for the development of skills and the experience that a person acquires throughout their life. Other options are also developing such as digital badges that represent a manner for recognizing and showing many types of achievements. This approach is used by companies, governmental organizations, and museums, among others (Blake 2013).

> CBE and “non traditional” students

Today, approximately 85 percent of US higher education students, do not have a profile of a “traditional” student, this is, they are not students between 18-22 years of age that attend full time, that live on campus and have the support of their parents (Bushway y Everhart, 2014). These “non-traditional” students are middle-aged adults that work and that are also in search of a professional degree (Wade 2014). University systems including most on-line programs, are not designed for satisfying the needs of this type of students, since they need to be flexible media that can validate knowledge acquired outside of a classroom and where what is important is the acquisition of knowledge and demonstrating mastery in the subjects instead of hours invested (Merisotis 2013).

> CBE and permanent learning

Differing from the traditional model that has an interdependent structure, CBE proposes a change towards modularization. Learning becomes a permanent search activity aligned directly with work objectives (Weise and Christensen in Horn, 2014). But it is not only about obtaining a work position, but also the way in which the needs for permanent training and professional careers are evolving. Today’s students need new ways for developing skills and acquiring the credentials they need for performing professionally at any time and at any age, with the purpose of applying their knowledge in an environment of constant change (Bushway & Everhart, 2014).

> CBE and MOOC

The MOOC are a means by which students can learn and acquire new knowledge. These can be part of the portfolios that a person builds with the evidences of their learning (Fain, 2012). Integration of the MOOC and CBE could open new opportunities for students as part of the formal higher education system (Blake, 2014). One of the main challenges of the MOOC is the accreditation of learning. Coursera, Edx and Udacity offer certifications for having concluded courses. In the case of Coursera and edX, they offer certifications of specialization, which incorporate an integrating project (Mcguire, 2014). Nevertheless these certifications are not valid for obtaining official academic credits. In this

sense, efforts have been made such as the case of MIT that grants CEU (Continuing Education Unit), a method recognized in the United States for quantifying the time dedicated to professional training developmental activities. Accreditation agencies will have to find a way for accrediting knowledge instead of the time invested (Black, 2014).

> CBE and adaptive learning

In an approach based on competencies, students advance when they demonstrate mastery of a competence, this being the only factor that determines the student’s progress. In this approach, assessment is immersed in each step of the learning process, with the purpose of providing students with orientation and support (Soares 2012).

CBE can take advantage of the benefits offered by adaptive learning to ensure that students demonstrate mastery in subjects for achieving academic credits and work relevance (Helix Education, 2014). Adaptive learning uses data and information based on the performance of each student, which allows designing the course depending on individual learning level and advancement at their own rhythm, while learning based on competencies releases students from the “time factor” and provides more flexibility as they demonstrate command of academic contents (Durden, 2013).

A critical point of view

Implementation of a CBE model represents changes and challenges, which may cause resistance to change and questions about its effectiveness. Questions of different types exist with respect to the suitability of the model and different points of view. Some of these are addressed as follows:



:

I am already implementing CBE, why return to the subject once again?

This is a frequent criticism by teachers, although in reality it could be a true lack of awareness of what a CBE model truly implies. Teachers are frequently heard asserting that they are already implementing education by competencies; nevertheless it is necessary to study this approach in depth, so as to have a clearer vision that allows identifying the difference between what is currently being done, with the structure that makes up a CBE model. Bringing about the implementation of a CBE model requires true awareness of the subject by all involved, otherwise, it will only be failed attempts and with disappointing results.

CBE does not develop work competencies for the future

In practice, it has been observed that the implementation of CBE has a strong approach towards employability, developing short term competencies in professionals for entering into the working world. Nevertheless, it is also observed that today the working world faces a very dynamic scenario, where new innovative companies are quickly created establishing a referent towards new skills and required competences. This is why the definition of competencies must be performed from the point of view of short, medium and long-term vision, preparing

students for the needs of the current world, but also for the changing factors of an uncertain future.

CBE focuses only on the employability of students

The concept of competencies has been frequently associated to a utilitarian and efficientist character and to the subordination of education to the productive sector. And therefore the risk appears of focusing only on work, without considering the personal development and comprehensive training of the person, as an affective, social, political and cultural being (Tuning, 2007). The fact that there are educational institutions that give priority to work is not a product of the competencies approach, but rather of their own educational project or of an inadequate conception of this approach (Tobón, 2006). The suitability of a comprehensive definition of competencies must also contemplate performance with excellence in the other fields of human life and not only at work (Tobón, 2006).



Challenges

CBE faces several challenges that must be overcome for achieving the most optimal outcomes of this model. The following page presents the most relevant challenges.

Challenges

1

Greater recognition and understanding of the model

This learning model is still relatively new for many, so that it has not yet achieved general adoption and acceptance. The graduates of programs based on competencies will very probably be received with skepticism in the working world, since many employers are still obligated to hire according to traditional programs or even, to grade averages.

2

Change of educational paradigm and adoption of the model

Transition from a system based on credit-hours to one based on competencies is a significant task, even for institutions that decide to gradually adapt their educational programs to this model. The change will represent great challenges, such as the construction of educational policies that contemplate issuance of credentials and a model of equivalencies with the traditional system, as well as a new curricular design, among others.

3

Correspondence between the curriculum and the needs of the environment

The structure of the curricular process is complex since it requires a deep analysis for achieving an appropriate correlation between the country's educational program and educational policy, social and industry needs. For this it is necessary to establish collaboration among docents, businessmen, experts, board members, students and society.

4

Recognition of prior learnings

Learning experiences can come from different environments, for example, by means of work experience, corporate training, independent study, courses without accreditation or even personal travel. The implementation of a CBE model must include mechanisms that allow assessment and accreditation of prior learnings, in this manner if a student is able to accredit a competence, they can be promoted to another level or higher grade.

5

Transferability of competencies

Today, there are no standards for the accreditation and transferability of competencies between institutions, this represents a great challenge for the formulation of pedagogical models in any institution. In many universities, accreditation based on credit-hours still prevails; this has no direct correspondence with the CBE model. Implementation of this model must take into account that it is necessary to design policies or instruments for recognizing and validating learning obtained by students. .

6

Mechanisms for the visibility of competencies

It is important to create administrative and technological conditions that facilitate students in demonstrating their knowledge and the application of their skills in different scenarios, in such a way that they make sense and have meaning for others; making necessary the creation of new and innovative tools for curricular mapping or e-portfolios centered on the student that give transparency to the acquisition of competencies (Clawson, 2014).

7

Development of data systems for assisting the teacher

Teachers need to have data systems on the students with their individualized learning paths, in order to provide appropriate orientation and guidance. Teachers need this information for identifying when a student has issues and needs assistance.



Recommended actions for teachers

Recommendations prepared by the Observatory of Educational Innovation for teachers that will allow them to explore the potential of Competency Based Education.

Know the CBE model in depth



Deeply study this approach and identify its benefits. True awareness is required on the part of all those involved for ensuring the success of the implementation of this model.

Develop new docent competencies



Perform an analysis and reflection of the competencies that need to be reinforced, or even developed, for realizing their docent practice in an effective manner in accordance with the educational model by competencies.

Enrich curricular design



It is important that teachers be involved in the restructuring and enrichment of the curricula, by means of practical inquiries in the classroom to clearly identify the correspondence between curricular design and the actual needs of the student.

Adopt a role of learning facilitator

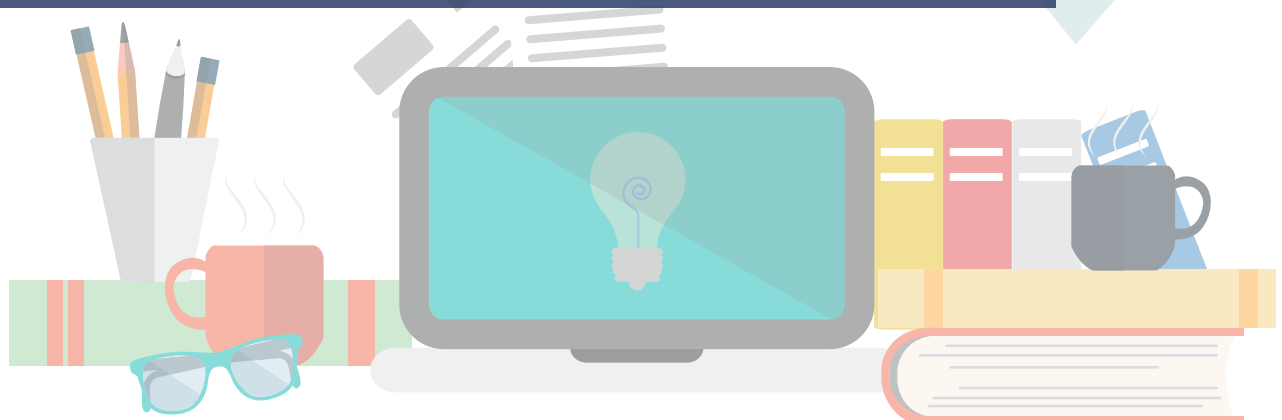


By being a learning facilitator, the docent must foster autonomous learning, design learning activities and strategies in different scenarios, making it possible for students to acquire an active role in the activities and become interested in them.

Design evidences of value



The teacher must design evidences of value, which by themselves allow demonstrating the student's competencies for sharing with the outside world.



Recommended actions for academic leaders

Recommendations prepared by the Observatory of Educational Innovation for academic leaders that will allow exploring the potential of Competency Based Education.



Involve faculty in the curricular process

Participation of the teachers is indispensable to be able to contrast the curriculum with their docent practice. The teacher can enrich the design and restructuring of the curriculum by means of their feedback.



Generate assessment strategies of the model

Work in the construction of strategies that include metrics for measuring the success of competencies based programs to be implemented. The more these metrics are linked to the existing system of institutional indicators, the more effective the assessment of the model.



Create a multidisciplinary team

For the construction and implementation of the model, it is important to ensure the creation of a multidisciplinary team that contributes different points of view from their fields of action. For example: Parents, students, businessmen, government, teachers, experts in education, experts in the model, former students, prospects.



Gather the Institution's prior experiences

Investigate the actions that have been performed in the institution, related with CBE, to know what worked well and what did not. Identifying the participants in these projects is important, since they can be valuable persons for comprising the multidisciplinary team.



Realize Comparative Research

Investigate the actions that have been performed in the institution, related with CBE, to know what worked well and what did not. Identifying the participants in these projects is important, since they can be valuable elements for comprising the multidisciplinary team.

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