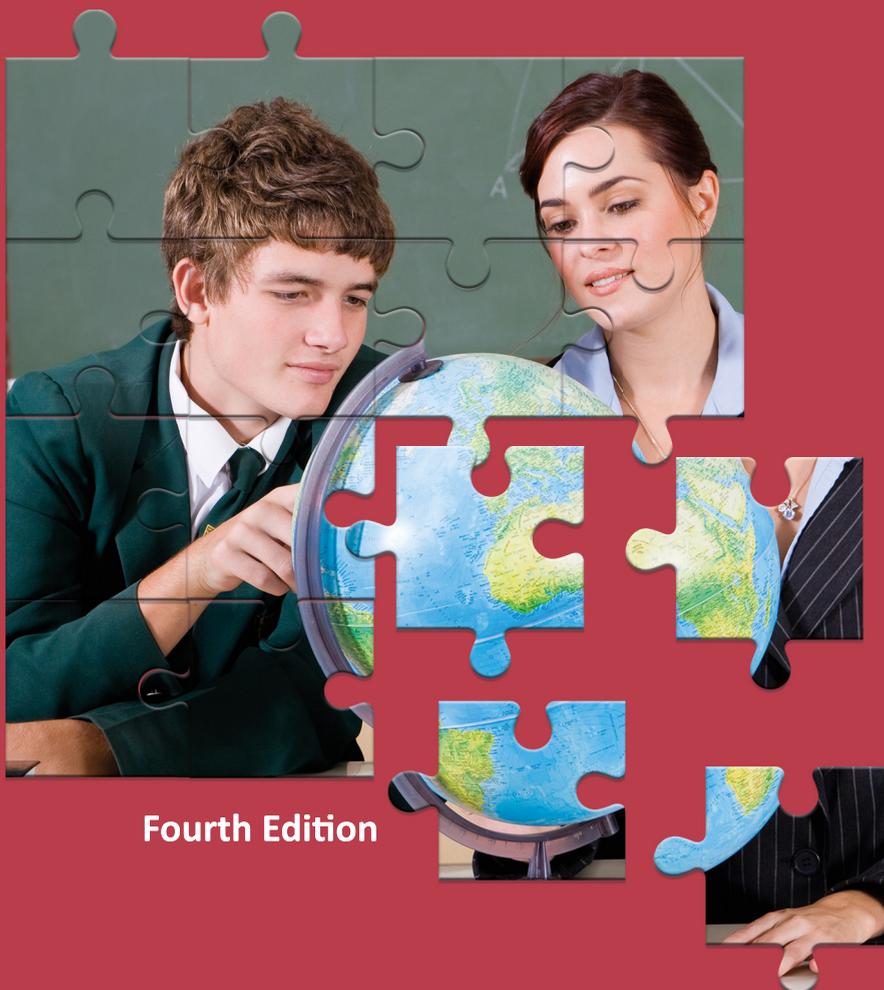


Integral Formation and Competencies

Complex thinking, curriculum, teaching and assessment



Fourth Edition

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Integral Formation and Competencies

Complex thinking,
curriculum, teaching and assessment

Dr. Sergio Tobón
KResearch

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First edition: 2015
ISBN: 978-0-9969924-0-4
Edition: U.S
Address: 801 International Parkway • 5th Floor •
Lake Mary FL 32746 • USA

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Prologue

This book by Professor Sergio Tobón on competencies-based formation is a document of strong academic rigor, of relevant and profound analytical capacity and timely applicative presence in the crucial world of educational challenges. Always the questions and proposals concerning the educational are full of interest and pressing concern. However, in the middle of the current globalization, complexity, and search for a sustainable future we require to investigate and apply new perspectives rightly directed towards the integral human development, since it depends a lot on the possibilities to improve the quality of life of millions and millions of human beings.

At this crossroads of problems and valuable answers required, this book is a timely and significant document. Proposes, as a good scholar and practical enthusiastic of educational action has to do it, with rigor and the vision anchored in reality, a pedagogy based on competencies from the complex thought. This requires poise, serenity of analysis and good evaluating judgment. Thus, the author does not stop at the iconoclastic attitude who opposes the economism potential alternative, which considers the competencies as an educational formula whereby any purpose, process and educational goals are reduced to the interests of economic processes. For this, the author inserted the competencies discourse in an open and dialectic vision of the personal life, cultural contexts and formation proposals, for example, in a perfect sample synthesized as overcoming any potential labor and economic reductionism, the following three areas of competencies: the labor and business, socio-cultural integration and self-realization. That is: form to be effective, to be solidary in the inevitable encounter with the other to manage own's ethical life project.

The ideological risk of the competencies proposal, as the center of an educational proposal, which then becomes a negative proposal, happens if, forgetting the etymological meaning of competence, it's equated with competition and competitiveness, as indeed on many occasions in the journalistic, politics, business and professional languages. As presented in the book, competere, means pursue something with others. That is, someone is competent when able, and ready to concur with others in performing some activity. Competence, then, brings a team together, to do with others, and be able to do with the other because each one is able to contribute in that to each other. Someone is competent when can join in a task with others.

From that significance is derived something magnificent and demanding for the complex system of the educational activities, whether formal, informal or non formal.

And we all recognize ourselves in a weave of living with others to do our part for the best

educational effort. Learning to be competent is to be formed at a personal, cultural and socio-labor conception that we all are called to self-realization in the best way possible and to live peacefully and in solidarity. But this is precisely the risk and equivocal problematic nature of competencies when is mistaken with competitive .

In a world like today's, under a globalized economy and need of competent people, it is easy to drift towards competitiveness. And it is from that economist foundation that it is understood and accepted that people should strive to be suitable, as long as it allows them to be competitive, a term that adds semantic dimensions such as fighting and rivalry. Let's see: humans are educated to know to be and know to do. Competitiveness refers to Know to do and just to know to do, in its current semantic reduction.

This crucial point is the one this book by professor Sergio Tobón perfectly solves: competencies formation proposed from the complex and ecological world of our current view of reality, can not refer to competitiveness of whom only gets formed competently as a way to get more power or dominate and exploit others. The competencies based formation proposed here from the systemic-complex paradigm and from the vision of Article 1 of the Declaration of Human Rights (1948) deals in an integrated manner a competencies teaching that is cooperative. Thus, it is prone to a psycho-cultural learning project that achieves a personal effort from human beings to be formed in the most appropriate and competent way in order to meet in a social space that enables equality, freedom and brotherhood of all.

One of the greatest satisfactions of recent years, in my long career as professor and researcher of Educational Theory and Social Pedagogy in the College of Education at the Universidad Complutense de Madrid, has been to meet, in the current crossroads of existence, with Professor Sergio Tobón. Meeting him to discern the progress of his work and research is a good example of dialogue. The analytical attention which with he listens, the serene ability of sincere feedback that from his active thought reconstructs and integrates what listened and with simple spontaneity with which manifests securities and questions, are poetic and practical expressions of competence on the know to do and know to be, which are in turn manifested in this book.

Indeed, responding today to the challenges of our culture from the angle of education with the proposal of educational competencies, requires maturity and clarity of thought and personality. This is not done to be in the sequence of a fashion, now emerging, more or less famous. But rather because, as done here, we find this proposal develops an approach to our culture and an expression of how to perform the educational alternative that will provide new perspectives to education professionals, the leaders of social life and, in general, to responsible citizens of the current crossroads. All, in the effort to form competently to do well cooperatively. The example of some companies that have

managed to link the work with quality of life and that is evident in the satisfaction and the smile of its members shows that this plan of being educated to be competent cooperative is an alternative of high relevance to address many of the problems and challenges of our days. The clarity, analyzed scholarship and permanent involvement with life make the following pages a lively gateway of cooperative competencies, how could it be otherwise if they are competencies for effectiveness, solidarity and ethical project of life management.

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Introduction to the First Edition

Competencies-based formation is a proposal of the meaningful learning and focuses on the integral human formation as essential condition of all pedagogical project, it integrates theory with practice in various activities, promotes continuity between all educational levels and between them and the working and living processes; encourages construction of autonomous learning, directs the formation and strengthening of the ethical life project; seeks the development of entrepreneurship as the basis for personal growth and socio-economic development, and founds curricular organization based on projects and problems, transcending thus the compartmentalized subject-based curriculum.

Despite the advances that have been made in the conceptualization of the competencies and the rise of publications in this area over the last decade, currently there are a number of gaps in this approach that make it significantly difficult to use in education (formal, non-formal and informal), namely:

- Competencies tend to be conceptualized in a reductionist and fragmented way, which is why its addressing from the search of effectiveness and efficiency in service to economic interest primes, without regard to their comprehensiveness and interdependence with the ethical project of life and social fabric construction.
- The competencies approach entered education as a fashion, from a context of uncritical and decontextualized thinking, ignoring the socio-economic determinants that have influenced their emergence and contributions of various scenarios to the construction of the concept (disciplinary and social).
- There is inconsistency and lack of clarity in the conceptual structure of the term competencies, which leads to confusion with other similar concepts such as intelligence, functions, capabilities, qualifications, skills, attitudes, dexterities, achievement indicators and standards.
- Educational projects remain under rigid structure from compartmentalized subjects. Methodologies are missing to guide teachers on how to design curriculum under competencies having as a basis the accumulated knowledge, teaching experience and new paradigms, as in the case of complex thought.
- Although ideal performance is emphasized, there is an absence of an explanatory conceptual model that takes into account the relationship between cognitive processes, instruments and strategies within the framework of the know to be, know to know and know to do.

- Finally, teaching is still anchored in the magisterial or expository teaching within a classroom context, with little connection to Information and Communication Technologies.

This book intends to make a series of suggestions and reflections in order to help overcoming the gaps described and provide a set of suggestions for establishing quality educational programs in the elementary, middle, high and secondary levels. To do this, the text has been divided into three

parts. The first part presents an integrative conceptual model of competencies, on the basis of complex thought and the historical development of the concept (chapters one, two and three). The second is of an applied nature and is intended to guide teachers and education administrators

on curriculum design under competencies based on complex thinking

(chapters four, five and six). Finally, the third part presents a proposal to undertake formation and competencies assessment from the framework of strategic teaching and teacher self-reflective activity (chapters seven and eight).

The competencies-based formation is a topic of great and current interest in various fields (education, social and business). For this reason this book is aimed at a wide audience: teachers, lead teachers, principals, school administrators, members of professional associations, educational researchers, human development managers, occupational psychologists, parents associations and business managers.

The author expresses his appreciation and gratitude to the following people: José Angel Lopez Herrerías and Juan Antonio García Fraile, doctors in education and professors in the Department of Theory and History of Education at the Universidad Complutense de Madrid, for the input and suggestions provided for this text, to Dr. Carlos Emilio Barrera León, for his support in the implementation of several professional development programs based on competences in the institutions he has led, to Dr. Jose Leonidas Fernández Tobón, for his constant advice in the articulation of complex thought to education; to Dr. Carlos Alberto Pérez Londoño, for his advice on the assessment and certification of competencies for technical programs, to Dr. María Victoria Bustamante Ramírez and Dr. Delfín Ortiz Montoya (experts in curriculum design under competencies norms), for their guidance, support and counseling in the implementation of competencies in education. Finally, the author acknowledges the advice given by Dr. Roger Loaiza Alvarez in the articulation of a competencies-based formation in virtual education and higher education in various projects in Latin America.

Introduction to the Second Edition

The first Spanish edition of this book was published nearly fourteen months ago and six months ago the first reprint was made, soon becoming in a book widely read and consulted in Colombia and other countries on the topic of competencies. Several authors have commented on the book, and, in general, have highlighted the following aspects: the articulation of conceptual aspects of critical reflection and its applicability, the approach of competencies with reference to complex thought, the proposal of a to curriculum design methodology on the basis of the educational action-research, and the explanation of a model for understanding the involvement of metacognitive processes on every competence.

However, like any human product, this book is not perfect and requires periodic reviews and updates to avoid losing relevance in its purpose to illustrate some basic aspects of the complex world of competencies. Thus from various seminars, conferences and courses taught by the author with professionals from several countries in Latin America, has realized the need to clarify to a greater degree the competencies based formation and, therefore, has incorporated the following new aspects regarding the first edition: (1) analysis of the competencies given the complexity of institutions (chapter one), (2) relationship of competencies with management policies and quality assurance (chapter Three), (3) linking competencies approach to instructional design (chapter three), and (4) presents some complementary aspects to competencies assessment (chapter eight). It has been sought to maintain the structure and approach of the first edition of the book.

There are many people who have contributed suggestions to improve the quality of this work. I specially appreciate the contributions of my friend Dr. José Angel López Herre-rías from the Universidad Complutense de Madrid for his guidance in the analysis of competencies with a critical and proactive spirit. Also I want to highlight the contributions of Dr. Juan Antonio García Fraile from the Universidad Complutense de Madrid, who has guided me in the application of the different approaches to competencies based education. I also acknowledge the assistance of the business administrator, Luz Marleny Montoya Agudelo in the articulation of competencies with management and quality assurance models. Finally, I express my gratitude to Dr. Roger Loaiza Alvarez for his help in the dissemination of this work internationally and the management of seminars and courses in which they have addressed many of the themes in this book.

The general purpose guiding this book is to contribute to the reflection on how to improve the quality of teaching at different levels of education, moving from the political and philosophical to practical issues regarding the organization of the curriculum, the definition of the purposes, context research and evaluation processes of learnings. It is

not to impose a particular point of view but to promote the revision of the ideas and enable the emergence of new proposals on the design and teaching work from the scope of the competencies. Therefore, I invite readers to share views and proposals regarding competencies based formation, to foster a team effort that enables progress in the rigorous construction of this perspective of education. Similarly, I appreciate any comments or suggestions to improve the quality of contents of this work, so that the book is in a constant improvement as is the essence of the competencies approach.

A very interesting discussion that has been generated in courses and seminars dictated by the author is whether the competencies are a pedagogical model or an approach. In this regard, among the authors working in this area are different positions. The position that is addressed in this book is that competencies are not exactly a pedagogical model: in view of the current developments in the area, competencies can only be considered an approach, i.e. a particular look to educational processes having as a reference the ideal performance. In itself, the competencies work in education is insufficient to think and address the complexity of the act of learning and teaching. A pedagogical model is much broader and presents a type of human being to form, a philosophy, values, a certain form to address teaching and learning, etc. And this does not happen with competencies, as these can be articulated to different profiles, philosophies, epistemologies, teaching strategies, evaluation mechanisms and curriculum planning. This implies for educational institutions to define and build the pedagogical model from which they will address competencies based formation. In the present work, we have tried to provide some coordinates in this sense, because although it has not followed a pedagogical model in particular, it is proposed to have as a reference in the design and applicability of competencies the complex thinking, the socio-formative approach and cognitive pedagogy, which is based on the developments of cognitive science and research in learning strategies, processes of understanding and creativity.

Introduction to the Third Edition

The concept of competencies is not new, but from ancient civilizations it has been addressed explicitly or implicitly, because it has always been considered that people should do what they should do with appropriateness and ethics. However, it is in the 70s and 80s of the twentieth century that the concept has an academic structure and begins to apply in the area of human talent management and in some educational environments. In the area of human talent management, competencies are beginning to be considered as attributes or performance of individuals to have better output and quality in their work within an organization, which was the basis for forming national training systems for labor in Europe, Canada, the United States and several Latin American countries (Mexico and Colombia, among others) as well as promoting changes in the processes of selection, evaluation and training of staff in business organizations. Similarly, the concept begins to apply in technical education institutions in order to find a higher relation of curricula with labor challenges.

However, is in the mid-nineties that, given the urgent need to establish new strategies to overcome the problem of low quality of traditional education, it is proposed the competencies-based formation as an alternative, and so it begins to be implemented in various educational levels and to be considered more and more often in educational policies of several countries (e.g. Australia, Finland and Colombia). Today we can assert that formation oriented around competencies has positioned in the field of education. This is evidenced by multiple experiences of application that have allowed the improved understanding of competencies, implementation methodology and management processes, both of which had a poorly development some years ago. So, we have gone from a state in which we were speaking about competencies in small environments to be a guiding model of education policies in multiple countries, both in Europe and the American continent, to be present at the great educational discussions and debates, and to be a highly researched topic nowadays. Also, many eminent investigators who formerly opposed competencies, or saw this concept with skepticism, today have incorporated it into their pedagogical and methodological approaches.

Following Professor Edgar Morin, competencies will not produce any significant change unless we change the way we think and feel what is the formation of people. And indeed, competencies have been applied in multiple educational institutions and organizations, but the change still does not have enough impact, because we have difficulty changing ways of thinking and addressing educational practices. That is why we are facing the following challenges:

1. Society and politicians to consider education in society as the essential axes for social and economic development, establishing clear educational policies, consistent and relevant to the current and future context, learning from past mistakes. This would increase resources for education and enable higher educational leadership and management and a greater involvement of social organizations, businesses and families.
2. To conceive curriculum management as an ongoing process in the educational institution, and not as a stage on the design of study plans. This requires monitoring and evaluation of curriculum that enables continuous improvement. It is also necessary to have simple methodologies for curriculum management that address the essential and don't get lost in the details, in order to facilitate its application.
3. To orient competencies learning from the integral human formation which should be the purpose of education, integrating the know to be, know to do, know to know and know to coexist, beyond traditional academic content.
4. To begin to emphasize in the formation of integral people, competent in changing scenarios, and not to limit formation to complete forms and having educational programs under competencies.
5. Overcoming the tendency to follow the structure of the traditional subjects and advance towards more flexible and dynamic strategies such as formative projects, which shift from the academic content and guide formation by addressing context problems.
6. To integrate into all areas of formation and evaluation the ethical life project as the essence of the integral formation from the complex thinking, so that people are able to meet the challenges of personal fulfillment in dynamic interaction within the social fabric, economic development, culture, art, recreation and the environment.
7. Taking the evaluation of learnings as the essential way of formation, transcending the tendency to evaluate using quantitative notes and integrating evaluation by performance levels (for example, many educational institutions have been working for several years under competencies, but still evaluate by notes as they have done it traditionally).
8. Implement teacher and directors professional development processes that are constant and are within the framework of strategic planning.

9. Move urgently to the application of competencies in the classroom and go beyond the speech, since in this field we tend to analyze and plan a lot, but to do little. It is essential, therefore, that the educational planning under competencies do not remain on paper but to reach students.
10. Finally, it requires removing barriers and obstacles, legal and administrative, to make reforms and educational transformations a reality, both at the government level as at the educational institutions level, through a clear understanding of the implications of addressing competencies in students from the perspective of the integral human formation.

In order to address these challenges is that we propose the socio-formative approach (also called complex approach) to competencies, to generate a shift in thinking among principals, teachers and the community, and to make possible the transformation of education. For this, we base on the complex thinking, a method that proposes a change of thought to think reality in its systemic complexity.

Now it is necessary to analyze whether the competencies are an approach or a model. In the second edition of this work was proposed that competencies, in general, were an approach and not a model, because they had a focus on formation. Today, this situation is changing due to multiple theoretical and methodological developments in this area, and that is why it can be posed that it already exists a pedagogical model of competencies, which although is just developing, transcends the characteristics of an approach. The reasons are: (1) the initial focus on the action to face problems with responsibility and suitability has been transformed, and today competencies are approached from an integral human formation considering the different processes involved in education, including policy decisions, human talent management (directors, faculty and staff), the social challenges, the role of families, the resource management, quality management, research and welfare of students, (2) there are great guidelines around the type of human being to be formed and has moved forward on the philosophy with which education should be oriented, and (3) there are significant achievements in direction and management of the curriculum, as well as in the approach to teaching, learning and assessment, considering the social context. These three aspects, among others, set up the competencies as a pedagogical model and thus transcends the character of an approach.

However, the concept of approach does not disappear, but it is left for the different perspectives or emphases that are in competencies. Examples of approaches are: behavioral approach, functionalist approach, constructivist approach and socio-formative approach. In this book, although taken into account general aspects of the competencies model, is emphasized in the socio-formative approach which is the approach the author has been devoted to.

Based on the lessons learned in this work, it has been modified significantly the curriculum management methodology from the socio-formative approach, which has been synthesized to make it more practical and feasible to implement. In this regard, several studies were conducted in different countries in order to identify the essential axes that must be in the curriculum from this approach, and that's how it came to the construction of the methodology GesFOC (Systemic Management of Formation under Competencies), which is based in metacognition, action-research and process of creative entrepreneurship. This has enabled to manage educational reform processes in a more agile manner in several Latin American countries.

In this third edition of *Integral Formation and Competencies. Complex thought, curriculum design and teaching*, we provide a number of innovations compared to previous editions. The first change is the title. From the diverse experiences of implementation, formation has been assumed comprehensively, thus overcoming restricted conceptions that we had a few years ago around competencies. From there, the title is: *Integral Formation and Competencies. Complex thought, curriculum, teaching and evaluation*.

The following lines describe the changes made in each of the chapters. In chapter one, the features of the socio-formative approach within which we articulate the competencies in the integral human formation and ethical project of life are described in more detail. We also analyze complex thinking skills, which are essential to take into account in the process of change, both in the thinking of teachers as well as in the educational structures.

In chapter two has been included an increased synthesis of the fields that have made contributions to the competencies model and it has been added the scenario of the educational quality management. In chapter three a recent methodology has been added for the description of competencies from the socio-formative approach that is simpler than the traditional. Likewise, differences between competencies and other educational concepts have been improved. This is of great importance in the current implementation of this model because there continue to be many confusions between competencies and other concepts, not only among teachers, but also among education principals and in some projects for national and international application.

In chapter four, we have modified the curriculum management methodology under competencies, to make it more simple and easier to apply. In chapter five there have been some improvements in the methodology of formative projects, arising from the application processes at different educational levels. In chapter six was revised the metacognitive model of performance under competencies. In chapter seven the teaching competencies model was added, taking as reference studies by CIFE Corporation, and in chapter eight the assessment with systemic matrices by performance levels was inte-

grated, which is one of the latest conceptual developments from the socio-formative approach in the area.

As in previous editions, we hope this book feeds new research, applications, reflections, discussions and projects in all levels of education and human talent management that contribute to improve integral formation, comprehensive and relevant to people so they can meet the challenges of personal fulfillment, social fabric, the economic and business development, the ecological balance, entrepreneurship and coexist in solidarity and cooperation. And for this, it is necessary for competencies to be addressed with flexibility, self-criticism and continuous study, to be conceived as a benchmark of how best to advance appropriate formation, looking for simplicity and not for complication.

Finally, readers are invited to assume competencies as a model to improve the quality of education and not as a panacea to all educational problems, or as the ultimate goal of education, because we have to consider that human being is not reduced to competencies but the human being is a whole comprehensive and holistic, in a culture and homeland, human being has a meaning of life, spiritual experience, an artistic sense, and transcendence as a person, competencies being only one dimension of human action. In this sense, education should focus on the person in its entirety, in its historical becoming and ongoing human development, hence competencies need to be addressed as a manifestation of this comprehensiveness.

Introduction to the Fourth Edition

This book is a new edition of the work *Competencies Based Formation*. Complex thinking, curriculum design and teaching, which already has three editions since 2004 and which title was changed in the third edition published in 2010 to give greater emphasis to the integral formation and to consider competencies as the key structural element of that formation, based on the socio-formative approach.

A new edition is justified when making changes or improvements that influence a structural component of the work, without the number of modifications being relevant, that may be few or many. Sometimes, a single modification or complement in a chapter can change the direction and approach of the other components of a book, or lead to a better understanding or implementation of what is exposed. To this must be added that for the improvement of a book deemed as a new edition is thus necessary that both, the author and the publisher conceive it as necessary, and fully justified.

What justifies a new edition of this book, when less than two years go the third edition was launched? The third edition of this work has been well received by readers, has inspired a large number of research and publications, and in several countries has become a reference text for teachers and people who work in the area of human talent management. In this fourth edition is advanced in a simpler and operative model to determine competencies and formulate relevant curriculum based on social-formation.

Competencies have each day a higher ranking in education. Have gone from being a secondary element strongly criticized to become a key concept of education at all levels. This is how most educational reforms that are taking place in Latin America consider them as a relevant and structural axis to achieve quality. Also, many technical institutions and universities are addressing competencies in the design or redesign of curriculum, both at the undergraduate and postgraduate and for continuous education. This shows the importance of this concept at present and the need to understand and apply it with relevance.

This is also happening in social organizations and business, which in front of the continuous changes and the emergence of new challenges posed by the knowledge society are restructuring human talent management as the main reference of competencies. This is how many organizations in Latin America are having positive results and positive impact by focusing on individuals, allowing to face difficulties and generate new products and/or services, a task in which technology and financial resources are not sufficient.

However, just as has been progress in improving educational and organizational processes through the work with competencies, there a number of challenges that is necessary to address, such as:

1. Making education a fundamental right, in coverage and quality, and at all levels, not just elementary. Quality education should be for all, not for the rich or for those with greatest skills on logical-mathematical analysis or those with better grades. Competencies can not be used, as is currently being done in many countries, to select people for the purpose of providing educational services. On the contrary, competencies should be used to ensure that all citizens have the educational service that best fits their profile and needs, without excluding anyone.
2. Having theoretical and methodological domain of competencies work. Often-times many principals and teachers have the best disposition to educational change, but lack of substantiation of how to bring it to reality and this requires specific training through conferences, seminars, courses, diplomas and/or graduate programs, as well as reading various materials, critically evaluate educational experiences and socialize what is done to learn from both, the successes and difficulties.
3. Making planning processes based on competencies simple. The emphasis on the concept of competencies has lead to the development of educational planning methods in great detail, sophistication and with multiple components, both for the curriculum as well as for the teaching sessions and assessment processes. This, in practice, is complicating the work of teachers, administrators, supervisors and advisors, because it involves to fill in a variety of formats and spend considerable time doing it, while the challenge is to implement the approach with students and support them to reach the exit profile established. Planning is necessary, but should be addressed simply and considering the fundamentals. The teacher, as a professional with criteria, may be free to do the respective complementation or adaptations according to the needs each one has.
4. Apply complex thinking in oneself, with others and the environment, and not to accumulate much more knowledge about complex thinking. Many teachers spend time reading the works of Professor Edgar Morin, and even sign in for courses and postgraduate programs about his work. The main challenge is not to learn more about complex thought but have it and practice it to be able later to form it in students, so they act with understanding, relevance, flexibility, bonding, creativity and ethics.
5. To transcend traditional approaches to competencies. There is still too much emphasis on addressing competencies from behaviorism and functionalism, al-

though educational institutions declare explicitly they follow constructivism. Traditional approaches have provided major contributions to the understanding and application of competencies, but it's time to find other references, and this is why is important to consider social-formation, an approach that has a systemic vision around education and human talent management based on relevant performance and ethics.

6. To address the educational quality assessment systemically. Very often educational quality assessment is done by applying tests to determine cognitive achievement, and this leaves aside multiple intelligences, performance facing real problems and ethics. Furthermore, rarely quality of education is assessed considering the socioeconomic environment, students' nutrition, the quality of educational materials, the social and family environment, management of principals, the way teachers work, the conditions of the study sites, the influence of different media, among multiple interrelated elements. The socio-formative approach seeks precisely that quality education is addressed by considering the different factors that influence and that each actor in the process take its responsibility with facts.
7. To transform traditional tests for assessment of learning into competencies-based testing. Progress has been made to have competencies-based educational reforms, but the tests that continue being applied in most Latin American countries to determine cognitive achievement remain under the traditional methodology, focusing primarily on content. It is necessary to transform testing, so that tests focus on performance levels and problems rather than content. This is a great challenge mainly in Chile and Mexico, countries with advances in the curriculum under competencies, but whose national assessment tests for cognitive achievement remain by subjects.

Considering these different challenges, the following improvements or updates have been made to this edition:

In chapter one, "Human formation and competencies: the socio-formative approach", a decalogue about how to understand and apply the socioformation in educational practice and human talent management, has been added. This responds to the request of many teachers to have a synthesis of the key principles of this new approach, which could guide them in everyday activities.

In chapter two, "Historical development of the concept of competence", we added a reflection on the current Latin American scenario contribution to the theory and methodology of competencies. Traditionally, educational models and approaches addressed in Latin America have been imported from the United States, Germany, Italy and France, among other countries, but with the competencies model there is a great opportunity

to build an educational model contextualized to the reality of our countries, and this is already being done with the contribution of different researchers, experts and teachers themselves in their classrooms. Even Professor Edgar Morin has said that Latin America is the continent called to revolutionize epistemology, philosophy, social sciences and education, to achieve a homeland and a new relationship with nature.

In chapter three, “The concept of competence. A socio-formative perspective”, significant improvements were made in the drafting of generic and specific competencies based on socioformation and recent advances in this area. We also worked to make more clear the method of identification of competencies in the curriculum and components that they must have. Also, we added some evidence in the generic competencies proposed by CIFE Corporation, to facilitate teaching and evaluation.

In chapter four, “General guidelines for the design of socio-formative curriculum”, there was a modification of the approach and went from having a general methodology to a series of steps, due to the need to provide a minimum framework for institutions to build or rebuild their curricula under competencies. From ten axes that were in the previous edition we have twelve in this one, based on the evaluation of recent experiences in the area that have allowed new insights about the factors of success that should be in the curriculum. However, it is still emphasized that this should be a continuous research process, based on teamwork and reflection.

In chapter five, “Formative projects: general methodology”, some improvements have been made to the wording and a section added with the analysis of frequently asked questions in this area, so that teachers have better clarity of this methodology. First of all, we have sought to clarify the relationship and difference with modules.

In chapter six, “Ten essential actions in competencies articulating metacognition”, has grown from nine processes in the formation and application of competencies to ten, the result of the comparative analysis of teaching experiences using educational action-research in the classroom. New processes have been added, such as the emphasis on conceptualization, assertive communication, transversality and resource management, other processes have been integrated, such as sensibilization and attention. This is a major modification of the book, and also the most recommended aspect to take into account by teachers in the classroom, because rather than having a renewed pedagogical speech, what is required is continuous improvement of the learning practices that benefit students in a real way.

Chapter seven, “Core Competencies of teachers and administrators”, was the sixth chapter in the previous edition. In this chapter has been established the minimum competencies education administrators must possess, this section has been taken from the content about the matter in chapter three, but expanded based on several workshops

developed with education administrators in Ibero America. Teaching competencies have also been improved adding essential evidence for assessment. Teaching strategies that were here before, have been moved to chapter six and integrated with the learning strategies because we believe that having several categories tends to confuse teachers in their daily practices.

Finally, in chapter eight, “From the evaluation to the assessment of competencies”, the paragraph on the application of the evaluation with the meta-evaluation process, a key component of the current socio-formative proposal has been complemented.

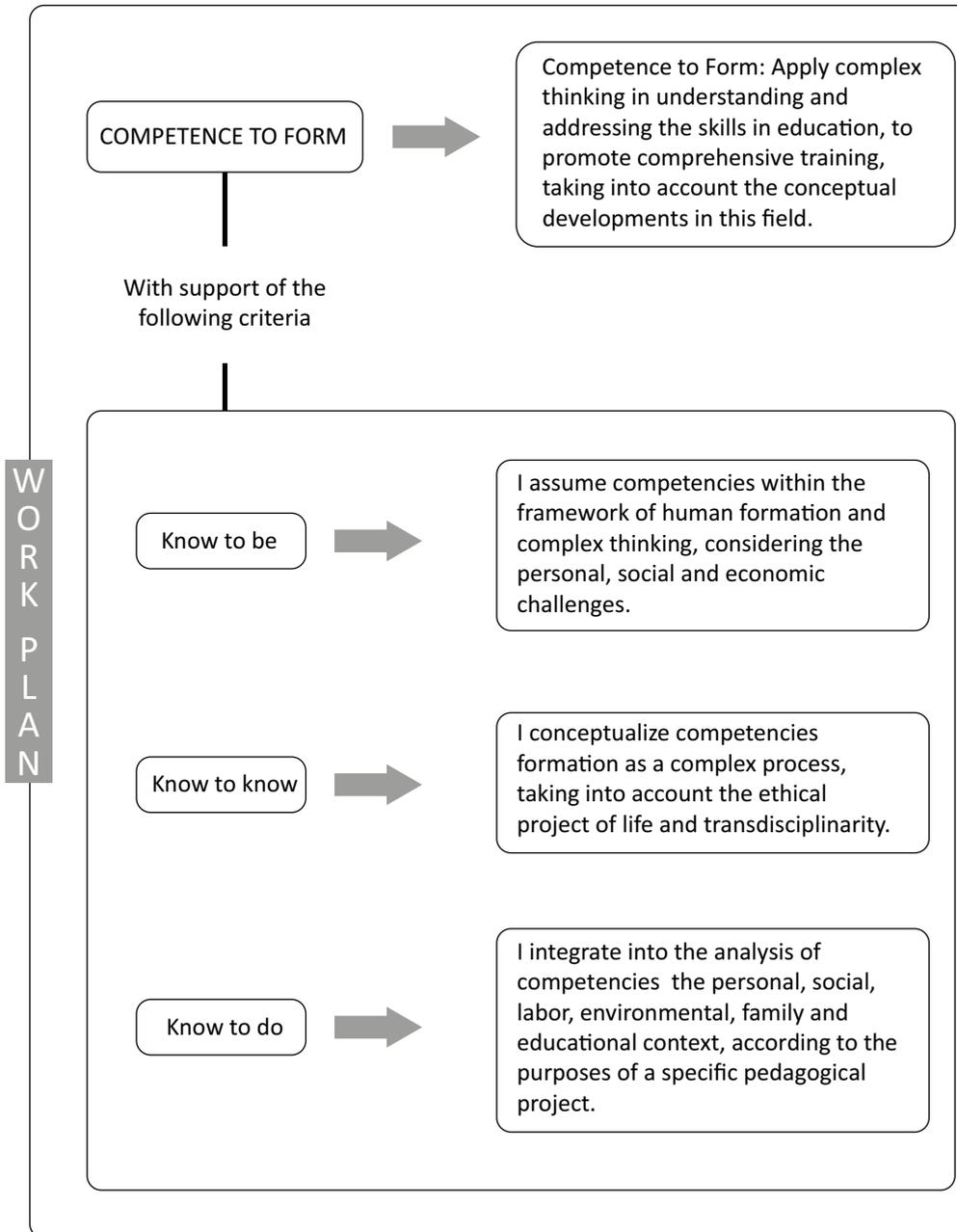
The author welcomes any comments and reflections that may arise concerning this work, as well as suggestions for improvement that readers deem relevant. It is also an invitation to become members of the international community for the study and research of competencies, which can be accessed via the following web address: www.cife.org.mx. There experiences of applying competencies can be presented, visitors can also ask questions and raise discussions on the topics covered. This new edition has many contributions to this form of networking with teachers.

Chapter one

Integral human formation and competencies: socioformative approach

The human being is physical, biological, psychological cultural, social and historical at a time. It is this complex unit of human nature which is completely disintegrated in education through disciplines, and is what has made it impossible to grasp what it is to be human. It is necessary to restore it so that each individual, wherever they are, take knowledge and awareness both, of their complex identity and their common identity with all other humans.

Edgar Morin (2000a, p. 14)



1. The socio-formative approach

1.1 Definition and main characteristics

Competencies are comprised of different approaches (see Table 2). One of them is the socio-formative approach, which is defined as a frame of educational action- reflection that aims to create the essential pedagogical conditions to facilitate the formation of integral and comprehensive people, who are competent to meet the challenges/problems of personal development, life in society, ecological equilibrium, cultural and artistic creation and professional-entrepreneurial performance, acting from the articulation of education with the social, community, economic, political, religious, sports, environmental and artistic developments in which people live, implementing meaningful formative activities. It differs from other competencies approaches because it emphasizes how to change education from changing the way of thinking of the people responsible for it, through action-research processes, taking into account the individual as a whole, one of whose dimensions are competencies.

The essential purpose of the socio-formative approach is to facilitate the establishment of resources and spaces to promote integral human formation and within these, preparing people with competencies to act with suitability in various contexts, based on the construction of the ethical life project, learning to undertake, and their cultural experiences, considering the social and economic dynamics. The socio-formative approach is structured in line with the development of socio-cognitive complex curriculum (Tobón, 2001), Habermas' Critical theory (1987), The Fifth Discipline (Senge, 1994, 2000), Complex Thought (Morin, 2000a), The socio-cognitive paradigm (Román, 1998, 1999; Román and Diez, 2000), 1994, The competence-based formation (Maldonado, 2001), The conceptual pedagogy (Zubiría, 1998) and Strategic Learning (Pozo and Monereo, 1999) (see Table 1).

The socio-formative approach does not focus on learning as a goal, but in forming people with a clear ethical life project under social, cultural and environmental interdependencies and the synchronous and diachronic dynamics. Formation, so understood, transcends then learning because it has a vision of the human person as a whole, considering people's dynamics of change and continuous accomplishment. This involves studying human being as it is, but primarily, all that can be constructively and ethically, performing the pedagogical mediation from self-realization of the person corresponding to the strengthening of the social fabric and economic development.

Why Complex? Complex, in this context, is not what is complicated, but the systemic changing relationship in an ecological environment. In other words, it is the fabric

comprised of the parties in a dynamic-evolutive whole. And that's where it comes the ethical commitment, because in order to act ethically it is required to act systemically (i.e., taking into account the implications of the actions in own's personal development, in the welfare of others and the environment), and systemic performance happens when acting ethically (following firm values such as respect for life, justice, truth, cooperation, coexistence, freedom, dignity, etc.). Hence, an educational model based on complex thinking is a model with a strong emphasis on ethic experiences in an ecological context.

The socio-formative approach of competencies has the following features:

Competencies are assumed as one more dimension of the human person, which is considered in its entirety and phylogenetic and ontogenetic evolution, articulating the biological dimension to the psychological, sociological and spiritual dimension.

Competencies are not the ultimate goal of education, as nowadays is commonly observed in educational policies in some countries, rather competencies are only one component of integral human formation to live in interaction with oneself, others and the ecological context. In addition, there are education processes that do not pass through the frame of competencies, such as the meaning of life, artistic creation and spiritual experience, etc. And this keeps in mind the complexity perspective of education.

It is given decisive importance to the fact that formation is a systemic process of co-responsibility between the person and the social, cultural, economic and ecological environments. This means that action must be taken not only in the learner and his/her formation, but dialogic and recursively one must also act in the social, political, economic, family and institutional context.

Unlike other approaches, in socio-formative approach competencies are not a response to the requirements of the context, but competencies are the actions the person has in an ecological framework, in accordance with the personal needs and interests, activities required by the context, coping with problems and creative and entrepreneurial taking on new challenges. Context is dynamic and interacts with the person, who creates new demands for performance facing activities and problems which combine the operational with the creative and proactive. There is then a two-way: the person acts on and modifies the context, and context, in turn, generates situations that drive the creative action of the person.

The education based on the socio-formative approach of competencies takes on the challenge of ethics formation in all educational areas, because ethics is not considered

as a competence but as the structuring essence of all competences.

Competencies are not tasks, behaviors or functions, not aspects referred only to specific, observable actions of people. In socio-formative approach, competencies are integral actions of people to activities and context problems with continuous improvement, ethics and suitability, as they articulate knowledges (know to be, know to coexist, know to know, and know to do) to handling external context situations, assuming the changes and uncertainty with autonomy and creativity. They are an expression of integral human formation, part of dynamic relationsz culture, art, recreation and the urban and natural environments.

An educational model based on the socio-formative approach of competencies conceives the human being in his/her entirety and evolution, in ecological interaction with the environment and society. This implies the challenge of orienting the formation to work with projects, which are the ideal environment to address integral human formation, not just the learning, as has been the traditional concern of education.

The socio-formative approach promotes addressing integral human formation as a system, and to that extent, it aims to identify the essential elements or nodes of formation, which guide its structure and dynamics. This has an important practical application and it is not to focus on all the details of formation when teaching, but turn our gaze to the essential elements that structure formation, which makes the process simple and facilitates the development of the expected competencies. This is comparable to the analysis of the leverage points of a system (Senge, 1994, 2000), in which the system structures in its essential factors and from there is where change occurs. Therefore, if we want to create change in learning and mediate for students to reach increasingly higher levels of formation, it is necessary to identify and target on teacher's actions within those nodes.

For example, it is common today to find competencies based curricula with a large number of components (objectives, goals, competencies, formation areas, thematic nuclei, problem nuclei, subjects, integrative subjects, modules, projects, etc.) pursuing the ideal of being as complete as possible, so as to ensure the integral formation. However, in practice, they are very difficult to apply for the many aspects that should be considered. In the other hand, in a systemic perspective the structural axes of a competencies curriculum are sought, and this makes the curriculum simple and feasible to implement. These are the curricular aspects that actually have an impact on formation. Thus, it is clear that the purposes and objectives have to be considered in education, but in educational management these two aspects are integrated in competencies, without being necessary to explain them as such.

This is what happens when, in the absence of systemic performance, educational

management turns complicated with so many details and lack of prioritization, and then we move to the other extreme that is simplification, reducing everything to one or very few variables with no clear structure. An example of this are the highly complicated models of competencies assessment being applied in various educational institutions that include a high number of components (competencies units, competencies elements, criteria, evaluation criteria, indicators, evidence, assessment strategies, assessment tools, assessment types, etc.). This ends up making the assessment of competencies a practice difficult to perform in everyday experiences with students, and therefore, ends up being simplified, returning to the traditional quantitative grades with some indicators. In the socio-formative approach, assessment has only three basic axes: criteria, evidence and learning maps, so it is easier and feasible to implement.

Table 1. Differences between traditional educational approaches and socio-formative approach

Feature	Traditional education approaches	Socio-formative approach
Concept of Men	The human being is assumed from an unidimensional plane, reducing him to objectified categories where loses his multidimensionality. Sciences and disciplines are addressed without contact among each other.	The human being is conceived in his integrity, within a multiplicity of interdependent dimensions, with a complex mindset whose achievement occurs sharing and interacting with others and the context.
Curricular Structure	Compartmentalized subjects that are grouped to create formation areas.	Problematical nodes and formative projects, which are woven into the challenges of integral human formation, community knowledge and disciplinary knowledge.
Goals	Formation of knowledges and skills subdivided into subjects with low interaction with each other and the real problems of context. They are based on the illusion of certainty.	Mediating integral human formation based on the ethical project of life and the development of basic-generic and specific competencies, so that people achieve self-realization and can contribute to social cohesion, environmental balance and economic development, in contact with historical, cultural and political processes. It moves from the illusion of certainty to the creative and proactive assumption of uncertainty as López (1999) proposes.

Teaching	<ul style="list-style-type: none"> -Instruction methods (active school). -Instruction by operative objectives and observable behaviors. (Instructional Teaching). -Uniform procedures for all students. -The same rhythm of learning. -Presentation by the teacher so the student introjects knowledges (classical school). 	<p>Competencies formation based on the problems of context and interests of the students.</p> <p>Respects people’s learning rhythm given some institutional and social guidelines.</p> <p>Teaching strategies are used that promote the formation of the entrepreneur spirit, exploration and intervention in the environment (formative projects, entrepreneurial constructive workshops, internships, conceptual cartography, etc.).</p>
Evaluation	<p>The evaluation is conceived as a procedure to determine student’s progress in obtaining knowledges established in the curriculum. It favors hetero-evaluation. Evaluation techniques prioritize knowledge tests through written, objective tests.</p>	<p>It works through assessment, which is focused on promoting human formation. Emphasis is on self-assessment of competencies from metacognition. This is complemented with co-assessment (by peers) and hetero-assessment (conducted by the mediator teacher and/or representatives of the education context). Values the know to know as the know to do within the qualitative and quantitative scopes.</p>
Teacher’s Role	<p>In the learning process, the teacher is assumed as information transmitter or sociocultural animator. The teacher is who plans, implements and evaluates.</p>	<p>The teacher is assumed as a mediator of integral human formation, from the counseling, support, advocacy, instruction and resource management. The aim is for students to build a strong ethical life project and develop the competencies established in the curriculum through affective-motivational learning strategies, metacognitive-cognitive and performance strategies. Students are supported to be themselves who plan, implement and evaluate the learning process.</p>

1.2 Differences with other approaches to competencies

The socio-formative approach is one of the latter approaches that have been developed to guide the understanding, implementation, formation, evaluation and certification of competencies in education and in organizations. This approach is similar to other approaches of competencies in areas such as: (1) it takes into account the study of the context, (2) searches more integrative curricular designs with respect to the traditional curriculum, (3) is based on teaching strategies that take into account the different knowledges of competencies, and (4) the assessment is based on criteria and evidence. However, the socio-formative approach differs from other approaches in several points, which are described in Table 2. It is noteworthy that the socio-formative approach

gives much importance to the ethical commitment, and sets this as a transversal axis of competencies formation.

Table 2. Comparison between different competencies approaches

Feature	Functionalist approach	Behavior-Organizational approach	Constructivist approach	Socio-formative approach
Concept of competencies	Performance of labor functions.	Performance based on behaviors that contribute competitive advantages to organizations.	Performance on labor and social dynamic processes, addressing dysfunctions that arise.	Integral performances to face problems and life situations with suitability, ethics and continuous improvement.
Key Concepts	- Functions - Labor Areas.	- Observable behaviors - Organizational goals analysis - Key Competencies	- Labor and social processes - Analysis of dysfunctions.	- Development of complex thought competencies - Ethical Project of life - Creative Entrepreneurship.
Epistemology	Functionalist	Neopositivist	Constructivist	Complex
Privileged Methods	Functional Analysis	- Registration of behaviors - Analysis of behaviors.	Employment prototype studied in its Dynamic (ETED, per its Spanish acronym) (Mandon and Liaroutzos, 1998).	- Educational Action-Research - Reflective workshop.
Characteristics of curriculum	- Sequential planning from the competencies. - Much emphasis on formal aspects and documentation of the processes.	- Emphasis on delimit and disaggregate competencies.	- The curriculum tends to be inclusive addressing dysfunctional processes of the context. - Tends to emphasize on labor type functions and less in social type dysfunctions.	- Emphasis on the systemic educational model, the curriculum map for formative projects, teaching teams and quality assurance.

Implementa- tion with students	Functionalist modules based on learning units.	-Subjects -Self-learning materials.	Subjects and formative dynamic spaces.	Formative projects.
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1.3 Construction of knowledge from unity in diversity

Everything that happens in and around formative processes occurs in the framework of dynamic and self-organizational interdependencies that produce continuous changes, where the various components enclose a multidimensionality that integrates cognitive, affective, administrative, political and technology aspects (Ruiz, 2000). Initially, in the mid 50s, the general systems theory was developed, which provided a reference for understanding the dynamic organization of education as an integrated system of interrelated subsystems. Then, complex thought was established, which complements the systemic epistemology addressing the construction of knowledge from the essential skills of complex thinking (metacognition, dialogic, metanoia, hologrammatic and self-organization), based on the interweaving of the parts into a whole, and the relationship of these parts together, considering the chaos, change and uncertainty. This involves understanding what is the complexity, and in this regard professor Morin (2000b) explains it as follows:

Expectations are not met and a God opens the door to the unexpected. This is complexity. Nobody can determine safely, accurately, what will come. Therefore, should not rely on probability, must always be seen the possibility of the improbable (...) Any action once launched enters an interaction game and feedbacks in the medium in which it is made. All this interaction and feedback can divert one's purposes. Even lead to a result contrary to that expected. It means that by knowing what is going to occur from an action, should be integrated into the knowledge the role of its context, of its environment (p.36).

Complex thinking is a method of construction of human knowledge from a hermeneutic, or interpretative and comprehensive view, retaking the explanation, quantification and objectification. It is a method that, as any road, has not been made or traced, but is done by walking it, as well expressed in Machado's poem (1998) Walker, there is no path, you make it by walking ... Thus, complex thinking is a new rationality in addressing the world and the human being, where are interwoven the parts and elements to understand the processes in its interface, recursion, organization, difference, opposition, and complementation, within factors of order and uncertainty. So says Morin (2000a):

Complexus means what is woven together, in fact, there is complexity when the different

elements that constitute a whole are inseparable (Such as the economic, political, sociological, psychological, emotional, mythological) and have an interdependent, interactive and inter-retroactive weave between the object of knowledge and its context, the parts and the whole, the whole and the parts, the parts together, complexity is, in fact, the union between unity and multiplicity (...) (p. 31).

Unlike traditional epistemology that assumes knowledge alone from the cognitive level, complex thinking addresses it as a process that is, at once, biological, cerebral, spiritual, logical, linguistic, cultural, social and historical and therefore binds to human life and social relationships (Morin, 1994a). Therefore, the construction of knowledge should take into account relationships between man, society, life and the world (Roza, 2003).

It is important to note that complex thinking does not reject the certainty in benefit of uncertainty, separation in benefit of inseparability, nor logic to authorize all transgressions. By contrast, this epistemology consists in making a constant back and forth between certainties and uncertainties, including the elemental and the global, between separable and inseparable.

The “complex thinking is primarily a thought that relates” (Morin, 2000c, p.67). It is not about abandoning the principles of classical science -order, separability, logic- but to integrate them into a framework that is both broader and richer. This is not to oppose a global and an empty holism to a systematic reductionism, is about incorporating the concrete of the parts to the totality, articulating the principles of order and disorder, separation and unity, autonomy and dependence, which are both complementary competitors and antagonists within the universe (Morin, 1997).

From the framework of traditional rationality the addressing of human formation is very limited, since that rationality tends to manage knowledge from the authority, finds it difficult to assume the change in ideas, unaware of their limits and denies affection and love. Thinking education complexly requires of a new rationality, as proposed by Morin (2000a):

True rationality, open by nature, speaks to a reality that resists. It operates a constant coming and going between the logical instance and the empirical instance, is the fruit of rational debate of ideas and not the property of a system of ideas. Rationalism which ignores beings subjectivity, affectivity, life is irrational. Rationality must recognize the side of affection, love, repentance. True rationality knows the limits of logic, determinism or mechanism, knows that the human mind could not be omniscient, that reality entails mystery, it negotiates with irrationalism, the dark, the irationalizable, is not only criticism but self-criticism. Recognizes true rationality for the ability to recognize its shortcomings (p. 20).

Below are noted schematically the central axes of complex thinking:

- Antagonistic notions come together without losing their differentiation and particularity (dialogic principle), which are excluded and rejected in the classic paradigm (Morin, 1992). Through dialogue we can make the different logics concur and complement .
- Processes are self-producing and self-organizing, while the effects produce causes and causes produce effects (organizational recursion) (Morin, 1996, 1997) Systems tend to be self-loops, creating their own autonomy, in order to preserve keeping their features, for which spend and draw energy, information and organization from the ecosystem where they exist (Morin, 2000b) People are self-eco-organizer beings, as from the dependence of the social ecosystem they are able to develop their identity as human beings from the autonomy.
- There are systems in which the part is in the whole and at the same time, the whole is in each of the parts (hologrammatic principle) (Morin, 1996 1997), this implies the need to know the whole to understand the parts, and study the parts to know the whole: If all things are cause and are caused, aided and helpers, mediate and immediate, and all interwoven by a natural and seamless lasso, which links the most remote and the most different, it is impossible to know the parts without knowing the whole and not knowing the whole without knowing particularly the parts (Pascal, 1976).
- The object and the subject are integrated: the researcher (conceptualizer), that observes the object is observing himself. In the classic paradigm, knowledge passes through the observer without breaking or crush him due to neutralization (Rozo, 2003). In socio-formative approach, knowledge on the object is analyzed in relation to the subject, and an observation is made about the observation, i.e., we analyze the effects of the own attitudes and mental models in developing the knowledge, methodology design and its application.
- The phenomena has regular and irregular features. Such characteristics interact in social processes within a continuous organization determined by the order and disorder.
- Qualitative analysis with quantitative analysis are combined, as with numbers can not be interpretation and with words can not be description with precision, which makes necessary to think what is done (Ibáñez, 1994).
- Reality is conceived as a process in continuous change, thus should have flexibility in how to address it.
- Complex thinking is not holistic nor totalitarian; it seeks to link the elements and

phenomena establishing their relationships with each other and assuming their differences. “The complexity, according to Morin, is not completeness is the union of simplicity and complexity. It is the practice of the double game of analysis and synthesis “(Ciurana, 2000, p. 56).

- The complex thinking has an ethical mission: to promote dialogue between ideas, encourage encounter between people and create bonds of solidarity, seeking a humanized homeland.
- The complex thinking does not oppose the simple thought, on the contrary, it proposes to address the construction of knowledge from the thought that separates and reduces along with the thought that distinguishes and rebind. “This is not about abandoning the knowledge of the parts by knowing the wholes, or the analysis by synthesis; is necessary to conjugate them” (Morin, 2000a, p. 36).

1.4 Development of complex thinking skills

In socio-formative approach of competencies is essential to develop and strength complex thinking skills, and this goal is present in all educational settings. This is one of the points within which are major differences with other approaches to competencies, that focus on the competence itself and not in its deep structural aspects, or in its inclusiveness.

Why is the development and strengthening of complex thinking skills presented? Current education continues emphasizing to separate the parts to know them, and little emphasis is put on relating the parts together from a whole. If we want to form integral, comprehensive, competent and ethically committed people, it is essential that education be directed to form human beings who address things by relating them to each other, in their unity, not to assume them separately. This is what Professor Morin proposes (2000d): constructing knowledge in its multidimensionality requires a complex mind or an ordered mind, from the transformation of our simple mind.

Competencies are the proceedings facing various life situations at the personal, social and environmental-ecological levels, with ethical commitment and suitability for which it requires the person to develop and apply the different complex thinking skills described in Table 3. What complex thinking skills to form? There are diverse complex thinking skills, but the most significant are: metacognitive skill, dialogic ability, metanoia (resilience) ability, hologrammatic ability and self-organization ability (see Tobón, 2010).

For education, this means: (1) establish more horizontal administrative structures in

educational institutions, based on teamwork, cooperation and solidarity, (2) train administrators, teachers and families in complex thinking skills, (3) implement curriculum management processes based on the dialogic, metacognition and hologrammatic (Tobón, 2010), (4) guide learning from formative projects articulately; and (5) facilitate the formation of complex thinking skills through learning activities and competencies assessment processes.

Table 3. Main complex thinking skills

Ability	Description	Examples
Metacognitive Ability	Is to reflect on own's performance facing activities and problems, and improve performance from such reflection. It is an essential skill in all competencies.	A student reflects on the causes of his/her poor academic performance and improves it through concrete actions such as attention in class, review notes, preparation of synthesis of knowledge maps.
Dialogic Ability	Is to seek to supplement ideas, approaches, theories, methodologies and different or opposing points of view to act more integrally, to create and innovate.	A social sciences professional who seeks multiple coping strategies to face the problem of violence and then articulates these strategies together looking for them to complement, in order to generate greater impact.
Metanoia (Resilience) Ability	Is to address objects, processes and actions in reality from two or more different perspectives, for greater impact in what is sought, and also to create and innovate. This enables also actions to be flexible.	A teacher who faces the need to improve their mathematics program seeks how to enhance learning investigating new strategies such as problem-based learning, Kolb's experiential learning method and working with maps (García Fraile and Tobón, 2009), from which develops an innovative formative path.
Hologrammatic Ability	Is to seek that each activity performed has as such the structure of the whole of which is part. Thus, when applying this skill, each part contains within itself the structure of the whole that contains it.	This ability is exemplified when a teacher in his/her subject (PART) takes into account the institution educational model (ALL).

Self-organization ability	Is to build process looking for them to have a strong structure that enables their evolution and continuous improvement, in the framework of changing relationships with the environment.	For example, an entrepreneur who creates a company with a solid strategic direction, which means that the company is in continued growth, evolution and improvement, through changing relationships with other business and society, assuming new requirements of the context, and reaching new scenarios (eg. internationalization). In this regard, the company is organized from an autonomus element: its strategic direction, which is key in its evolution and continuous improvement.
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1.5 Concept of formation in the socio-formative approach

Human formation is traditionally conceived in education from a rigid, fragmented and decontextualized perspective from the self-realization process and the socio-economic fabric (Tobón and Agudelo, 2000). At the root of this is the fact that in the social and human sciences there has been a tendency to assume the subject taking as reference, explicitly or implicitly, the classic positivist paradigm (Rozo, 1999). Formation, in general, refers to the construction of skills, abilities, knowledge, attitudes and values within the framework of a set of personal potentialities. However, it should be mentioned that each era, science and social process has given a different answer to the human formation, which “is a complex process that represents a challenge to the traditional epistemological conceptions” (Lizarraga, 1998, p. 156). This means it is not possible to think human formation within the framework of unidimensional, simplistic and univocal epistemological proposals, so that complex thinking is a relevant perspective for reconceptualization.

In socio-formative approach, formation is seen as socio-formation, which realizes the integration of social and contextual dynamics that operate on the individual with the personal dynamics, hence formation is the resulting from the articulation of socio-historical processes and individual processes (Lizárraga, 1998). This articulation is given in a continuous interweaving of relationships through language and communication. Morin (2000a) says: “The human is a fully biological and fully cultural being that carries this original uni-duality” (p. 40).

Also says: “Man is only complete as fully human by and in culture. There is no culture without human brain (biological apparatus equipped with skills to act, perceive, know and learn), and there is no spirit (mind, mente), i.e., the capacity for consciousness and thought, without culture “(p. 41). So there is an inter-creation between man and culture: culture creates man and man creates culture. It is from this postulate

that arises the proposal to address competencies formation as a recursive and dialogic process through which society forms its members for self-realization and in turn, is the formation what enables permanence and the continuous re-creation of society.

Socio-formation implies that society as a whole allows spaces, resources, strategies, support, purposes, rules, demands, expectations and values to mediate the formation of its members, in order to maintain and reconstruct itself continuously facing changes, within the framework of certain contexts.

The coherence and subsistence of society is not done spontaneously, automatically. Society consists of diverse groups and individuals that, if left to themselves, would fall into anarchy and society in dissolution. An ideal, an aspiration, a common type of life is necessary to keep them together and save differences and disputes that arise between groups and individuals. Education is one of the means -perhaps the main- with which this unit is performed and enables coexistence of the members of society (Luzuriaga, 1954, pp. 28-29).

This means, then, that the survival of society is only possible through education, which is an essential means in order to achieve unity and conflict management. Formation is historically conditioned but not historically determined. Through self-reflection, each person always has the ability to build their way of being, thinking and feeling, taking distance from the constraints and blockages that often places the social context.

As clearly raises Morin (2000b), society produces its members, but each member contributes to produce the society. In the self-realization process, every member of society undertakes actions, performances, works, activities and projects which with has a responsibility to help to further improve the quality of life both of himself and of others. This implies that formation is at the same time, subject formation and construction-reconstruction-transformation of social fabric, in a reciprocal and two-way relationship. We can bring this in a more deterministic way saying that full human self-realization requires, as a rule, of the contribution of the person to the improvement of the conditions of life of the community, looking for a change in social structures when they do not respond to the collective welfare.

Society requires the formative process of its members, but also all formation requires from society for realization. Therefore, there is no society without formation or formation without society. Even the most individual of the formations is not carried out in vacuum, in solitude; it is always required an other and a context. Here the concept of society integrates the labor-business aspect, which also has the challenge to assume its role in education, for which should address people as ends in themselves and not as means, with a view of development at a human scale (Max-Neef, 1996),

where the solidarity primes over the competition (Merlano, 2000).

Education, understood from socio-formation, “is a function of the society through which it attempts to develop or facilitate man’s plan of life and introduce him to the social and cultural world” (Luzuriaga, 1954, p.28). Education, therefore, “is performed during the life of man, from birth to death, reaching all dimensions, from the organic to the spiritual” (Luzuriaga, 1954, p. 28).

It is necessary to consider that all human achievement is only possible by integrating the individual with society and species, in a recursive tissue: “All truly human development means joint development of individual autonomies, community participation and sense of belonging to the human species” (Morin, 2000a, p. 42).

Autonomy involves the formation of individuals who can think for themselves (Ruiz, 1999) and this is only formed from a dependence relationship (Morin, 2000b). Let’s see: the individual is born in society according to some goals and purposes of this, with a relation of emotional, physical, cognitive, sensory, motor and affective dependence that is essential to live. From this dependence has the challenge of building on the individual level his autonomy, within the ethical life project.

This way, the individuals assume a responsibility to themselves, others and the homeland, in a continuing search for their full sel-realization. Consequently, competencies formation is given from an ongoing relationship and complementarity between dependence and autonomy.

1.6 Formation as a complex system

From complex thinking a system is a set of elements related by multiple links, able, when interacting with their environment, to respond, to evolve, to learn and self-organize (Morin, 1993). The elements of any system get organized around a purpose. Education is a system and as such raises the requirement to perform a reflection on the actual functioning of its components in interaction with context, taking into account their long-term evolution.

Education, as well as society, is also a complex macro-process (Michel, 1996) involving multiple factors in relation and that makes it a dynamic, varied and diverse subject (Ruiz, 2000) (see Table 4). However, pedagogy currently lacks an adequate understanding of complexity as inherent to the formative process, which ends often producing in educational agents chaos and confusion that affects their teaching and administrative efficiency (Ruiz, 1999).

Table 4. Formation as a complex system

Goal	To form diverse, multicultural and changing human beings.
Environment	Continually changing by technological, social and entrepreneurial transformations.
Types of education	Primary, secondary, labor, technical, higher and continuing, which, despite the variety of their objectives, should be articulated.
Pedagogical models	Diverse. Each has its own objectives, philosophy, concept of man and methodology.
Relationship with the environment	It is a closed and open system at once. Is closed about its methodologies and philosophies. It is open in front of the social needs and challenges. There is a constant change in the environment expectations about formation, which requires continuous transformation of educational institutions.
Results	The results are not immediate. Occur in time. It is difficult to perform a predictability at medium and long-term of the effects of certain formative activities. Its products are difficult to measure in terms of efficiency and quality. This limits the evaluation through clearly measurable patterns.
Interests	Confluence of different interests: political, philosophical and economic.
Relationship between components	There is a continuous interaction between the various sub-systems that shape education, leading to changes occurring in the formation processes.

1.7 Ethical life project

The ethical life project is the realization of the integral human formation and is the process by which the human being lives seeking his/her fulfillment according to his/her vital needs for growth and a particular view of life, taking on the challenges and possibilities of social, community, economic, political, environmental, recreational, scientific, occupational and artistic context, in the present and into the future, with a strong ethical commitment based on the abundance of universal values. This differs from the traditional concept of life project, which has tended to be conceived as a life planning without considering the ethical performance as such.

Today we are clear from the integral human formation that human fulfillment is not possible without ethical commitment. That is why within the ethical life project the following minimum ethical conditions must be met comprehensively:

1. have a peaceful coexistence based on human rights, respect and conflict resolution through dialogue and agreement;
2. contribute to the social fabric through solidarity and cooperation;
3. perform the occupational or labor exercise with suitability and responsibility;
4. contribute to one's quality of life and that of others, and
5. seek balance and sustainability of the ecological environment in the homeland.

This implies a continuous reflection on the consequences of own actions, so that they are directed towards the welfare considering values, and preventing errors and undesirable situations, in others and in the environment. Yet mistakes can be made, but the ethical commitment is to immediately recognize them and correct them before they cause more damage, and repair their negative consequences (see Figure 1).

Education has the challenge to promote the formation of people with a sound ethical life project, with humility to recognize that they can make mistakes, and therefore they need to reflect to act according to the values. The world will move in an ethical direction only if we want to go in that direction, and if we do, we need to develop complex thinking from forming it in the family, school, college, business and society.

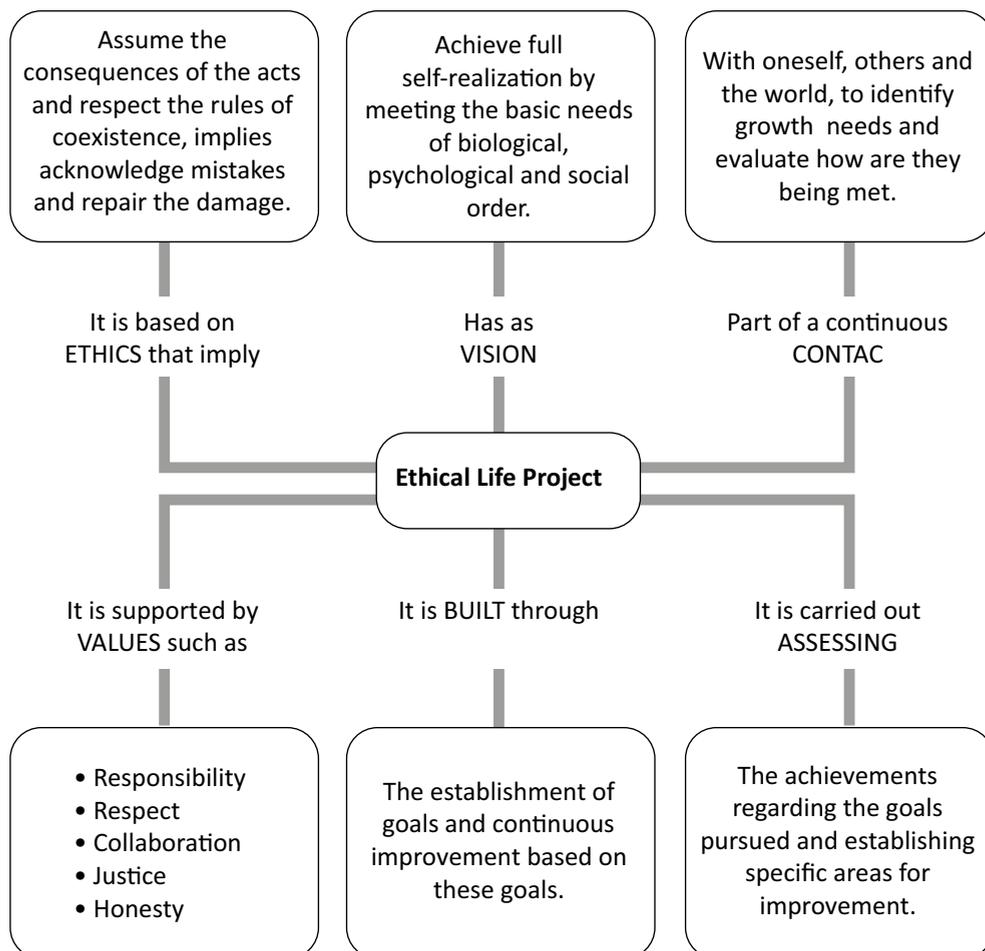


Figure 1. Ethical life project components

1.8 Institutional Formation

Competencies formation often tends to be assumed as a matter of teaching and teacher training, or of organization of the curriculum. This is a simplistic view of competencies based formation that takes little into account the various systemically interrelated aspects involved in every educational act framed in the institutional level. Thus, and taking up the proposal of Zabalza (2003) in the sense that universities are centers of formative decision making, may suggest the challenge of any educational institution, in the field of competencies, is to address the pedagogical level considering all axes, such as: What competencies to form and why? How and where to orient the formation of competencies? What spaces and under what criteria to guide such formation?

This involves assume competencies formation considering the educational process as a system within any educational institution that, in turn, interacts with systems external to it, as can be seen in Figure 2. So, then, the look at any competencies oriented project should focus on students (with their competencies at entry and graduation), managing the human talent needed to carry out the formation of the expected competencies (with a systematic process of selection, evaluation, promotion and professional development of teachers and administrators), pursuant to the requirements of everyday life, society, disciplines, research and productive world (labor), all framed in the Institutional Educational Project (PEI, for its Spanish acronym) agreed with all groups that make up the institution. From this, formation will focus in four interdependent basic processes: teaching, learning, research and extension, all of them necessary to form competencies.

The administration of educational institutions also has a major impact in competencies formation, as they require different resources to mediate this process, beyond the traditional chalk and board, such as well-endowed libraries (with easy access to them by the students) availability of computers, access to information and communication technologies (internet, multimedia resources, etc.), appropriate laboratories, enough sports venues, agreements for business practices, etc. In this, the educational institution must manage resources with various private and official entities, yet the latter must take education as a fundamental issue for social and economic development by offering appropriate financial resources.

Also, competencies formation must be contextualized within a particular community to possess relevance and belonging. And the challenge of the community environment is to validate and promote such formation, looking for its reinforcement and for it to be supplemented with the support of other social institutions such as family, social support networks, recreation and sporting activities, cultural settings and mass media, because it is impossible to make an impact in the formation of high level competencies if there is no agreement and coherence between educational institutions and social processes that permeate and influence people.

Finally, to all of the above must be integrated the implementation of strategic management based on quality management to really ensure the competencies formation consistent with the IEP and the appropriate feedback, control and improvement mechanisms. Without an institutional management and quality assurance system, is impossible to generate a real impact on improving the quality of education, and this must correspond in turn with a management and quality assessment system by the government and independent private institutions.

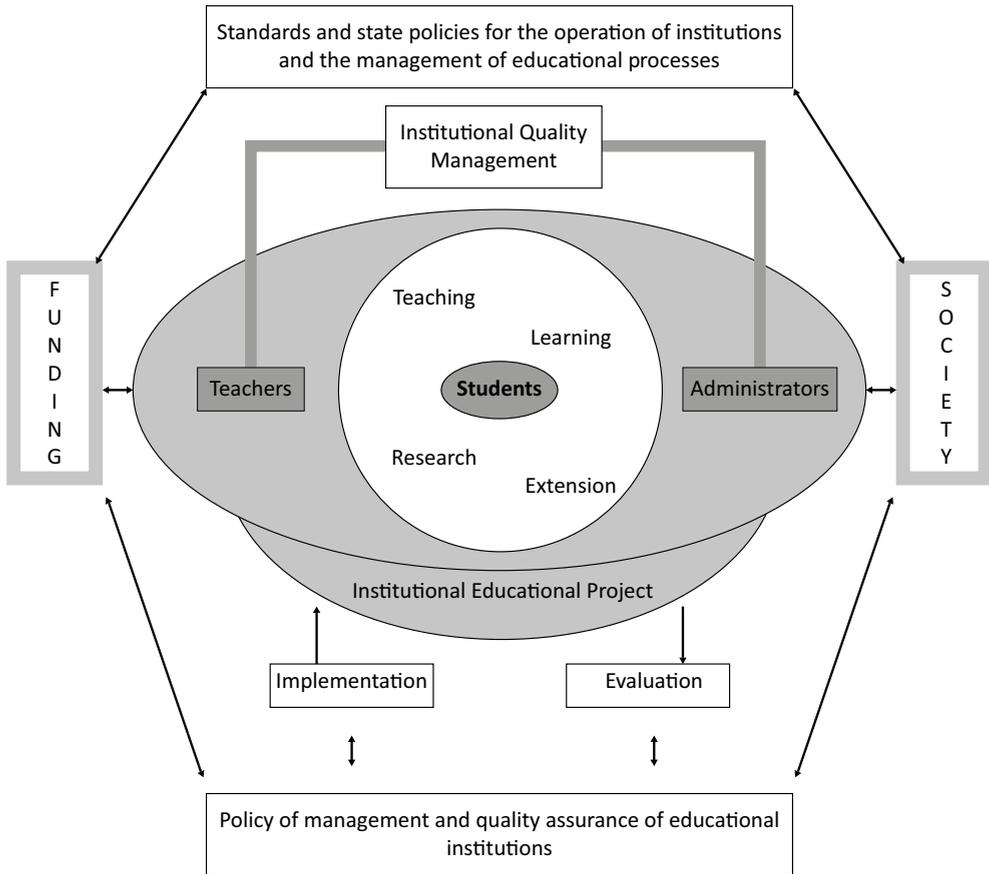


Figure 2. Complex dynamics of the various factors influencing integral formation and competencies development

2. The seven necessary knowledges for education in the future

The contributions of the complex thought to the formative process are focused on the Seven knowledges that Morin (2000a) has proposed as necessary for the educational system (see Table 5). They must be taken into account in any pedagogical proposal and are essential to the competencies-based education. It is very important that these knowledges are taken into account in the training of administrators, teachers and parents.

Table 5. Necessary Knowledges for Education in the Future

Name	Gaps in traditional education	Knowledge constructed from complex thinking
1. Teaching of the knowledge process and its tendencies towards illusion and error	Education does not teach or enables the spaces and appropriate resources for people to be aware of what is knowledge, how to know, what for to know and why to known.	Education needs to teach how the process of knowledge happens from a multidimensional vision, developing in people the ability to search lucidity behind the tendency to illusion and error. This requires mediating metacognition in the integral human formation process.
2. Relevant knowledge teaching.	Knowledge fragmentation and decontextualization. Educational institutions have been isolated from the world of life and labor.	It requires direct education towards addressing problems of the personal, social, organizational and environmental contexts, by setting the location of each area within the overall study plan, and then determine the links between the different areas.
3. Teaching about the human condition.	Teaching about the human condition is dispersed across compartmentalized disciplines without contact with each other.	The challenge is to teach what does it mean to be a human being from the integration of academic knowledge with personal knowledge and community context, establishing their common tissue.
4. Teaching of earthly identity.	Planetary destination of mankind has been neglected. Intercultural dynamics are not taught.	Education has the challenge of promoting understanding of mankind planetary destination by interrelating local to global processes in different aspects.
5. Teaching of the uncertainty process.	Planetary destination of mankind has been neglected. Intercultural dynamics are not taught.	Education has the challenge of promoting understanding of mankind planetary destination by interrelating local to global processes in different aspects.
6. Teaching of the comprehension process	Traditional education has seek the transmission of information, neglecting its understanding.	Understanding is the means and end of human communication. It is given by contact and linkage with that we seek to understand: oneself, others and the environment.
7. Teaching of anthro-poetic.	The teaching of ethics has traditionally been addressed from the field of the morals, as a set of codes.	There is a need to teach the individual's condition in relation to himself, society, the species, and the ecological environment.

3. Six axes in the formation of people with competencies

From a large and complex perspective, the formation of people with competencies is not solely the responsibility of educational institutions, but also of society, the state, the labor-business sector, family and of the human person (see Figure 3). Let's look at each of these necessary axes in detail to form integral and proper persons:

Social Responsibility

Is having a continuous culture of promotion of citizenship competencies to live in coexistence, solidarity and cooperation, looking that the media take on their social responsibility to educate people with ethical and social commitment. Also, various social groups such as religious communities, athletes, artists, scientists, academics, the army, the police, etc., must be an example of ethics, creativity and entrepreneurship.

Government responsibility

The government in each country must take its responsibility to evaluate continuously the quality of education, and from there, to implement concrete actions to ensure that the educational service is consistent with the needs of people and the social, labor, professional and cultural challenges. This requires providing sufficient resources to allow a suitable human talent (directors, supervisors, administrative staff, teachers and assessors) and make the necessary arrangements for education to meet its mission of educating integral persons.

Responsibility of educational institutions

Educational institutions must provide educational services commensurate with the highest standards of quality in the context of the national and international public policy, the formation needs of people and their social, economic and ecological environment challenges, making arrangements to have sufficient resources and the required human talent (directors, staff and teachers) with a high level of suitability. This requires managing an institutional educational project to comply with the government policies and assume the challenges of forming people with a solid ethical life project and the necessary competencies.

Responsibility of social organizations and business

The social and business organizations should be actively involved in the formation of people with a strong ethical life project and the competencies

needed to find personal fulfillment, building and strengthening the social fabric, social and business entrepreneurship, economic development, development and artistic and cultural creation, and the pursuit of sustainability and ecological balance. To do this, these formal and socially recognized organizations must be authentic spaces of human talent development and support society, government and educational institutions to provide an educational service in accordance with the needs, requirements and challenges of local, national and international context, considering the present and the future.

Family Responsibility

The family must assume full responsibility for forming its members to possess an ethical life project and have the minimum basic and generic competencies to live in society. For this requires that the family practice seven essential knowledges in the process of coexistence and growth, which are the following (Tobón and Fernández, 2004):

- ✓ **Knowledge of leadership:** is to work as a team in the family to reach ever higher goals of welfare, education, family environment, security, economic stability, coexistence, etc.
- ✓ **Knowledge of contact:** is the continuous improvement of the emotional bonds between family members and between them and others and the environment through respect, cordial treatment and trust.
- ✓ **Knowledge of self-reflection:** is to achieve that members of the family reflect on their strengths and areas for improvement, and this enables them to make changes to live better.
- ✓ **Knowledge of dialogue:** is to practice the dialogue as a basis for family communication to establish agreements about what is wanted and resolve conflicts that arise.
- ✓ **Knowledge of self-realization:** to identify the vital needs for growth in the family and work to meet them, in a spirit of continuous improvement and self-improvement.
- ✓ **Knowledge of entrepreneurship:** is to undertake economic and social projects as a family, articulating personal and family goals.
- ✓ **Knowledge of the common-union:** is the construction of family union by practicing values such as justice, solidarity, cooperation, dignity and transcendence.

Personal Responsibility

It consists of the responsibility to be assumed by each human being in the self-management of their ethical project of life, learning the basic, generic and specific competencies commensurate with the challenges of their vital needs

and the social, cultural, economic, environmental and recreational dynamics in which each person is immersed. It is also necessary that other actors assume their responsibilities, such as government, society, educational institutions, social and business organizations, and the family.

To form ethical people and with competencies to meet the challenges of the current and future world needs, so that the different actors involved in the educational process fully assume their responsibilities, with the greatest possible commitment. This is the invitation complex thinking in education makes us, and thus the necessary bases are generated so that people are *competent and cooperative*.

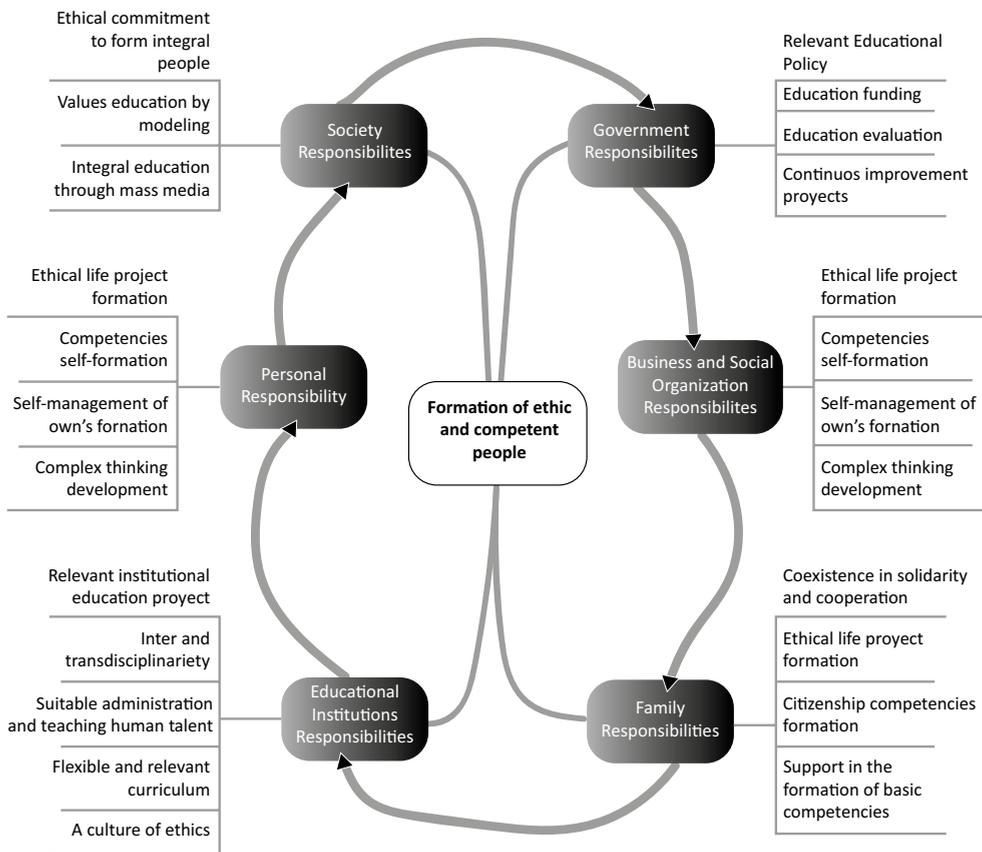


Figure 3. Axes responsible for the formation of integral persons with competencies

4. Transcending the boundaries of disciplinarity: transdisciplinarity

The problems involved in the formation of competencies are increasingly poli-disciplinary, transversal, multidimensional, transnational and global, but our knowledge moves in a different route: specialization, fragmentation and disunity. "We must learn to unite the disciplines, which implies a mental education and a structure of thought capable of dealing with complexity, complexity itself that can be the subject of an instruction " (López and Vallejo, 2000, p. 63).

From the complex thinking, it is promoted that educational institutions implement transdisciplinarity in their curricula, seeking the interweaving of knowledge in the various required and optional areas, which is a need for the entire educational process, especially when the purpose is to form competent, cooperative people. Transdisciplinarity refers to what is in, through and beyond all disciplines at the same time. It aims at understanding man interacting with the world through the integration of knowledge, (academic, scientific, poetic, mythic, cultural, religious, philosophical) methods, perspectives, values and principles, which is in line with the vision of Prigogine (1988), who states that a dialogue between the natural sciences and humanities (including art and literature) can be as innovative and fruitful as it was during the classical period or during the seventeenth century with Newton and Leibniz.

In transdisciplinarity, the key question is how to perceive at once the whole and the part, transcending disciplines and transcending specialized disciplines, in order to address the phenomena in all their complexity. Complex thinking is needed in order to build common threads from the particular knowledges, through the interplay of levels, patterns and contexts. In the method of integration of knowledge, is essential to retake uni-disciplinarity, multi-disciplinarity and inter-disciplinarity in a continuous recursive game, to achieve the construction of processes that are interdisciplinary, polidisciplinary and transdisciplinary at a time, where there is exchange, cooperation and poli-competence.

The following actions are suggested to build transdisciplinarity in education:

- Develop a natural aptitude for people to recognize in the disciplines its unity by organizing and articulating dispersed knowledge in the natural sciences, humanities, literature and philosophy, in order to understand the unity and

diversity of all that concerns the human being (Morin, 2000a).

- Depart from global problems and articulate to them partial and local knowledges (Morin, 2000a).
- Develop "meta-views that allow reflexivity, that direct especially to the integration of the observer-conceptualizer in the observation-conception and promote the ecology of observation-conception in the mental and cultural context that is proper" (Morin, 2000a, p. 26). We must move towards an observation that dialogues with the different dimensions and that transcends hyper-specialization.
- Assume the human, social and natural reality from its multidimensionality. The human being is biological, psychological, social, cultural and affective at the same time, so does society, which comprises historical, economic, political and religious dimensions. It requires dialogue between the various dimensions and between knowledges built around them (academic and popular) to achieve understanding (Motta, 2000).

5. Towards the development of a complex thought.

We tend to seek order, the parties and certainty, and this is precisely what prevents us to be aware of the uni-diversity of phenomena, their constant organization-order-disorder-reorganization. Similarly, it is what blocks us in building ties of solidarity. This trend is largely part the result of a formal and social education system based on fragmentation of knowledge, polarity and explanation from simple principles. But reality sets in and surprises us every moment with its chaos and disorder, with its uncertainties, which arise with the same intensity as certainties.

Think, understand and address the process of formation of people in its comprehensiveness, vicissitudes, order and chaos has as a fundamental condition that we, as teachers and facilitators of educational programs, change our thinking currently based on simple logic for a more complex thinking, so that we can have the mental and cognitive tools to weave knowledges, to contextualize knowledges, to integrate the whole to the parts and the parts to the whole, turning disparate and irreconcilable proposals into complementary proposals, taking the chaos and uncertainty as expected phenomena and address them through strategies and, finally, rebind what its separate: affection with reason, science with poetry, philosophy with myth, theory with

practice and dependence with autonomy. Around this, Morin (2000d) indicates that it is necessary to reform thought to reform teaching and reform teaching to reform thinking.

Think in a complex way is what Morin called good thinking, which is defined as "the way of thinking that allows to grasp jointly both the text and the context, the being and its environment, what is local and what is global, what is multidimensional; in abstract, what is complex, i.e. the conditions of human behavior" (Morin, 2000a, p. 76). And this is nothing other than ethics, because complex thought is an ethical commitment to life. To develop the complex mindset and have a well-ordered mind we suggest the following:

- Make contact with our self and with our biography, making an insight into the spirit about the roots of simple mindset and the way we approach everyday situations from this.
- Looking inside ourselves and determine trends we have towards individualism and rivalry with other human beings, to be aware of these trends and contrast them.
- Addressing the educational process always watching ourselves in order to detect and overcome reductionism, in this way, we will form a spirit in continuous vital combat searching lucidity and this way, we will be able to plant this seed in our students.
- Conduct regular process of self-reflection about how we are guiding the formation of our students and the potential mistakes we could have made by thinking from a logic of simplicity. Here Morin (2000a) says: "The mental practice of permanent self-examination is necessary as our understanding of our own weaknesses or faults is the way to the understanding of those of others" (p. 76).
- Establish in the mind the ability to live with the different ideas (ambiguous, conflicting, different, strange, reductionist, deterministic, mythical, scientific, religious), understanding its nature and approaching them from self-criticism, integrating different perspectives, to avoid falling into idealism, in streamlining and simplicity.

This helps us detect when we lie to ourselves and when we falsify reality to fit our desires. Our pedagogical concepts must have within themselves the self-criticism, openness, questioning and the ability to reform themselves.

6. Socio-formative Decalogue

Based on the ideas in this chapter is presented below a decalogue with the essential principles that must be taken into account when applying the socioformation. This has been helpful to teachers who have applied it and therefore shared. Is expected to be a reference in improving practices and not a rigid structure.

Principle 1. Thinking complexly to be better persons

The ultimate purpose of socioformation is that people possess a solid complex thought, which enables them to live ethically in relation to themselves, others, and the environmental-ecological context. This means: to be flexible in addressing situations, analyze and solve problems articulating knowledges from different areas and disciplines, to identify and strategically address uncertainty; understand the activities and problems from different viewpoints, addressing the challenges of the context complementing different approaches and perspectives, have key axes to face reality in its multiple dimensions, and organize large amounts of information held each day.

If we all follow complex thought in education, this should lead us to focus more on the vital practices with students than to complete hundreds and hundreds of formats, something that has turned many educational organizations into paper institutions, because for every action they perform, it demands completing a format as stipulated by the authorities, supervisors or certain consulting experts. In socioformation planning is necessary, but focused on the key axes of the formation process, without focusing in excess in the details, and with the flexibility to meet the changes and situations as they arise. Do not plan everything from the beginning.

Principle 2. Living with an ethical life project

In socioformation it is seek for principals and teachers to refine, day to day, their ethical life project and mediate for students to build and perfect theirs. This involves identifying the goals in the short, medium and long term, acting effectively and efficiently to achieve those goals based on universal values (e.g., responsibility, honesty, justice, peace, truth, solidarity, etc.). For this it is necessary to prevent, correct and repair errors so they affect as little as possible the person, others and the ecological environment. An ethical life project involves the challenge of continuous development and to be a better human being at the personal, labor and social levels.

Principle 3. Form by serving

In socioformation people form by serving people, i.e., contributing to the resolution of personal, social, organizational and environmental needs. This is key to the integral formation and competencies development. There is then a benefit related to the same formation and at the same time a benefit from the application of such formation to improve living conditions. Having knowledges is not enough: we must apply them in the transformation of the world.

Principle 4. Formation is the responsibility of all society and not only of teachers

In socioformation, diverse cultural, social and business organizations must make a commitment to education. On one hand, should contribute to the formation of their members and families, on the other, should support the formation processes of schools, colleges and universities, providing human talent and economic, physical and internship resources. It is also necessary for them to model suitability, quality and ethics, helping to generate values on citizens.

Principle 5. Formation requires collaboration processes

The integral formation based on competencies needs that students work collaboratively, supporting each other and complementing their skills, values and knowledges. For this, it is necessary that among students, they help each other to achieve their goals and favor resolution of difficulties.

Principle 6. Problems are opportunities

In socioformation problems are a challenge of how to move from a given situation to an expected or ideal situation. Thus, any problem is an opportunity to meet a need, and this means, for example: increase awareness of something, build an object, generate a process of entrepreneurship, innovate a product or service, resolve the contradiction between two or more approaches or theories, etc. Looking for the positive side of problems to generate better environment and quality of life. Each problem is dealt with interpretation, argument and proposing solutions.

Principle 7. Formation is entrepreneurship

The challenge for teachers and administrators is to mediate the necessary actions for students to learn to plan, initiate and take forward projects that aim to improve living conditions in the personal, family, work, social, scientific, recreational, sporting and environmental aspects. So the integral development of competencies is achieved and people contribute to society. Rather than prepare to live in society and get a job, to prepare to improve society and generate self-employment.

Principle 8. Continuous improvement

Competencies formation involves improving continuously in the action to achieve certain goals. This requires a reflection process to become aware of what we think, feel and do so as to identify and correct errors and difficulties in the shortest possible time and with minimal negative side effects. It is important that reflection occurs before, during and after each activity. All should be guided by the ethical project of life, so that performance is based on universal values.

Principle 9. Search for simplicity over complication

Education is too complicated to complicate it even more. However, that is what is happening today with many educational proposals having a large number of factors and requiring much of teachers time, time that often surpasses the hours assigned to work. In socioformation it is aimed to make the formative process easier for students, based on the approach of the different dimensions involved and understanding their interrelation, to then focus on the key areas: and so simplicity is achieved. Is not about simplifying, because to simplify is focusing on a single factor of formation, but more about focusing on more structural and impacting elements on students, considering the challenges of current and future context, in the framework of past learnings. The latter leads to use the concepts and procedures truly necessary, facilitating that students are able to appropriate and apply them creatively.

Principle 10. Demonstrate performance with evidence

In socioformation is useless to say we are suitable, entrepreneurs, responsible, honest, caring and good citizens, we have to prove it with facts, which should be evident by observing what is done or its effects on the own person, others and/or the ecological environment. Evidence are, then, concrete and tangible elements to prove competencies, considering the know to be (attitudes and values), know to coexist (relationship with others), know to know (concepts and theories) and know to do (procedural and technical skills). Through evidence, we can determine what our achievements are, what do we need to improve and what to do to improve.

7. Suggested Activities

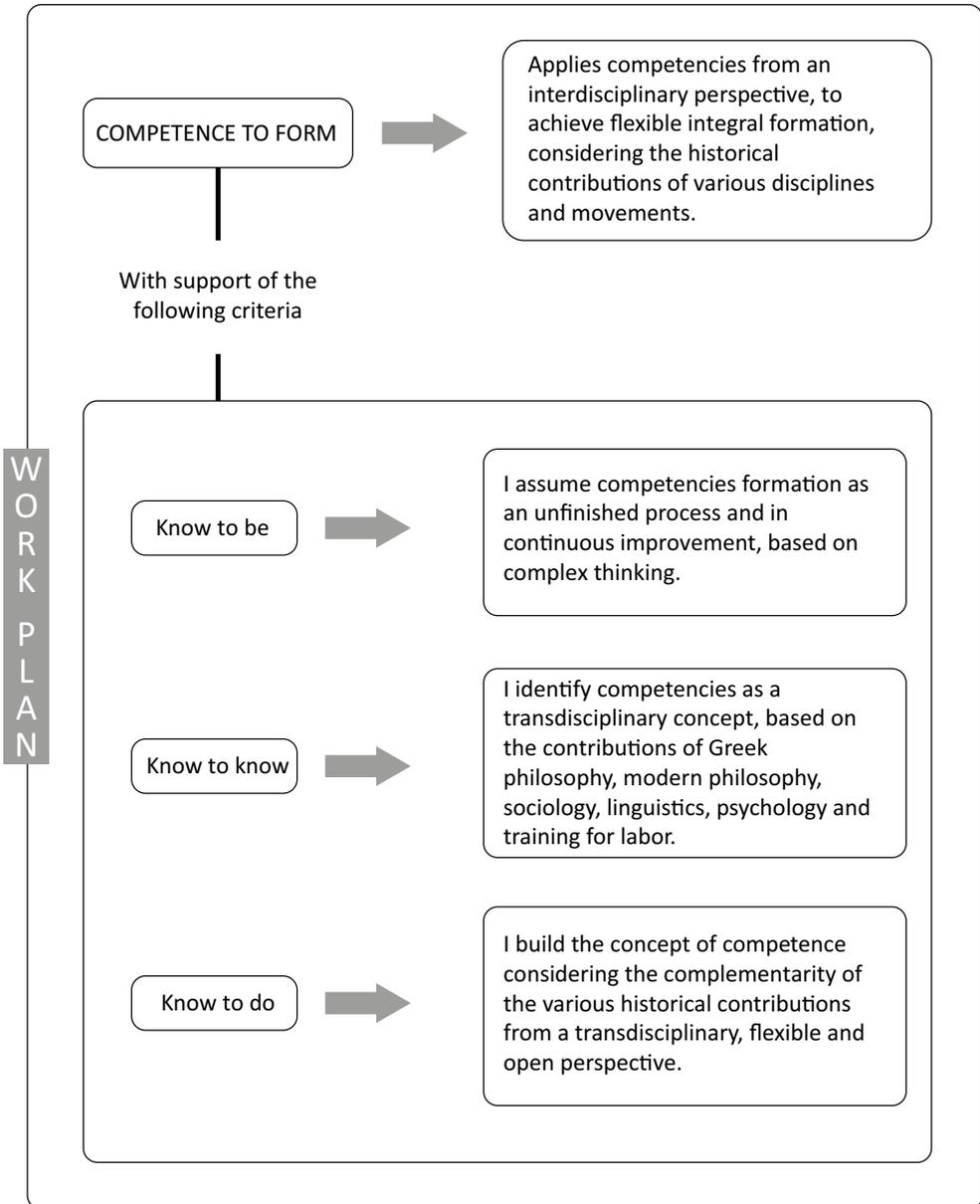
1. Prepare a mental or conceptual map of the essential contributions of the socio-formative approach on competencies formation. In your experience, what are the main pedagogical problems for understanding and solving complex thinking?
2. Read the following questions and write your thoughts, analyzing your teaching area: Am I addressing the human formation in its entirety? Do I assume the human formation as dynamic whole processes of order and also uncertainty? Do I consider in human formation the educational role of society, the necessary relationship between dependence / autonomy and the transformation of society as a result of such formation? Do I address the educational process from the integration of different academic and everyday knowledges (adages, myths, legends, proverbs and stories) for students to understand and solve the real problems of context?
3. Complex thinking invites us to change our thinking as a fundamental condition to achieve the transformation of teaching. Analyze a recent problem in the educational field and determine whether you approached it from a complex logic or from simple logic, and present the respective arguments. From this, provide a set of recommendations to help you progress in improving your thinking towards complexity.
4. Study the curriculum of an educational program and reflect: is it a flexible and open-to-change curriculum? How to integrate competencies formation in it, from the self-realization and social fabric construction based on solidarity?
5. Finally, we invite you to share with others the products of the different activities, so that you can know their point of view and also receive feedback on your contributions.

Chapter two

Historical development of the concept of competencies

In the disciplinary fields, historicity is the manner of existence of the concepts, since it is not the intention there to describe the world but to dialogue-controvert with a world previously and inevitably interpreted.

Bustamante (2003, p. 21).



1. Competencies' concept development timeline

Competencies have been addressed from the trans disciplinary work because it has been shown that a concept of competence is not possible constructed from a single discipline, but require the integration of the contributions of many disciplines to address the various dimensions of human action, in the various contexts in which performed. Thus today we have progress in building competencies from a unified theoretical framework, result of multiple applications in educational institutions, social organizations and businesses.

In the trans disciplinary construction of the concept of competencies it is essential the analysis of the various historical references to this model, to understand its nature and strengthen its implementation in the field of integral human formation. In this way, we present a synthetic time-line including the major historical background of the concept (Figure 1).

- *Ancient civilizations*: in various ancient civilizations evidence has been found of the use of terms similar to that of competencies, or that are part of the etymological roots of this concept. For example, the Code of Hammurabi was written in a very remote period (1792 - 1750 b. C.) in the Mesopotamia civilization, and there are mentions of a concept comparable to competence, as can be seen in its French translation. In the Epilogue, we can read: "Telles sont les décisions e justice que Hammurabi, le roi compétent, a établies pour engager le pays conformément à la vérité et à l'ordre équitabile." (Mulder, Weigel and Collins, 2007). In ancient Greek there is also a usage comparable to the concept of competence, which is *ikanótis*, which translates as the ability to get something (Mulder, Weigel and Collins, 2007).
- *XVI Century*: in this century the term competencies existed in various languages, including Latin (*competens*), English, French and Dutch. In English, for example, the use of the term competence can be identified (as well as competency), which means the overall capacity to perform an activity or solve a problem in a course or subject (Mulder, Weigel and Collins, 2007).
- *1960's*: the academic use of the concept of competencies starts. This happened in linguistics by Chomsky (1970). The concept served to think the linguistic development and performance of people in language in a different way. This was an inspiration for further studies in the field of language, and in the learning field, then getting to the education field. Must be emphasized that Chomsky did

not take the concept of competencies from the labor world, not from business competitiveness, but from the use of the term in the community and his own studies on the history of linguistic analysis (for example, he studied the linguistic contributions of Descartes).

- *1970's*: the academic structuring of the concept starts in the area of human talent management in organizations through McClelland's studies (1973) on performances successful workers have in contrast with the less successful workers, and the most appropriate recruitment strategies. Additionally, the implementation of the concept in education started through the Competency-Based Education and Training (CBET) movement, which sought to improve the preparation of teachers and generate strategies to articulate education to social and economic challenges (Blank, 1982).
- *1980's*: projects are established in different countries (for example, in Canada, USA, UK, Australia, Spain and France) to improve qualification and accreditation of individuals for job performance, with the support of companies and unions. An example of this are the professional qualifications established in the UK under the name of National Vocational Qualifications (NVQ) (Winterton et al., 2005).
- *1990's*: Building of models around the curriculum, didactics and competencies assessment begins at different educational levels, based on research and study of the shortcomings of the traditional teaching processes (see, for example, Gallego, 1999; Gonczy, Curtain, Hager, Hallard and Harrison, 1995; Hernández and Rocha, 1996; Hodkinson and Issitt, 1995; Mertens, 1996), also are started to implement rigorous and systematic applications of the competencies approach in various countries and educational institutions, such as the United States through the core competencies project SCANS (1992a, 1992b, 1993) and in Colombia through the reform to the State Examination for Admission to Higher Education (Icfes, 1999).
- *Decade of 2000*: the concept of competence is incorporated into the international education policies, such as the Tuning project in Europe (González and Wagenaar, 2005) and the DeSeCo project (OECD, 2005). There are also new theoretical and methodological developments of competence-based formation in a holistic and complex approach (Rychen and Salganik, 2003; Tobón, 2001, 2006, 2009a, 2009b).

In conclusion, the term competence has a long history because humanity has always been concerned with the fact that people are able of doing their part with quality. However, the academic application of the concept of competence begins as late as the

sixties, with the nineties being the decade where it started to be implemented in all levels of education, and in the 2000s it became an educational policy of global significance. This happened at the same time a series of educational changes are positioned by the introduction of autonomous learning, meaningful learning, constructivism, metacognition and new theories of intelligence.

Nowadays, competencies are addressed from different approaches looking that people appropriate and apply the knowledges into concrete actions with suitability and responsibility. This shows that it is not a recently created term, nor a term brought from competition in business. However, it must be remembered that companies, neoliberalism and globalization have influenced and influence the rise of competencies (Tobón, 2006), as well as knowledge society.

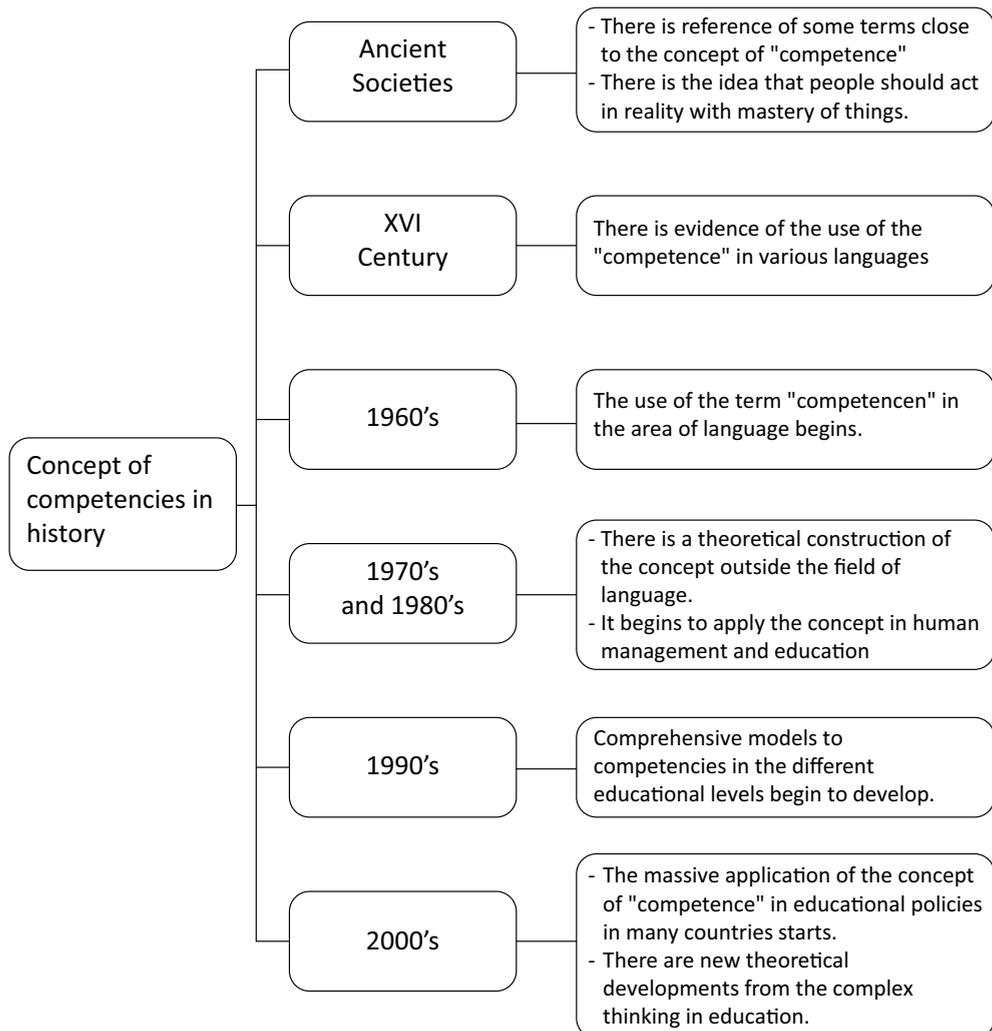


Figure 1. Timeline of the concept of competence

2. Scenarios that have contributed to competencies-based formation

2.1 Scenario of Greek philosophy

Greek philosophy in general

Greek philosophy is a fundamental scenario in the construction of competencies for the following reasons. First, philosophical reflection is mediated by a mindset where knowledge and reality are questioned. We found how the key issues are addressed by Greek philosophers, from contextualized problems, and in this sense, they are not random occurrences; on the contrary, are proposals to interrogate reality, being, and mankind in an informed way. In the current concept of competence, the questioning of reality plays a central role as it is based on the resolution of problems with meaning to people.

Second, Greek philosophy builds concepts looking to apprehend reality in those concepts, establishing relationships and connections between different issues and problems. This makes philosophical elaborations have driving threads and weaves, transcending the mere fortuity (Torres, 2001). Today, in competencies formation, there is an emphasis on the need to articulate the knowledges from different disciplines, based on inter and trans-disciplinary activities that would allow to overcome the traditional model of subjects, to achieve this, dialogue plays an essential role in understanding and constructing common axes.

Protagoras and Plato: the being

Greek philosophy questions the man and being in the reflection about identity and difference, essential aspects of the human formation process. There, we find the maxim of Protagoras: "Of all things the measure is Man, of the things that are, that they are, and of the things that are not, that they are not" (Llanos, 1968, p. 266). This phrase encapsulates an important philosophical tradition that places man at the center of reflection, which was continued by Socrates and other Greek philosophers. Today, education is facing the challenge to look back at man in his entirety, in dynamic interaction with the context.

According to Torres (2001), in Protagoras there is an invitation to controversy as the measure of being and non-being of things is determined by men from the debate. It is about controversy to build and to create, not the controversy to take advantage of the

other or empty him. In competencies-based formation, debate is performed to build knowledge and reach clarity of ideas on the basis of respect.

In competencies-based formation occupies a prominent place the process of knowledge and its trends towards illusion and error. This reflection is found in Plato, who shows in his work *The Republic* how humans can fall on the mistake of assuming reality from appearance. In the description of the metaphor of the Allegory of the Cave, he proposes that to reach the true knowledge requires a constant search for the essence of things, transcending the apparent and surpassing errors of perception. This is possible because any person has in his soul the ability to learn. Competencies-based formation aims that people have a deep understanding of the context and the activities to be performed.

Aristotle: potency and act

Aristotle raises in several of his philosophical works a continuous relationship between knowing and the acting process, as may well be seen in the book of *Metaphysics* (Aristotle, 1999). In this regard, we find:

- It is argued that all men have the same powers (capacities for knowledge), what makes them different is the use they give to such powers.
- People have a potency -power- and this is expressed in particular acts -actions-. The potency is possible and the act is what actually happens, the future being the passage from potency to act, from matter to form (Bustamante, 2003; Torres 2001).
- People have by nature the desire to know, which breaks also from pleasure and its usefulness.

2.2 Scenario of linguistic

Noam Chomsky: linguistic competence

Several authors argue the concept of competence was raised in linguistics pioneered by Noam Chomsky in 1965 (Torrado, 1999), from his theory of transformational generative grammar, under the concept of linguistic competence (Chomsky, 1970), which accounts for how humans appropriate the language and use it to communicate.

All people are willing to learn the mother tongue, to speak it according to the scenarios

where they interact and to perfect it, in order to be understood by others. Chomsky's central thesis is: humans can produce and understand new sentences, as well as reject others for not being grammatically correct, based on their limited linguistic experience (Chomsky, 1970). This means that the language has a creative and generative nature.

Chomsky makes a critique of empiricist views of language, which argue that language is repetition by memory. Against this, he proposes the linguistic competence as an a priori construction, which guides the language learning and performance. For this, he has two terms: competence and performance. Performance refers to communication and concretion of language, whereas competence refers to the device of grammar that is expressed in the ideal speakers, whose formation is independent of the interaction with the world.

The grammar of the language is given by a finite set of rules whereby they can generate and comprise an infinite number of sentences. Linguistic competence refers, therefore, to the knowledge of abstract rules or principles governing the linguistic system; knowledge which is evident in the actions and linguistic performances. This competence is based on a more abstract system such as universal grammar or device for the acquisition of language common to the human species (Chomsky, 1970).

More specifically, the competence is the ability of the speaker-listener ideal for operating linguistics. Therefore, it can be understood as an abstract action framework, general and ideal which allows the understanding of particular cases.

On one side is the universal grammar, and on the other, the use of this by each individual in their performance. Between one and the other element, is the competence, which is individual. However, its action is of general-ideal character, with no variation according to the context. In other words: competence is the knowledge that the speaker-listener has of his/her language, while performance is the actual use of language in certain situations (Bustamante, 2003).

Finally, it is important to note that Chomsky articulated the linguistic competence to define the object of study of linguistic science and, as such, did not address education. This author rescues the term of psychology of faculties from the seventeenth century, part of the Cartesian philosophy (Chomsky, 1972). Thus, it can be argued that the concept comes more from a psychological than a pedagogical or even linguistic tradition (Bustamante, 2002). Therefore, the concept of competence is not new, but it has been structured for centuries from psychological and philosophical sources. An important legacy of Chomsky is that he allowed us to understand the creative character of competencies from the analysis of language, and the relationship between deep and superficial structures operating in the language

from the minds of people. However, Chomsky's most significant contribution is his motivation to reflect on how we are living and the way we can change the world, freeing ourselves from prejudice and fighting for human freedom (Barsky, 2005).

Dell Hymes: communicative competence

Chomsky's contribution was supplemented by Dell Hymes (Hymes, 1980) who placed competencies beyond linguistics, establishing the concept of communicative competence (Hymes, 1980), which raises the uses and concrete acts arising from language, within specific contexts. In this sense, unlike linguistic competence, communicative competence is not ideal and invariable; to the contrary: it takes into account the specific contexts where the interaction occurs. Therefore, a competent person in language is one that uses it to integrate with others, understanding and making him understood.

Communicative competence, while a contextual process, unfolds, not when the grammatical rules of the language are handled (linguistic competence), but when the person can determine when and when not to speak, and also what to speak about, with whom, where and how; when is capable of performing a repertoire of speech acts, to take part in communicative events and to evaluate the participation of others. Communicative competence takes into account the attitudes, values and motivations related to language, with its characteristics and uses, also looking for the interrelationship of language with other codes of communicative behavior (Hymes, 1996).

2.3 Scenario of modern philosophy and sociology

In the twentieth century, many philosophers and sociologists made constructions related to competencies, which are central in this model. In that regard we have thinkers such as Wittgenstein, Habermas and Argentine sociologist Verón. The following are their main contributions.

Wittgenstein: language games

Wittgenstein gives to competencies the concept of language games, which are complete communication systems interwoven by rules (Wittgenstein, 1988), where the meaning is the result of language use within a context or lifestyle. The rules are not individual nor rules a priori, but have a social context.

In any competence there is a use of explicit or implicit rules to communicate. Learning a science can be taken therefore as:

A process in which one learns to play a number of language games relatively specialized. Learning a science is to become competent in these language games. This means that the student must achieve a relative ownership of the grammar of each particular game. Is not enough to understand some concepts or principles in isolation; should learn to articulate them and put them into action in different situations, according to the rules of the game and possible strategies (Granés, 2000, pp. 211-212).

Habermas: interactive competence

Jurgen Habermas, unlike Wittgenstein, frequently mentioned the concept of competence under two terms: communicative competence and interactive competence. These two kinds of competencies are addressed from the use of language, into the perspective of understanding and being understood with someone about something, a phrase that contains the core of his philosophy, where people are conceived as speakers-listeners who use language to understand about a certain topic, producing meaning within the same field of use.

Thus, the meaning is not preset, but is determined by interaction. However, unlike Wittgenstein, Habermas raises the idea that communication requires universal pre-suppositions that necessarily must be met for people to understand about a particular topic.

In the following text it is described how this author uses the term of interactive competence:

The use of the term "interactive competence" indicates the basic hypothesis, which I will start from, that the capabilities of the individual acting socially can be investigated from the point of view of a universal competence, that is, regardless of this or that culture, as happens with language competencies and knowledge when develop normally (Habermas, 1989, p. 161).

Thus, Habermas, like Chomsky, proposes that competencies have a number of universal components that enable understanding between people. In the current concept of competencies, such components are studied from the framework of cognitive processes.

Eliseo Verón: ideological competence

In the field of sociology is important to highlight the contributions made by the Argentine Eliseo Verón in 1969 and 1970. This author proposes the concept of ideological competence, defined as the set of specific ways to make selections and organizations of a particular discourse. People perform selections of words and put them in a certain order according to certain rules. Every time someone talks, chooses certain terms and not others, and each time this happens, such terms are organized in a manner and not otherwise. This is an ideological performance from the field of speech.

Thus Verón transcends the conception of ideology as something alienating, even when sometimes it is. He argues that any act of speaking is itself ideological because of the process of selecting and organizing what to do, which is based on the implicit or explicit influence of society from the internalization of certain rules and principles in a given context.

The ideological competence, like Chomsky's linguistic competence, has the character of being generative: a structure of finite elements has the potential to generate endless ideological structures. The selection and organization of utterances is always given from this set of finite elements that transcends the individual and is linked to the historical moment that society lives. Therefore, we speak selecting and organizing the discourse from specific historical conditioning (Verón, 1969, 1971).

At present, Vernon's major contribution to competencies-based formation is his theory of social discourse or semiotics, which raises broadly that social reality, is a construction from the discourse (spatial-temporal configuration of sense), for which it has as a base the beliefs, myths and ideals of people who make up that society (Verón, 1998, 2004). This is based on two assumptions: (1) *"all social phenomenon is, in one of its constituent dimensions, a production process of meaning, whatever the level of analysis"* (Verón, 1987, p. 125), and (2) *"Every production of meaning is necessarily social: it can not be described or satisfactorily explained a significant process, without explaining its social productive conditions"* (Verón, 1987, p.126). To this end, Verón has had as base authors such as Wittgenstein, Bateson, Benveniste, etc.

It should also be noted that Vernon's theory of social discourses is part of the paradigm of complexity, stating that the production of meaning in the social context is not linear (Sigal and Verón, 2004) and is an interwoven that needs to be addressed from the articulation of semiotics with the contributions from other disciplines such as history, anthropology, sociology, political science and economics (Verón, 2001). It is essential to keep in mind this legacy in the understanding and current application of competencies in education and the management of human talent.

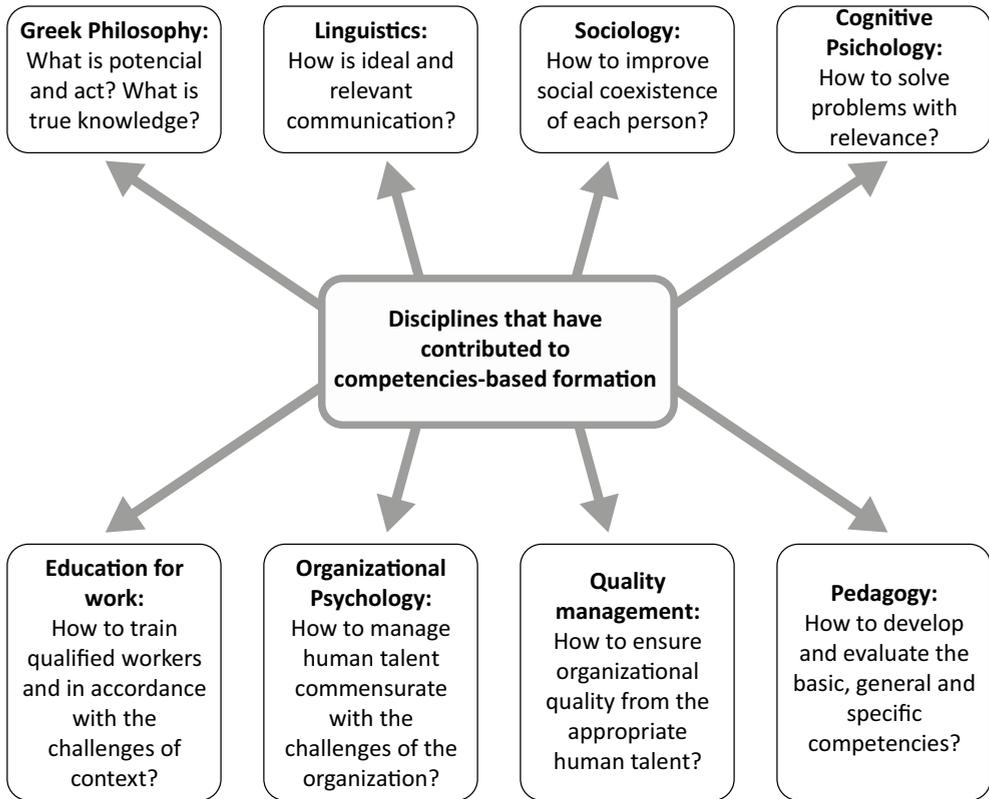


Figure 2. Disciplinary fields which have made contributions to competencies

2.4 Scenario of education for work

In the United States, Canada and England developed a movement of competencies-based education and training (Competence-Based Education and Training, CBET) in the late seventies and early eighties (Blank, 1982; Fantuzzo, 1984), in order to tackle the economic crisis of the time. This approach was based on behavioral psychology and it sought to orient training to meet the requirements of the labor world. It had two concrete achievements: identifying the characteristics the ideal teachers must have, and promoting the creation of projects in different countries to improve training of people for employment.

Regarding the creation of projects to improve the job skills of people, this was consolidated in the eighties under the peak of human resources formation with efficiency and efficacy parameters, in a context of national and international business competitiveness in developed countries. In this context, it began to gradually

create a set of criteria in order to implement processes of training for a job that led in the eighties and nineties to the focus of labor skills from four interrelated areas: identification, standardization, training and certification of competencies. From this today are consolidating new training scenarios, where the challenge is to implement quality vocational training programs (Rial, 2000).

In the UK the training system for job-based skills began to be implemented from improvements in industrial and service business in the early eighties (Hanson, 1996). This created new educational reforms by the middle of this decade, which had the following objectives:

1. strengthen the competitiveness of workers in the international arena;
2. generate a workforce with ability to be flexible to adapt to changes in production;
3. provide continuing education consistent with the requirements of companies;
4. direct the education system based on business demand.

In the same country was created in 1986 the National Council for Vocational Qualifications, NCVQ, in order to guide the establishment of professional programs according to the demands of the job environment. This led to implement qualifications based on competence levels required in certain work position. From the beginning, the system was structured from the representation of companies (Taylor, 1998), guilds, unions and educational institutions. One aspect to highlight is the fact that workers began to be able to certify their competencies from evaluations administered by independent bodies that would examine what they were able (know) to do, without professional qualifications needed.

Australia is another country where the establishment of training-for-the-job programs was based on job competencies. This began since 1987, when unions requested more training in business and that knowledge and skills could be certified. A number of government documents succeeded one to the other on the issue and in the year of 1989, a more definitive document was created in which the job training system was established, based on the job skills' formation. In 1990, a government mission was established to know experiences abroad and the system started firm, looking to have the basis of the demands of companies expressed in competencies norms (Gonczi, 1998).

In Latin America, job competencies training began in Mexico, country that implemented the 1995 Council for Standardization and Certification Of Occupational Competence, from a diagnosis of the sector, which had found the requirement of companies to have qualified staff, able to respond to market demands, with high flexibility, mobility, problem solving and ability to work as a team. It was also found that training programs

for work were designed and implemented purely in the academia, without taking into account the demand of companies and the market (Ibarra, 1996). Furthermore, there was no mechanism that would allow certifying experience and suitability of workers gained in the employment context.

Mexico was thus introduced a system of training for the job through occupational competencies with the following characteristics: (1) consisted of the users themselves (business, unions, government and educational institutions); (2) was based on the requirements of the labor sector identified from occupational studies, (3) accurately reported what was needed by companies from the competence standards, (4) allowed each worker to certify his/her expertise and knowledge in certain job activities, regardless of the context where he/she had learned them; and (5) guided the design of educational programs with relevance and belonging.

2.5 Cognitive psychology scenario

Since the mid-twentieth century, cognitive psychology has been conducting a series of important contributions to the understanding of competencies, from concepts such as intelligence, information processing, cognitive processes, thinking skills, cognitive strategies, heuristics and schemes, among others. Also, in recent years it has been proposed in this field the term cognitive competencies related to processes by which information is processed in accordance with the demands of the environment, putting into action cognitive schemes, techniques and strategies, which allow humans to know, perceive, explain, understand and interpret reality.

At present, the contributions of cognitive psychology to competencies model can be organized in three main lines of research:

1. theory of cognitive modifiability,
2. theory of multiple intelligences, and
3. teaching for understanding.

Theory of structural cognitive modifiability

From the theory of cognitive modifiability, competencies are formed through cognitive structures that can be modified by the influence of learning experiences. Such learning is not linear, but happens in spiral, by associations and relationships of increasing complexity. In order to form cognitive competencies, it is required that people possess learning potential, i.e., ability to think and develop intelligent behaviors, using previous experience to address new

situations (Prieto, 1989). Learning potential is expressed in the so-called cognitive functions, which are central nervous system activities through which learning takes place.

All mental act has three phases and within each, certain mental functions apply: input phase (information received from both the internal and external environments by functions of perception, attention, vocabulary usage and spatial-temporal relations); elaboration phase (the information received is analyzed and gets organized by short, medium and long-term memory mental functions; and output phase (knowledge is applied to address a task or solve a problem by mental functions such as communication by trial and error, precise response and control of responses). In this perspective, competence, from this approach is based on the information processing by cognitive functions in order to perform tasks or solve problems.

Multiple intelligences theory

The traditional concept of intelligence has the following problems:

- Intelligence has been conceived from a simple and reductive approach as a single process.
- The current approach has been to conceive intelligence measurement within a normal curve through standard psychometric tests.
- The theoretical construction of the concept of intelligence has been separate of the social context and in an abstract way.
- Intelligence has been assumed as a structure that tends to remain unchangeable.

Gardner (1987, 1988, 1993), in contrast to this approach, launched in 1983 his theory of multiple intelligences as a new perspective for the conceptualization of intelligence. The development of a person in everyday life has to do with many capabilities that go beyond the approach of logical-mathematical and literacy factors. That is why this author presents empirical and theoretical evidence to argue that rather than just a type of intelligence, such as has been traditionally thought, there are at least eight types. Gardner sees intelligence as the ability to solve problems or create products that are valued in one or more cultural settings. Each one of the eight intelligences proposed meets that definition.

The eight types of intelligence are independent, but may interact dynamically. Each intelligence expresses a capability that operates in accordance with its own procedures, systems and rules, and has its own biological bases.

Description of the eight types of intelligence:

1. **Logical-mathematical.** The sensitivity and the ability for abstract reasoning, numerical computation, the derivation of evidence and solving logical or numerical problems. It involves the ability to handle long chains of reasoning.
2. **Linguistic.** Sensitivity and capacity for literacy and verbal communication with others, through the management of sounds, rhythms and words with its nuances of meaning.
3. **Musical.** Ability to appreciate and produce musical rhythms, along with their tunes, melodies and sounds in different spaces.
4. **Spatial.** Ability to perceive the spatial visual world and perform transformations in own initial perceptions. Comprises thinking in three dimensions and orientation in space, recognizing various scenarios.
5. **Bodily-kinesthetic.** Ability to control body movements and handle objects skillfully. Comprises communicating with the body, performing gymnastic activities and creating manipulative objects.
6. **Interpersonal.** Ability to discern and respond appropriately to ways, temperaments and motivations of others, through understanding.
7. **Intrapersonal.** Capacity for introspection and self-knowledge. Access to own feelings and ability to take them into account to guide the behavior.
8. **Naturist.** Capacity and sensitivity to distinguish, discriminate, recognize and define the living and non-living things. It is expressed in the establishment of relationships between the different components of the environment and the development of actions to protect them.

Teaching for Understanding

In recent years we have moved from a conception of the human mind as intelligence-ability to a theorization of it as context-representation, where the emphasis is on strategies and representational processes, it is seek to determine how we humans represent the world, others, and ourselves. Therefore, from this discipline, competencies are processes given by representations of reality and actions based on strategies, which relies on the concept of comprehensive performance (Perkins, 1999).

In this approach, "understanding is the ability to think and act flexibly from what one knows" (Perkins, 1999, p.70). This implies a new perspective compared to what the concept of understanding has traditionally been, which has had as essential condition to posses knowledge and cognitive structures.

A consequence of this approach for the competencies models is the need for education to emphasize not so much on representational content, but on the fact that people

learn to address reality with an open, contextualizing spirit and considering all possible perspectives, leaving aside rigid and preconceived notions.

In general, from cognitive psychology there is a number of contributions from which is necessary to assume competencies: (1) human actions are expressed on particular and specific contexts, (2) competencies are made by processes, schemes, knowledges and cognitive strategies, (3) in all performance are involved internal and external factors, and (4) human beings have different ways of processing information, which depends on the context, heritage and cognitive evolution.

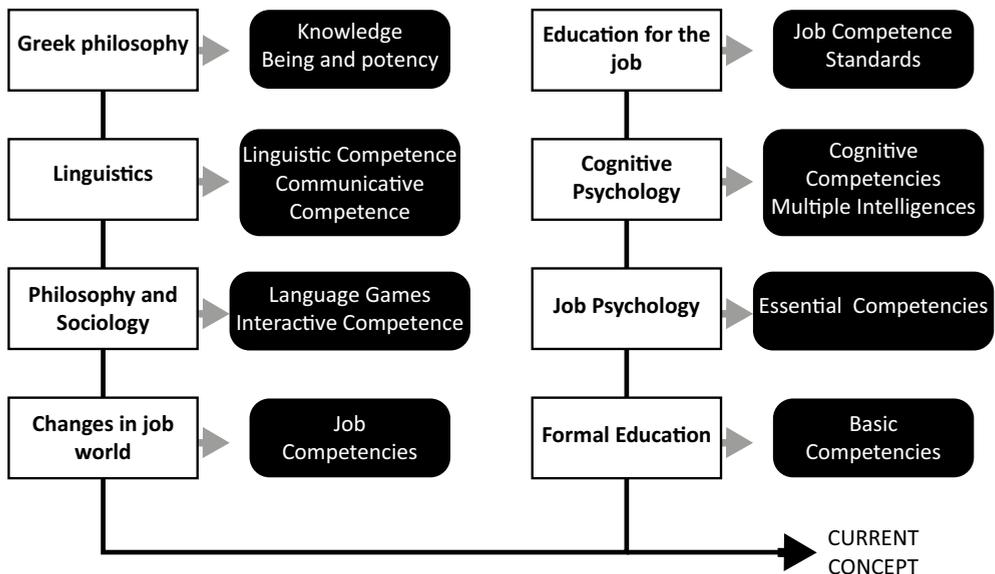


Figure 3. Most important historical contributions to competencies

Note: This figure summarizes the major historical contributions of various disciplines to competencies-based formation

2.6 Labor-professional scenario

The current emphasis on competencies comes to respond to changes in the social, labor, professional and organizational worlds, occurred in recent decades. These changes require people formed with ethical commitment, creativity, entrepreneurship and self-criticism, and that's where competencies based formation makes its contributions.

The labor-professional field has had a substantial change in its model, moving from the Fordist-Taylorist production, to the economic model of techno-globalization the information economy and deregulation of markets. This leads to the requirement for companies to prepare for a continuous state of competition at the local, regional and global level. In this new paradigm of business management, it is essential to carry out training processes for people to increase their competencies (ECLAC-Unesco, 1992).

Companies are changing to adapt to the social and economic dynamics. This requires them to have people with a high degree of flexibility to adapt to new job processes and adjust their

performance to customer's requirements. Furthermore, production systems and services offering rely increasingly on teamwork between members of a company, which is leading to the establishment of flatter organizations.

This relates to the approach of Hyland (1994), who argues that competencies emerged in the sixties, when new job organization processes began to be implemented. Similar idea to Mertens' (2000), who discussed how the competencies model grew out of the requirement on companies to promote organizational learning, competition and labor mobility.

In the eighties it was given a great impetus to the improvement of production conditions, this is how professional competencies began gradually to be in first order. In England, companies had into account this approach to improve the efficiency and quality of the production system, within the context of having competitive companies in the global arena. The same happened in the U.S. and Germany, countries that have traditionally worried about having highly competitive production organizations, where the ideal performance of professionals and management teams is essential.

During the nineties competence-based human talent management gradually consolidated. That was how specific methodologies for conducting the selection, training, remuneration, promotion and evaluation processes were built based on this approach.

This has the following implications for members of an organization:

- Specific performances matter more than possessing the knowledges.
- People need continuing education that enables them to develop and strengthen the skills required by the production system of a particular organization.
- People need a know-how that is flexible, so they are able to embrace change and form new competencies consistent with the demands of business.
- People need to develop high capacity for teamwork, leadership and creativity to participate in conducting collective activities.
- People need to have a high degree of suitability in what they do, since competitiveness of enterprises depends highly on this.
- Academic degrees or experience don't matter as much as the degree of suitability to perform professional activities contributing to fulfilling the organizational goals.

2.7 Organizational psychology scenario

In organizational psychology, the concept of competencies emerged as a way to determine the characteristics employees have to possess for companies to achieve high levels of productivity and profitability. The concept was implemented by David McClelland (Spencer, McClelland and Spencer, 1994) in the seventies, from a number of studies in which he found that traditional performance tests were not effective to predict success on the job. Therefore, this author proposed to consider more the characteristics of workers and their specific behaviors to job situations, rather than the traditional descriptions of attributes, academic transcripts and intelligence quotients.

McClelland argued that traditional tests based on measuring knowledges and aptitudes, as well as school grades do not predict success in performance in specific situations at the workplace. Competencies, in contrast, relate more to performance in work tasks and have as reference those employees who are particularly successful compared to those that have an average performance. So when we talk about competencies we refer to features that are factors of job success and not to all work-related characteristics as in the traditional model.

Organizational psychology brings the concepts of threshold competencies and key

competencies (Gallego, 2000; Goleman, 1999) to human talent management in organizations. The former allow a normal or adequate performance in an activity (they are the minimally necessary competencies to perform the duties of a particular job), the latter, by the contrary, refer to characteristics that enable people to perform outstandingly in an activity, bringing competitive advantages to the organization as a whole. Key competencies would be distinctive competencies that certain person's posses and produce excellent organizational results (Goleman, 1999).

Today these concepts are used in the management of human talent under competencies in organizations. This is how the recruitment, selection, assessment, training and promotion processes in organizations are based on competencies, in accordance with specific strategic planning. Thus, academic skills are no longer the center in the selection of human talent, and instead are competencies, that emphasize the performance as such, with suitability, continuous improvement and ethical commitment (Tobón, 2010).

2.8 Scenario of quality management scenario

In the nineties, quality management was positioned in the organizations, in order to ensure that the processes were developed according to standards established in the area. There we found Models of Excellence Management (MGE) such as the EFQM model (European Foundation for Quality Management) and the ISO 9000 family of standards, which were assumed worldwide by ISO (International Standard Organization) in 1994. In recent years MGEs and ISOs have been incorporated in educational institutions to ensure academic quality in students by articulating them with the competencies model.

Excellence Management Models: EFQM

The EFQM model was established in 1991 by the presidents of the 14 largest European companies, with the support of the European Commission. Today, the EFQM organization consists of more than 600 organizations, including universities and research institutes. The EFQM model seeks to elevate continuously the quality of an organization with high levels of efficiency, efficacy and innovation, addressing the processes and outcomes involved in the products and / or services. This model was created by the need to have an own model of excellence in Europe, following traditional models such as the Malcom Baldrige model from the U.S. or the Deming Model in Japan.

In 1999 the EFQM model was revised, and the current edition contains two parts

(Figure 4): (1) a set of criteria of organizational excellence that covers all areas of operation of the organization, and (2) a set of rules that guides on how to evaluate every aspect of the organization with reference to the criteria. Regarding the criteria, there are two groups:

1. Results (criteria 6 to 9) represent what the organization achieves for each of its actors (customers, human talent and society).
2. Agents (criteria 1 to 5) are aspects of the organization's management system. They are the causes of the results.

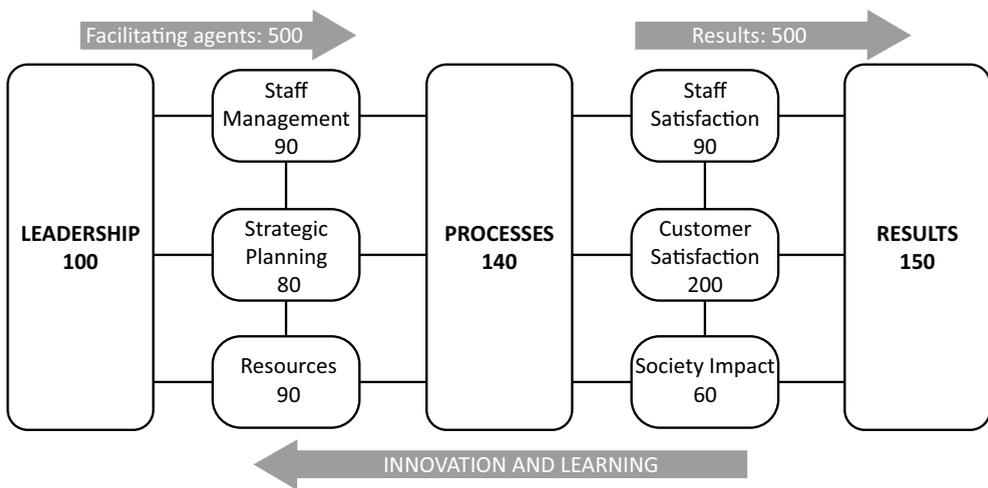


Figure 4. EFQM Model

The EFQM model is being implemented in educational institutions, but it may not be the same way it is done in social organizations and business, since it needs to address the nature of the formative process. In this regard, CIFE Corporation has built an adaptation of the EFQM model to education, considering the philosophy of integral formation and the educational language (Tobón, García Fraile, Rial & Carretero, 2006).

An overview of the adaptation is shown in Figure 5 and in Table 1 the EFQM model for educational institutions with its various components is presented.

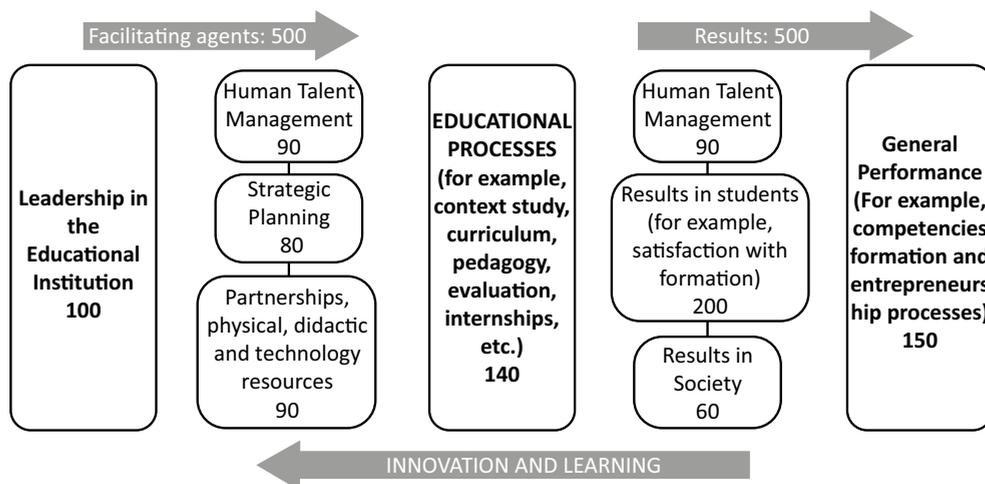


Figure 5. EFQM Model in Education
 Source: Adapted from Tobón et al. (2006).

Table 1. Essential criteria in the EFQM model applied to education

<p>Criterion 1. Leadership</p>	<ul style="list-style-type: none"> - Management to achieve the mission and vision of the educational institution. - Coordination of the management of educational quality model. - Coordination of academic processes from strategic planning. - Coordination of human talent and resources based on the mission, vision and academic processes.
<p>Criterion 2. Strategic Planning</p>	<ul style="list-style-type: none"> - Strategic planning of the organization considering the students and the socio-economic environment. - Construction and empowerment of the mission and shared vision with participation of the educational community. - Implementation of continuous improvement strategies flexibly and with prospective analysis.
<p>Criterion 3. Human Talent Management</p>	<ul style="list-style-type: none"> - Performance of institution's human talent. - Promotion of human talent in line with the strategic planning established. - Articulation of human talent with the shared vision, academic processes, students and the socio-economic context.

Criterion 4. Partnerships and resources	<ul style="list-style-type: none"> - External partnerships according with the strategic planning and requirements of academic processes. - Management of resources to support the process and achieve the results established. - Evaluation of the use of resources in the administrative and academic levels.
Criterion 5. Academic processes	<ul style="list-style-type: none"> - Integral formation academic processes. - Articulation of academic processes with strategic planning and management of human talent and resources.
Criterion 6. Results in the students	<ul style="list-style-type: none"> - Results achieved by students, considering the challenges of context and educational policies.
Criterion 7. Results in human talent	<ul style="list-style-type: none"> - Results on human talent, with respect to their performance, formation and promotion.
Criterion 8. Results in society	<ul style="list-style-type: none"> - Results in society, locally, nationally and internationally.
Criterion 9. General performance	<ul style="list-style-type: none"> - Results of the organization in relation to their goals, both in the integral formation and competencies development in students, and extension processes (social, art, community, environmental, projects, etc.) and research (teaching and context).

Reference: CIFE (2009).

ISO Standards

Meanwhile, ISO standards provide a way for an organization to standardize its processes and thus can demonstrate its quality to internal and external customers, as well as to their suppliers. ISO standards seek for the processes involved in the organization's products to meet certain quality standards. This increases users and customer's confidence, because they see that the organization is implementing concrete actions to offer quality products.

The fact that an organization is certified in quality management through an ISO standard, provides recognition anywhere in the world, and this becomes a key factor for global trade. However, meeting a quality standard by itself does not ensure the improvement of management, nor decreases imperfections, or the final quality of the product or service. There is where comes to play in a key role the ideal human talent to ensure a well performed job in all areas of the organization, from executives to personnel operating the basic processes.

In education, the relationship between the EFQM model and standards ISO 9000 is

as follows: the EFQM model provides a number of strategies for each school to self-assess and continuously improve its academic quality, based in leadership and strategic planning, taking into account all academic processes and results in the formation of students. The ISO 9000 standards, however, will provide educational institutions externally accredited educational standards for the quality of its administrative and formative processes. This means that the EFQM model is for the use of the organization, while the ISO 9000 standards are to certify the quality of processes to other institutions, the state, the community, their human talent and students. Therefore, it is necessary to integrate a management model of excellence, such as the EFQM model, with the ISO standards in educational institutions.

Both ISO and the MGE have been incorporating the concept of competencies in three areas:

1. *Job Descriptions:* on ISO standards and the MGE is necessary to describe the job and its relationship with organizational processes, activity in which competencies allow a clear methodology that helps people staying aligned with the vision, mission and goals of the organization.
2. *Training:* ISO standards and MGE contemplate training processes, and competencies allow guiding training in accordance with the requirements of organizational processes, increasing their relevance.
3. *Certification:* in competencies, suitability of members of the organization is certified, and this, in turn, is a fundamental component to the quality assurance in organizational processes, as evidence of suitability of the people who run and work in the organization is provided.

From the socio-formative approach, an alternative management model of academic quality is presented, which main advantage is to be a guide of how to organize and evaluate educational processes under competencies. This model is described in Tobón (2010). Chapter four has this model as general guidance.

2.9 Pedagogy scenario

Education is also a scenario that has made significant contributions to the conceptualization of competencies. This area began to address the subject in the context of the establishment of innovative methodologies for learning and quality of education assessment (Jurado, 2003) in the early 90's, thereby seeking to overcome traditional methodologies based on rote memorization, the accumulation and

the mechanical repetition of data, to privilege the cognitive processes (perception, attention, understanding, intelligence and language), cognitive skills (interpretation, argumentation and proposition) and solving problems that are meaningful to students. This has allowed to improve learning assessment through more open approaches based on the know to do in context.

The concept of competencies reached formal basic education from the field of language, from the linguistic competence and communicative competence, which aim to take the study of language and human communication beyond the transmission of rules and memorization of meaning of words. The contributions of linguistics, along with the influences of the theory of information processing, multiple intelligences and professional competencies, led to introduce the term in other areas of the curriculum different to the language area. Thus gradually consolidates the concept of basic competencies (communication competencies, mathematical competencies, social competencies, competencies in natural sciences, etc.).

2.10 Emotional intelligence scenario

For several decades, it has been raised the need to consider the emotional part in human performance. A first contribution of large relevance was the social intelligence established in 1920 by Thorndike (Mestre, Guil, Carreras, and Braza, 2000), then the contributions already described from Gardner (1987) on the intra-psychoic and interpersonal intelligence. In the same line are the contributions from Salovey and Sluyter (1997). However, it is Goleman (1996) who masterfully manages to describe the importance of emotional intelligence for success in personal, social, labor and business life, when he proposes that emotional intelligence contributes 80% of success, while cognitive factors and competencies contribute the remaining 20%.

In our opinion, Goleman has moved in his studies from the emphasis on the concept of emotional intelligence to the emphasis on the concept of emotional competencies. Initially, he classified the emotional competencies into five domains (emotional self-conscious, managing emotions, self-motivation, empathy and social skills) and twenty-five competencies. Later this was revised (Goleman, Boyatzis and McKee, 2002) and only four domains were proposed (self-awareness, self-management, social awareness and relationship management) and eighteen competencies. An alternative denomination for these competencies is given by Bisquerra and Pérez (2007) with the name of socio-personal development competencies, which seems relevant to take into account; they include both personal competencies as well as those of interpersonal nature.

Table 2. Domains of emotional competence and associated competencies

PERSONAL COMPETENCE
SELF AWARENESS
Emotional self-awareness
Proper valuation of oneself
Self Confidence
Self-management
Emotional self-control
Transparency
Adaptability
Achievement
Initiative
Optimism
SOCIAL COMPETENCE
SOCIAL AWARENESS
Empathy
Awareness of the organization
Service
RELATIONSHIP MANAGEMENT
Inspired leadership
Influence
Development of other
Catalyze change
Conflict management
Establish links
Teamwork and collaboration

Reference: Goleman, Boyatzis and McKee (2002, pp. 72-73.) and Bisquerra (2007, p. 64).

Emotional competencies are defined as "the set of knowledges, skills, abilities and attitudes needed to understand, express and appropriately regulate emotional phenomena" (Bisquerra, 2007, p.69) and are critical in the formation of people in the family (Tobón and Fernández, 2004), in school, in college and in organizations. So, intelligence goes far beyond the neurons or the Intellectual quotient. According to Goleman (1996) the smartest not always win or those who learn content better, or

those who take better notes in class, but those who best understand their feelings and those of others, are flexible and have the ability to interact positively in different social environments.

3. Challenges of competencies based formation, CBF

3.1 Addressing the competencies-based formation with theoretical rigor

Competencies entered the education because of the large influence of factors such as the change from industrial society to knowledge society, the crisis of traditional education and the process of globalization, but with a low degree of study, critical analysis and discussion by the educational community (Bustamante, 2002; Gómez, 2001; Marín, 2002; Tobón 2006; Zubiría, 2002). That is why, despite the view of Torrado (2000) in the sense that the "topic of competencies does not correspond to a new pedagogical fashion and, on the contrary, the idea rounds education... from several years ago, bringing winds of change" (p. 38), the reality is that currently, competencies are being undertaken as a trend, in which the importance is to relate any educational situation with that term, regardless of the thoroughness with which it is done, since the mere fact of mentioning the word validates what it is being done, as it is within the socially accepted discourse. If this trend continues, the outcome can be similar to other terms in education, which have been highly publicized and then have been forgotten (Bustamante, 2003).

In opposition to the previous trend, it is essential that each teacher assumes a reflective perspective on competencies, considering the historical process that this concept has had, given by the confluence of contributions from multiple scenarios (Greek philosophy, modern philosophy, sociology, linguistics, cognitive psychology, organizational psychology, technical education and formal education). From this, the challenge is to move towards gradual integration of all these contributions, to begin establishing an order, a general background matrix that directs formation in the various fields of human action, without having the intention to build a univocal term of logical positivism style; rather, it is about defining the logics of construction of the concept and clarify some basic limits. Therefore, that competencies are a fashion or cease to be to become a rigorous model in the pedagogical field will depend on how critical the appropriation of this perspective will be by educational administrators, teachers, universities, researchers and the community.

3.2 The challenge of scientific knowledge

Often the prime orientation of competencies it's about the know to do, without critical reflection, nor research. And this sometimes occurs at all levels, from curriculum design, in which the process tends to stay in the instrumental and operational, to the formation itself, where practicality is favored over understanding and theoretical ownership. It is necessary, then, to cultivate scientific thinking in the competencies model for a rigorous appropriation of this concept and mediate their learning with creativity, innovation and relevance.

Historicization of CBF invites us to address this proposal through analysis, inquiry, critical reflection, contrasting ideas, identifying problems and their solutions, and argued and proactive public debate to thus advance to a better conceptualization, understanding, theoretical development and application of the CBF, which leads us to transcend the apparent, the illusion and subjectivity, very natural tendencies in humans, as very well shows complex thinking (Morin, 2000a).

Against a common criticism of the CBF that claims it emphasizes the labor-professional field, experience has shown that this approach leads us on how to boost science education at different educational levels, articulating in the curriculum the research competence transversely based on the methodology of formative projects. Thus, we have observed in practice how the CBF from complex thinking promotes continuous inquiry, self-criticism, hypothesis testing, and argumentation and problem solving in the field of scientific research, enabling tools for institutions to increase their impact in this area.

3.3 The Latin American context in competencies

In Latin America it has traditionally been a tendency to import models, educational approaches and methodologies from other contexts with characteristics very different and without making the necessary adjustments. This has hindered that the region possesses pedagogical referents that respond with high relevance to the formative needs of citizens, considering the wide variety of communities, cultures, ecological environments and production mechanisms that are common to the region. This use of imported models without contextualization and with great absence of Latin America owns proposals has many causes, some of them are:

- Due to historical processes of colonialism, it is tend to value educational models from economically "developed" countries by some politicians, researchers and certain stakeholders in the education system.

- Often, the fact that an educational proposal comes from abroad means the proposal is seen as "valid" because it is thought it has been applied and it has succeed. Often these results are recorded globally without the specific analysis that is necessary. For example, today it is common to listen, *"such education approach or methodology is required to be followed in the country because it comes from Finland or Singapore, countries with high scores in the PISA test"* but the relationship between the proposal and the educational results are not determined, nor how it will adapt to the circumstances of each country.
- Educational research tends to focus more towards describing educational facts and assess the impact of external methodologies than to adapt, create, and / or innovative proposals that generate changes in practices of politicians, social institutions, teachers, families and students, in order to make the education more relevant.

We must seek for most appropriate educational practices to be generated, to ensure integral human formation in Latin America, creating and adapting theoretical and methodological proposals with contributions from researchers and teachers themselves. This is being accomplished with the competencies in which there is a significant production of references and methodologies in Latin America, contextualized to the various countries, as well as with adaptation and improvement of proposals from outside. Obviously this is just the beginning and there is a long way to undertake to strengthen Latin America as entrepreneurial in education, with highly humanistic value components, with social criteria and responsible action with the ecological environment, key axes to seek social and economic sustainable development.

The socioformation is, precisely, an approach that is being developed and strengthened in Latin America (with contributions from European researchers) and it aims to guide the transformation of education to ensure integral formation of people with a strong ethical life project, which is both personal and collective, and in relation to the ecological environment. It focuses in generating actions to change educational practices strongly rooted in cognitive and rote content, looking for people to learn to act before problems, mobilizing different knowledges.

This approach is already being implemented in various countries and at all educational levels, from preschool to graduate school. This is allowing teachers to have a simpler methodological referent than those of traditional competencies approaches and, above all, according to the sociocultural context and challenges in Latin America. Thus, it is expected that day to day this approach be increasingly considered by politicians, educational leaders, researchers and teachers themselves, following the invitation of Professor Edgar Morin for Latin America to be the region that energizes a new culture based on relevant education, solidarity and anthro-poetics.

4. Suggested Activities

- 1) Create a mental or conceptual map of the essential contributions of the various scenarios that have been and are involved in the competencies-based formation
- 2) Reflect: What do you think of the tendency in many educational sectors taking competencies as a new fashion? Analyze what aspects do you consider a novelty in competencies and what aspects are no novelty.
- 3) Determine which scenario is the most prevalent in the concept of competencies that you as a teacher know.
- 4) Do you consider that currently the concept of competencies in education is resuming the various scenarios discussed in the chapter, or, on the contrary, it is used with a partial vision where only the contributions of a single stage or perspective are taken into account? From the above, we invite you to build a proposal to address competencies considering the various scenarios discussed. To do so, please describe some general ideas. It can be useful to draft a mental or conceptual map as a teaching aid.
- 5) Finally, we invite you to share with other people the products of the above activities, in order for you to know the point of view of your colleagues and also receive feedback from them on your contributions.

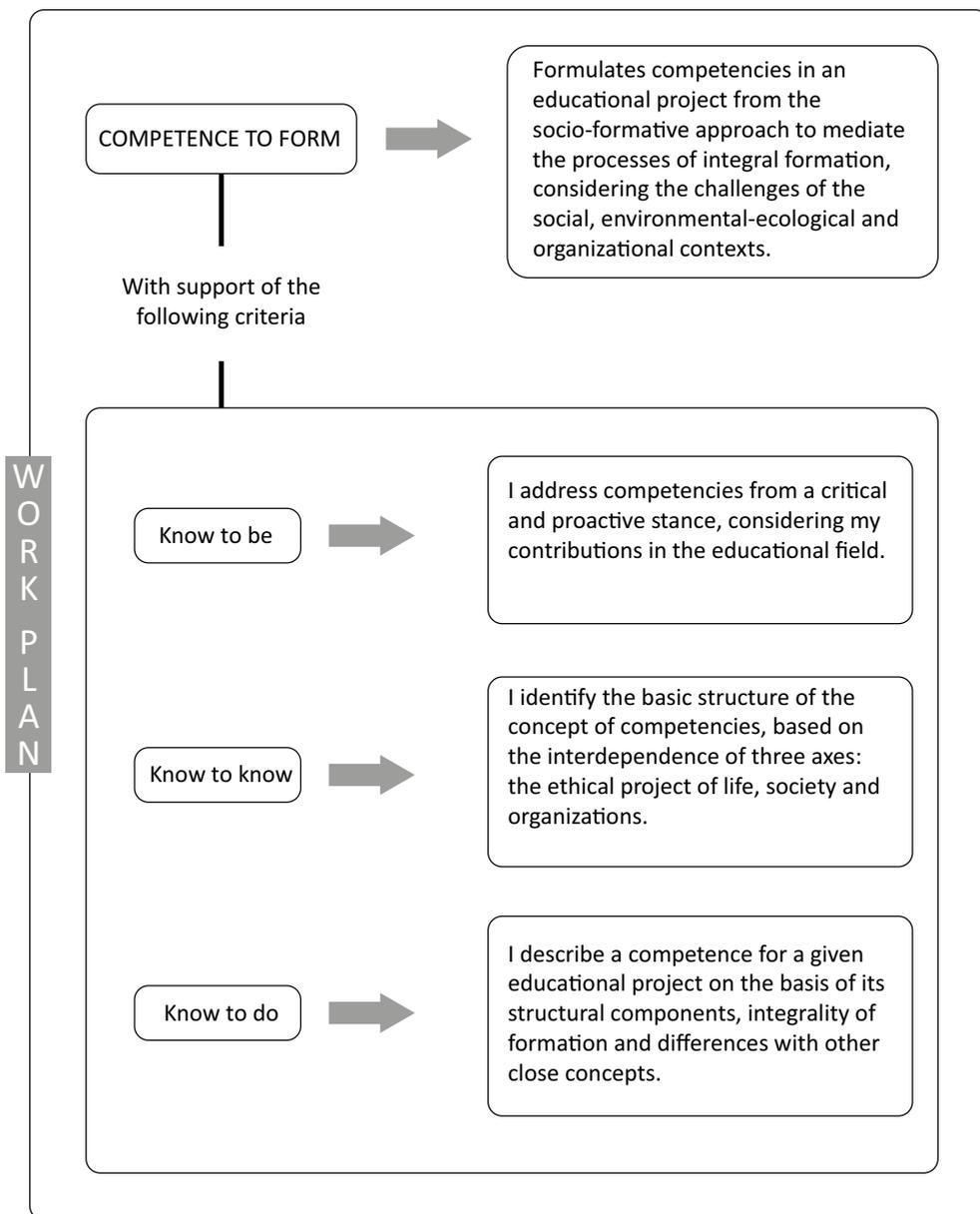
Chapter three

The concept of competencies. A Socio-formative perspective

It is not of our interest for the concept of competencies to be Assimilated with the concept of competitiveness, if that means bringing to the educational system the market laws and with them the parameters of effectiveness, profitability and efficacy. We speak of competencies in terms of those individual capabilities that are a necessary condition to promote social development in terms of equity and citizenship exercise.

This raises the need for rigorous and deep work with the knowledge and the human being who is immersed there.

Torrado (2000, p. 32).



1. The need for a systemic and complex approach of competencies.

The competencies-based formation has been implemented with a high degree of publicity about its benefits, but with limited thoughtful and critical looks around those interests at their background (Baccarat and Graziano, 2002; Barrantes, 2001; Tobón, 2006). This notion is used without clarity about the historical conditions that determine and legitimize it academically and pedagogically: "*Much of the educational community does not ask why the word appears, or why it was not important before, but believes to discover with it a foul in the past, including an explanation for why certain failures had always persisted... until today, that will happily be overcome, for it we have made the word to be around*" (Bustamante, 2002, p.13). This homogenizer discourse that supports notions without conceptual rigor has negative effects in pedagogical practice, as "*is not merely a generalization of teleological cut (abstraction), but can boast tangible consequences in the way some practices are taken collectively and incorporated into everyday tasks and even to regulations that prescribe concrete actions (the least visible of the speech)*" (Barrantes, 2001, p.126).

Competencies are being introduced in the various Latin American countries from the context of a modernizing pedagogic discourse, which is in itself a return to a policy for human resources formation from the decades of the seventies and eighties, which explains the emphasis on concepts such as efficiency, equity, quality and efficacy without a clear pedagogical support (Baccarat and Graziano, 2002). As clearly raises Jurado (2003), this trend is supported and encouraged by the World Bank, and raises the need for educational institutions to form the human capital required by the local and global markets. Here "being competent means to perform according to professional and occupational standards to get a specific outcome" (Barrón, 2000, p. 29), but it doesn't clearly appear the integrity of these standards with respect to the human self-realization and cooperative work.

Many current educational policies intend to form a *worker-competent-citizen* (Braslavsky, 1995), which falls on reductionism, since education must have as a vision to form integral women and men, within whom an aspect of great importance is to form for both, the labor market and to create decent working conditions that favor quality of life.

Initially, competencies were conceptualized as an alternative option in education (Granés, 2000, p. 210). Soon, however, they have move from being an alternative to be the ultimate goal of education (Torrado, 2000; Zubiría, 2002) with which it has reached an unprecedented reductionism, that reductionism the same competencies

have sought to attack. That's why Latin American educational systems increasingly rely more on this notion, regardless their conceptual, theoretical and epistemological foundations.

In this reductionist framework, competencies tend to be conceptualized as those observable and habitual behaviors that enable success of a person in an activity or function. They are the know-to do in context. (Hernández, Rocha and Verano, 1998), involving the analysis and the management of surrounding problems through the use of knowledges and resources from the situation. Such a definition of competencies as "know to do in context" has six key issues: (1) the "know to do" emphasizes the procedural, rather than the essential aspects of human rationality, such as understanding and comprehension of the implications of the facts (Montenegro, 2003), (2) does not take into account the attitude towards the ideal performance and its articulation with personal values, (3) the performance is reduced to action and problem solving, ignoring the assumption of responsibility for the human act, (4) deals with acting in the environment, but neglects or disregards that smart performances of greatest impact imply the transformation of that environment in favor of human welfare (Montenegro, 2003), (5) it assumes the *know to do* separately from the *know to know* and the *know to be*, when reality shows that all performance process integrates the three knowledges and "to do" is (6) very limited and denotes interaction with objects, rather than on interpersonal and intrapersonal human actions (Montenegro, 2003).

In order to make progress in bridging the gaps and shortcomings that the concept of competence has, in this chapter an structural analysis is made of the concept based on complex thinking and the methodology of concept construction called *Conceptual Cartography* (CC) (García Fraile and Tobón, 2009; Tobón and Fernández, 2001, 2003), which directs the construction of any concept based on eight essential dimensions: notional approach, categorical placement, characterization, differentiation, subdivision, linkage, methodology and exemplification. The following was drawn from the theoretical contributions of the *socio-formative approach* of competencies.

2. Conceptual structure of competencies

2.1 Notional Analysis

Much has been said about competencies, but there are still large gaps and disagreements around its definition (Soto, 2002). This is a serious obstacle for structuring educational programs based on this model. Furthermore, conceptualization of the term competence depends "on the approach to human talent management, the assessment given to the worker and the job in the accumulation of value. It is also defined differently

if individual learning is considered more significant or if the concept of collective learning is incorporated or if the intention is to form qualifying organizations" (Corpoeducación - Sena, 2001, p. 14).

The definitions built daily on competencies are also determined by the way the related tangible and intangible aspects are focused. For example, it is often considered the social competencies (they tend to be intangible) different to the technical (tend to be more tangible) competencies. Also, the meaning of the concept switches between countries referring either to educational titles, employment categories, job positions, etc.

Analysis of the term "competencies"

The term *competence* or *competencies* is ancient. In Spanish, the term comes from the Latin *competentia*, which, from the fifteenth century, means the responsibility of, belong to, correspond to. Thus, the noun *competence* is formed, with the meaning of "*what corresponds to a person to do with responsibility and suitability*" and the adjective competent, meaning apt or suitable. This is how the term is currently used in education and human talent management.

However, in Spanish, the term competence also has the meaning of contest against, compete with, contend with, influenced by the Greek terms *agon* and *agonistes*, leading to the nouns *competition*, *competence*, *competitor*, *competitiveness* and the adjective *competitive* (Corominas, 1987; Corripio, 1984). This is the proper term of business competition and sports, but not of human formation.

Cultural uses of the term "competencies"

The term *competence* appears increasingly in everyday discourse and it is being used with multiple meanings, as may be seen in Table 1. This indicates a highly polysemic concept that facilitates the accommodation of the speech to the purposes of the speaker (Levy-Leboyer, 2000) and the various situations.

Conceptions of competencies

The term *competence* is a confusing concept in organizational culture and in education today (Robotham and Jubb, 1996; Soto, 2002), as it is unclear whether competencies relate to what people are capable to do, should be able to do, have to do or really do, to achieve success in a job or an organization (Gil, 2000).

Table 1. Uses of competencies in social context

Use	Examples
Competence as authority. Refers to the power of command certain position may have.	"The deputy has the competence to evaluate the performance of the administrative assistants and make a decision about their future in the company".
Competence as training. It is about the extent to which people are prepared to perform certain jobs.	"This job requires high level communication in English and that you have the competence to perform successful in this area, so we will hire your services".
Competence as labor operation. It refers to the responsibilities and activities that everyone should perform in a particular job.	"The manager has the following competencies: represent the company, establish strategic partnerships with other companies and managing human talent".
Competence as suitability. It refers to the adjective of being suitable or unsuitable in relation to the performance in a job.	"The secretary of the human resources office has high competence due to serving people well and providing enough information".
Competition as business rivalry. Expresses an essential axis of the business area, as it is the need of every business to excel over other companies in the production of goods and services, in respect to factors such as price, quality, timeliness and benefits.	"Spring Flowers Inc. opened new markets in China and Japan due to the modernization of its production system, which is allowing them to compete with lower cost than other companies in the area".
Competence as competition between people. It occurs when an employee seeks to stand out among others for promotion opportunities, better income and/or awards, etc..	"Employees in this section are competing against each other to win the prize to the best insurance salesman of the month".
Competence as a set of requirements to perform a job position. It refers to the skills, abilities, dexterities, knowledges, values and attitudes that a candidate to a particular job must present in order to be linked to a company.	"The company Caribbean Motorcycle Inc. is hiring technical staff for their customer service office with the following competencies: management of computer programming, equipment installation and maintenance, management of word processors, and network creation and monitoring".
Competence as a sport. It refers to sporting events as a noun.	"Yesterday we held a cycling competition in Bogota that Carlos Camacho won".

Transcending the usual definitions of competence (see Table 2), this concept can be taken as a comprehensive and reasoned action to deal with uncertainty, uncertainty management in a world changing socially, environmentally, politically and in the labor-professional area in a globalized and rapidly changing society (Baccarat and Graziano, 2002). Thus, competencies could not be treated as observable behaviors alone, but as a complex structure of required attributes to perform in various situations, which combine knowledges, skills, values and attitudes into the tasks that must be carried out in certain situations (Gonczi and Athanasou, 1996).

Table 2. Some definitions of competencies

"As a principle of formation organization, the competence can be seen as the set of attitudes, knowledges and specific skills that make a person capable of performing a job or solve a particular problem" (Ouellet, 2000, p.37).
"Competencies include an intention (interest in making things better, interest in doing something original), an action (setting objectives, responsibility for results, assumption of calculated risks) and an outcome (improvement in quality, productivity, sales and innovation in products and services)" (Gómez, 1997, p.52).
Competencies are a complex structure of attributes necessary for the performance in specific situations, that combine aspects such as attitudes, values, knowledges and skills in the activities to carry out (Gonczi and Athanasou, 1996).
Has professional competence who has the knowledges, dexterities and attitudes necessary to perform his/her own job activities, solves problems in an autonomous and creative way, and is trained to act in his/her working environment and the organization (Bunk, 1994).
Competencies are a "suitable action that emerges in a particular task, in a meaningful context, where there is knowledge properly assimilated and which acts to be applied in a determined situation, in a sufficiently flexible way so as to provide varied and relevant solutions "(Bogoya, 2000, p. 11).
Competencies are "codes of behavior that some people master better than others, making them effective in a determined situation" (Levy Leboyer, 2000, p. 10).
"A competence is an ability to perform relatively new tasks in the sense that they are different from the routine tasks that were done in class or that arise in contexts other than those in which they were taught " (Vasco, 2003, p. 37).
"Ability to conduct and use knowledge, skills and attitudes that are integrated in the professional repertoire of the individual" (Mulder, Weigel and Collins, 2007, p.18).

Competencies and transdisciplinarity

For some authors (e.g. Zubiría, 2002) competencies are being addressed in education from a framework of paradigmatic decontextualization due to the fact that: "(...) a notion such as competencies cannot be taken out of a theoretical paradigm, and operationalize it in other and functionalize it in another. The very idea of 'theoretical paradigm' implies that if a category is removed from the system, it is necessary to remove the appended theses, the dominant and subordinate thesis "(Zubiría, 2002, p. 55). According to this author, the current notion of competencies has been arbitrarily taken from a theoretical paradigm (linguistics) and is being applied to other areas in an unsystematic way, unconnected, without clear criteria (Zubiría, 2002):

Having taken out the word competence without having reflected on the notion of theory and without taking into account the problem of paradigm concept, a big confusion occurs and leads to the competencies turning into a completely arbitrary list of whatever. That's cynicism. Soon we will begin talking about competence to tie your shoes, competence for orgasm (Zubiría, 2002 pp.55-56).

Here are relevant the following two comments:

1. The notion of competence that is currently used in education does not come from a single theoretical paradigm as poses Zubiría (2002), but has multiple theoretical sources (philosophy, linguistics, sociology, psychology, education for work, pedagogy, quality management, emotional intelligence, etc.)
2. Indeed, a pedagogical theory requires having theoretical interdependencies and is hinged to a conceptual system in which each term is supportive of others. This has already begun to happen in competencies-based formation and in this respect there are significant theoretical and methodological advances from the transdisciplinary framework and complex thought.

Complex thought, as a method of knowledge construction based on the weave of relationships between the parts and the whole from the continuing order-disorder organization, involves abandoning all pretense of having ideas, laws and simple formulas to understand and explain reality (Morin 1994b). Consequently, addressing scientific concepts from this epistemology is to consider multiple dimensions and axes of meaning, which makes it difficult to define exactly, and to employ them with certainty (Baccarat and Graziano, 2002). Thus, assume complexity as competencies epistemology involves recognizing that competencies constitute an unfinished model, one in constant construction-deconstruction-reconstruction, continuously requiring

the critical analysis and self-reflection to understand and use this model in the integral human formation.

Hence building the concept of competencies from the complexity, more than accounting for an "objective and accurate reality", aims to develop the logic of the conceptual relationships that allow us to understand it in a socio-historical frame, comprising its historicizing and historicity, products, processes and future trends, and their implicit commitments (Zemelman, 1992). This should lead us to understand the interests that are in the background of competencies in education, beyond visualizing such discussion from a theoretical awareness of competencies, is given a historical conscience that notes how they have developed, what their explicit and implicit purposes are, and what are their goals for the future.

Social-formative concept of competencies

Integral formation and competencies formation requires the assumption of a new intelligence and rationality that transcends the division and fragmentation, in order to address reality in its multidimensionality:

The divided, compartmentalized, mechanistic, reductionist and dilemmatic intelligence breaks the complexity of the world into separate fragments, fractionates problems, separates what is attached, uni-dimensionalizes what is multidimensional. It is a myopic intelligence that usually ends up blinded. Destroys from the egg the possibilities of understanding and reflection, reduces the chances of a corrective judgment or a long-term vision. Therefore, the more multidimensional the problems become, there is more incapability to think about its multidimensionality; as crisis progresses, more progresses the incapacity in thinking the crisis; as more planetary problems become more unthinkable are. Unable to project the context and planetarium complex, blind intelligence becomes unconscious and irresponsible (Morin, 2000a, p. 34).

From the above, it is proposed to conceptualize competencies as:

Integrated actions to identify, interpret, argue and resolve context problems, developing and implementing articulately different knowledges (know to be, know to coexist, know to do and know to know) with suitability, ethics and continuous improvement.

In short, competencies are integral actions in response to activities and context problems with suitability and ethical commitment. In such perspective, they consist of underlying processes (cognitive-affective) as well as of public and demonstrable processes; therefore always imply an action from oneself to others and/or the context.

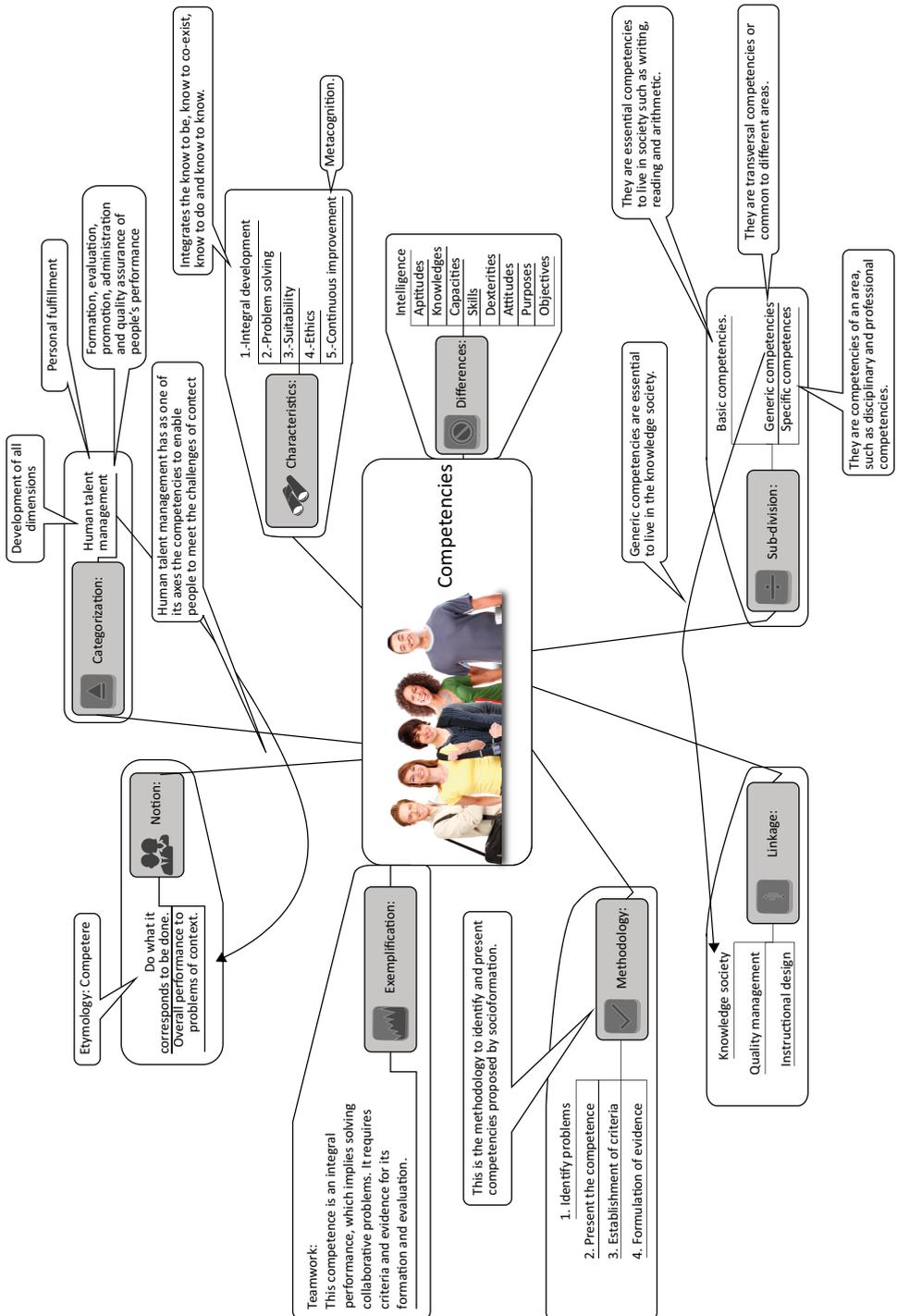


Figure 1. Complex concept of competencies based on the conceptual cartography

As well raises López-Herrerías (2002): "We should not say many times that each person is a universe that is done in dialogue with the world, that each one of us is our difference, the open and communicational result of the dynamic and interdependent, bio-psycho-socio-cultural complexity, we consist of" (p. 16). Therefore, the aim of developing competencies in people from the integral human formation is to turn into reality the personal self-realization from the ethical life project; contributing to the environmental balance, performing an occupation with relevance, appropriateness and ethics; work in the social tissue for socio-economic development, and undertake social, economic, community and/or scientific projects based on creativity, critical-purposing sense and the flexibility (Figure 2). Thus the humanism in education and talent management vindicates, but without ignoring the world of production.

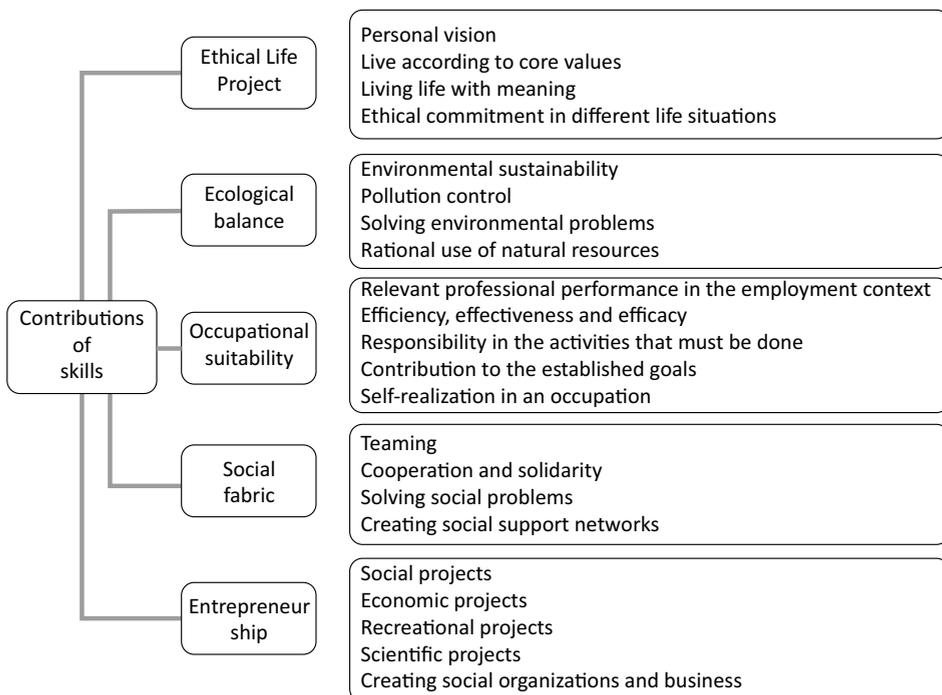


Figure 2. Contributions of competencies to the person, the environment and society

This confronts and challenges the prevailing current view to assume competencies as a simple individual performance, view explained by the predominant culture of selfishness, consumerism and materialism. The position defended here strengthens the contribution of competencies to building the social fabric through cooperation and solidarity, as well argued by Torrado (2000): "a basic quality education, oriented to competencies development, can become a strategy to form people able to exercise the civic and democratic rights of contemporary citizens, as well as to participate in the labor market, increasingly knowledge-intensive" (p. 32).

This involves testing the competence=competitiveness=rivalry relationship, such as expounded by Jurado (2000):

In regard to the term competence, it is necessary to clarify that it is not about the act to compete with others, nor is it about competitiveness in the market; it is a know to do that all individual carries in a certain field, which is always different in each individual, and at each time and that is only possible to identify in the action itself, it is a mastery and accumulated experiences of different type, which helps the individual to function in practical life and build social horizons, always in relationship with the other (p. 95).

2.2 General Category

Competencies, from a complex perspective, fall into the general category of talent management, although currently it is scarce the view on this point (Durán, 2003). The talent management is the process by which the harmonious development of the different potentialities of the person is seek (Table 3), consistent with certain vital needs for growth and goals, in order to have a fulfilling quality of life, considering the challenges and possibilities of family, social, economic, political, environmental and legal context where one lives. The talent management requires an approach from the complexity so that is not addressed in a fragmented manner in the different educational settings.

Tackling talent management in its entirety involves transcending the traditional dualism of body/soul, individual/society, nature/culture. Human being as a complex entity is indivisible and its understanding requires considering the weave of the multiple dimensions that enable his essence and emergency. His identity is not given once and for all, but is permanently constructed through relationships and interactions with himself, others and the changing environment over a lifetime, making possible the maturation of his biological structures, but transcending them from the formation of oneself from the vital needs of self-assertion, self-discovery and historical social reality. Also, everyone has the potential to be responsible for their feelings, thoughts, actions, decisions and destiny, which implies assuming the consequences of their actions, respond for them, repair possible damages and realize how far personal actions can go without violating the rights of others.

This implies that all educational proposals must address each person as unique, in the way of constant awareness of himself/herself, in process of self-realization, open to experience and in continuous learning. This is where education, taken as an institution, mediates, facilitates and provides opportunities to guide and channel the human

formation, helping to overcome the different blockages and allowing each person be what he/she has built as perspective and horizon.

The human person has the potential to be a singular being, transcending the driving forces of individualism, which isolates, feeds the fighting spirit and blocks the construction of the social fabric, so, uniqueness allows human being to assume himself as different, as unique and unrepeatable, without involving a fight against another or others, for the uniqueness, despite the recognition of oneself, is open to other people. At the same time, all human beings are also plural and similar to others. Plurality that goes on a different road from massification, because it is not about integrating with others uncritically, but to be recognized as a member of a society and a species where a common destiny is shared at the macro-level and common rules and laws are respected in order to allow coexistence. Therefore, we can say human realization only occurs to the extent that owns identity is built, pairing with the performance of a projection to the others and the context, contributing to social and environmental wellbeing.

Table 3. Talent management dimensions

Dimension	Definition	Processes
Dimension	It is the way human beings process information.	<ul style="list-style-type: none"> - Development of intelligence. - Thinking skills. - Cognitive strategies.
Bodily	It refers to the physical structure of human being and how this is meant by culture. It consists of perceptual processes, muscular-skeletal structures and organic systems.	<ul style="list-style-type: none"> - Formation and physical motor development. - Body experience. - Ludic experience. - Bodily kinesthetic Intelligence. - Spatial Intelligence.
Social	It is the interaction with others to carry out processes of coexistence and collaborative work by the assumption of rules, laws and guidelines built collectively.	<ul style="list-style-type: none"> - Assumption and monitoring of social customs. - Respect for cultural differences. - Interaction. - Search and construction of cultural identity. - Globalization.
Communicative	Language is the vehicle through which the symbolic and cultural universe of each individual is configured, in interaction with others and the world. The central role of language is the significance and from this the process of communicating messages using a code from receiver and emitter is structured.	<ul style="list-style-type: none"> - Significance systems construction. - Understanding, interpretation, analysis and production of texts. - Communication ethics. - Aesthetic processes associated with language. - Development of thought.

<p>Ethics</p>	<p>Ethics is the ability to make decisions taking responsibility for acts through the awareness of actions and being part of that over which one acts, seeking respect to personal dignity and that of others, as well as respecting the integrity of the environment.</p>	<ul style="list-style-type: none"> - Moral development. - Construction of the norms. - Formation of values. - Development of moral-intellectual autonomy.
<p>Ludic</p>	<p>Everyone has a tendency to feel joy, satisfaction and interest in living difficult situations, chances, risks and freedom, in which the imagination and distraction are expressed. Ludic, in turn, is a mode of cultural expression, social and health integration, as it allows handling everyday stresses.</p>	<ul style="list-style-type: none"> - The process of play. - Learn through play. - Recreation.
<p>Labor</p>	<p>The labor world is another central dimension to human development and consists in performing activities directed to an external end.</p>	<ul style="list-style-type: none"> - Vocational orientation. - Preparation for a job. - Planning of work within the framework of self-realization.
<p>Spiritual</p>	<p>Involves assuming oneself in contact with the whole (society, human species, planet, cosmos) beyond each individual being, so that the person can understand his/her position in that whole and the role corresponds to him/her to live. Questions appear in this dimension such as What is our mission? What is the meaning of life? What is the meaning of death? Spirituality involves love for truth, seeking personal transformation and context transformation. So that it can be said that there is a spiritual experience only when there is truth and transformation from the ethical commitment.</p>	<ul style="list-style-type: none"> - Bonding with the species, society and the universe. - Search for personal transcendence and experience of contact with the whole. - Self-reflection for truth search. - Generation of changes and transformations in the person and in the ethics context.

2.3 Characterization

Competencies have five key characteristics: they are an integral performance; they seek to solve problems, focus on continuous improvement and are based on the ethical performance.

Integral performance

The notion of competence involves "a domain of the use, in different contexts, of the basic underlying rules (...) Competence points to a domain of the grammar, expressed or implied, of a knowledge sector "(Granés, 2000, p. 211). This is based on the understanding of the information and not on its memorization; the latter makes the appropriation of knowledge based on the domain of the basic rules, as well as putting it into play in various situations (Granés, 2000). Memorization looks for introjection of information to be repeated unchanged. This does not mean that memory is unimportant for competencies: on the contrary, competencies are based on processes of long-term memory, with analysis and critical relationship linking the verbal, the non- verbal and spatial.

It's different to possess knowledge about a particular matter than know how to act. The latter involves a process in which actions are performed with a particular purpose, in a flexible and timely manner, taking into account the context. The action also aims to modify and transform the context, and not just to accommodate to it or understand it. This is an essential point in any proposal for competencies formation, with the aim of targeting the tissue of human growth, society growth, and economic development.

Finally, action should be assumed as a comprehensive process where knits and weaves the sense of challenge and motivation to achieve a goal, based on the confidence in the person's own abilities and the social support (know to be), with the conceptualization, understanding of the context and the clear identification of activities and problems to solve (know to know) to execute a planned set of actions mediated by procedures, techniques and strategies, with constant self-evaluation and correction (know to do), taking into account the consequences of acts.

In any activity, the human being should be seen as a whole, as a unit such that it is not possible to affect one of his dimensions without affecting others. This entails overcoming the cultural and disciplinary tradition that has seen human beings in a partial, particular and isolated manner. Competencies emphasize the integral action of the human being to activities and problems, thus effectively closes the traditional gap between knowledge and its application in real life. Every action is mediated by

mental, physical, environmental, interpersonal and cultural processes, so performance should also be assumed in its entirety, as an ecological fabric where the person, both, in relationship with himself/herself and with others, acts under links that involve reciprocally.

The action combines dynamically, constantly and in many cases, unpredictably, the human nature with the world of culture, thus forming a fact that constitutes in the complexity of actions and relationships of the subject with the world, leading to the erotic, ethical, aesthetic, cognitive, expressive or communicative experience and to the construction of experiences which have as a condition the development of capacities and competencies for its appropriation, application and transformation.

Human beings are transformed by the environment, but at the same time, they have the potential to transform that environment, from their active and creative powers, ideals, dreams, wishes, disagreements and problems. The creative activity enables man to put the stamp of his uniqueness both, serving his own welfare and serving the uniqueness and welfare of other human beings.

In the predominance of simple thought in the design of competencies, have been privileged conceptual and representational contents, for fear to fall in instrumentalism (Gómez, 2001). However, from the socio-formative approach, competencies integrate complementary the representational domain with the domain of the strategies, in order to account for all comprehensiveness of human action.

All competence revolves around the know to be composed of attitudes and values, the know to do, which means acting in reality with the procedural skills needed and the know to know, which is to understand and argue what is done and should be done. The know to coexist is integrated in the know to be, because it is based on attitudes and values and these facilitates both, curriculum management as well as talent management.

Solving context problems

Another key component in competencies is problem solving. Solving a problem is not simply applying a logical algorithm, perform established operations and arrive at a result. This is a simple view of this field. Neither problem solving depends exclusively on the degree of learning of notions, concepts and categories of a given discipline, but also depends on the way problems are meant, understood and addressed in a context.

Therefore, problem-based formation...

It is revealed as the most fruitful for an education for the development of competencies, not only because it involves and disclaims the diversity of issues (...) but because in its 'hard core' assumes human cognition as a construction and a social practice, related to how we act and interact in the world according to representations, strategies and skills we have at one given time (Gómez, 2001, p. 121).

With regard to addressing problems in competencies, the following clarifications need to be made. First, the problems may refer to negative situations in the context to be solved or may also be challenges to improve, create and innovate. Second, the problems can be activities, which in their performance involve some improvement challenge. And third, addressing problems in socio-formative approach is not one more competence as proposed in other approaches to competencies (behavioral, functionalist and constructivist) but an essential component of any competence.

In problem solving from competencies is necessary to perform the following actions:

1. Understand the problem in a disciplinary, personal, environmental, social and/or economic context.
2. Establish several solution strategies, in which are considered the unexpected and uncertainty.
3. Consider the consequences of the problem and the effects of the solution within the overall system.
4. Learn from the problem to assume and solve similar problems in the future.

In problem solving there have been two trends: one focuses on contextual use of strategies and procedures (Poza, 1994), the other aims to solve problems by applying general skills (Nickerson, Perkins and Smith, 1994). The two perspectives have pedagogical implications, according to the position the teacher assumes, it is largely determined the formation of comprehensive performances in students (Gómez, 2001). In the first perspective, it is taught to solve problems in a specific context, the second, however, it is taught to solve problems with application in multiple contexts. Both perspectives are relevant to the competencies-based formation and can be addressed in a complementary way in education.

All context is a weave of meaning relationships by people who, in turn, are intertwined and fastened by the meaning environments that have thus constructed. It is necessary to understand the contexts traversed by economic, political, social and educational changes, all of which influences people. "The context is a complex reality, crossed by

certain powers, some languages, some rules, some codes, some interests, and some specific demarcations" (Marín, 2002, p. 108).

In competencies, the context is to locate a particular case in a conceptual universal-ideal system (Zubiría, 2002), as in the massive competencies evaluations held in different countries. Performance is assessed according to predefined criteria of ideal character, which results in a historical and abstract process (Zubiría, 2002). In a complex hermeneutic perspective, context has three types: primary context (field of speech production), secondary context (field of speech reproduction) and tertiary context (social relocation of the field of speech). Therefore, the context goes beyond some disciplinary ideals, locating in family, social relationships, for valuation and multiculturalism (Zubiría, 2002).

Contexts of competencies include: disciplinary, transdisciplinary, personal, socioeconomic, environmental, etc.:

- **Disciplinary contexts:** refers "to the mobile set of concepts, theories, epistemological history, areas and articulating axes, action rules and specific procedures corresponding to a determined area" (Icfes, 1999, p. 17).
- **Transdisciplinary contexts:** knowledge fabrics constructed by the integration and coordination of different knowledges (academic and popular).
- **Personal contexts:** refers to the inner life of each human being, his personal fulfillment and his particular way of understanding and acting on the world, within the sociocultural interwoven.
- **Socioeconomic contexts:** are given by cultural, social and economic dynamics in which the person is involved.
- **Environmental context:** is the natural and ecological environment in which the person lives.

In a complex view, it cannot be exclusively spoken of competent or not competent people, but must also be taken into account the ecological contexts within which the person is included. "The competence of the subject depends on the requirements of various kinds (cognitive, communicative, aesthetic, axiological, etc.) on the cultural environment in which he or she develops, also, such environment acts as an enabler or inhibitor of those competencies" (Duarte and Cuchimaque, 1999, p. 11).

Competencies are formed in interaction with contexts. On the one hand, the latter

require demanding and enabling all necessary resources for their formation, because otherwise people will not feel the need to acquire or possess the resources to do so. On the other hand, people, to build the competencies from their own perspective of life, change the environments (Duarte and Cuchimaque, 1999). Ultimately, contexts act on people and people act on contexts, thus establishing a mutual interdependence.

Suitability

Adequacy is a central feature of the concept of competencies, thus we can say that a criterion for determining whether a person is more or less competent is to assess their level of suitability in his or her performance. It has been a tendency to assume suitability with reductionist criteria (Zubiría, 2002) in terms of time and amount (for example, when relating to the suitability of a person in a company to perform a certain amount of product in a given period of time). From a complex perspective, suitability relates and integrates the time and amount of the production with aspects such as: quality, use of resources, timing and context.

Ethics

Regarding ethics, it must be said that all competence implies an ethical performance when analyzed from the complex thought. To our knowledge, there is no other possibility if we are consistent with this epistemological framework, because if it is proposed that competencies are articulated to integral human formation, and that they integrate the know to be and know to coexist, then it will be present the ethical conduct. Therefore, ethics is not one competence more, as is the case with other approaches to competencies, but an essential dimension of all competence.

Metacognition

From socioformation, in any competence there is a metacognitive process. This means that the person seeks continuous improvement from certain goals, based on the continued practice of reflection.

2.4 Differentiation

Competencies are often confused with a lot of concepts, which although relevant to them, they are not equivalent, although in many cases the differences between concepts are very small and subtle. Below it is presented an exercise in differentiation that is expected to help clarify the different terms, without being a finished proposal as such. Regarding the different concepts described below, it is important to prevent

its use in the formation process. The principals and teachers require understanding such concepts, but that does not mean they have to explain them on every educational activity, and this is mentioned because there are institutions that plan lessons with all or most of these concepts. For example, CIFE evaluated the formative plan of a college at a university, and it was required for all teachers to develop their modules considering: purposes, objectives, multiple intelligences, aptitudes, competencies, knowledges, capabilities, skills, dexterities, learning outcomes and evidence, thereby pedagogical mediation was a highly complicated process. And so are many cases that exist today, in the mistaken belief that the more components possess the curriculum, more the academic rigor it has. It is therefore necessary to understand these terms, but then select only the key components in the management of formation.

As discussed below (Figure 3), from the socio-formative approach, formation mediation is focused on competencies from the criteria and evidence (along with the procedural axes and indicators when deemed necessary). Multiple intelligences or aptitudes are not made explicit, nor the objectives, purposes, capabilities, skills and dexterities, because all these aspects are integrated in each competence. Here is precisely where is located one of the great advantages of this approach, which is to integrate different educational concepts in a systemic structure. And this is translated into practice in an easier way to mediate the work according with the goals the formation program has.

Differences between competencies with intelligence and aptitudes

Competencies are not the same as intelligence (Table 4). Intelligence is the general cognitive-affective processing that everyone has. Competencies, however, are how intelligence develops and it is put into action in front of the various context situations.

It is difficult to conceptualize aptitudes because they tend to be considered as synonymous of capabilities. However, in the pedagogical and organizational use, aptitudes are the potential talents that each person has in his/her intelligence, and that can be developed through formation. For example, each of the multiple intelligences include aptitudes (potential talents) that when developed become capabilities. Competencies are the result of the effective development of aptitudes through capabilities, along with its implementation in action in the context with suitability, continuous improvement and ethics.

Table 4. Differences of competencies with intelligence and aptitudes

Concept	Definition	Example	Differences with competencies.
Intelligence	Intelligence is the general structure by which living beings process information in order to relate with the environments in which they are embedded, based on processes of perception, attention, memory and inference.	"Camilo has a high degree of musical intelligence, allowing him to be sensitive to sounds and different musical tones, as well as learning rhythms and songs with ease."	Competencies are only acquired by learning, and constitute putting into action the intelligence into specific action processes. Thus, to be ideal in music is required, in addition to musical intelligence, to develop the musical competence by learning.
Aptitudes	They refer to innate potentialities in intelligence that human beings have and that need to be developed through education (Murillo, 2003).	"Sebastian has aptitude for Geography." This indicates that he has the necessary cognitive conditions to learn it and to potentially apply it.	Competencies are actions that are based on the effective development of aptitudes and putting them into action in specific situations, in order to understand and solve problems.

Differences of competencies with knowledges, capabilities, abilities, dexterities and attitudes

There is increasing clarity about what is meant by knowledges and capabilities (at least on the theoretical level), but there is still great confusion regarding the abilities and dexterities, and their relationship with the capabilities (Table 5). Román (1999, 2000) proposed that capabilities consist of dexterities, and these in turn, are made up of smaller parts called abilities. The capabilities are general processes, while abilities are very specific and concrete aspects in acting. dexterities are, in this theory, mediators between the capabilities and abilities.

On this approach, there is agreement with Román in the sense that capabilities are general performances, however, the socio-formative approach has an alternative proposal to address the abilities and dexterities: it is considered that abilities contain the dexterities and not the other way around. For example, the written expression is a capability that is broken down into dexterities such as vocabulary handling, spelling, sequencing and redaction. The ability to handle vocabulary, for example, can be decomposed into two dexterities: to search the dictionary and use of the etymological roots of words. Regarding the differences with competencies, it has to be risen that these differ from knowledge because they have a fundamental behavioral component, and from capabilities, because they involve a performance with suitability, articulating

knowledges, attitudes, values and considering the challenges of context, features which a capability doesn't have by itself. Furthermore, competencies require being demonstrable with public criteria, which does not happen with the other concepts described.

Table 5. Differences between competencies and knowledges, capabilities, abilities, dexterities and attitudes

Concept	Definition	Example	Differences with competencies.
Knowledges	There are mental representations about different facts. There are two types of knowledge: declarative and procedural. The first concerns what things are, which allows us to understand and relate to each other. The second type of knowledge refers to how things are made and has to do with the know to do.	"Paula, as a manager, knows very well the goals of the company (what) and the specialized procedures to manage the human talent in search of compliance with the strategic objectives of the organization (how)."	Competencies are based on knowledge, but also involve putting knowledge into action with autonomy, self-criticism, creativity and specific goals. Furthermore, competencies integrate in every performance the what with the how within the problem resolution frame.
Capabilities	Are cognitive, affective and/or general psychomotor performances, from the aptitude development? Are applied in processes formed of activities.	"José Leonidas has the capability to present in public and socialize projects he does" (This is a process)	Competencies have as one of its components the capabilities (affective, cognitive and/or psychomotor) in order to conduct a process. Capabilities are possibilities and having them does not imply that someone will act with suitability and ethics, competencies, however, do involve an appropriate and ethical conduct.
Abilities	They consist of cognitive-affective and/or procedural performances by which activities are performed in pursuit of an objective. They are part of the capabilities.	"José Leonidas operates the projection equipment during his oral presentations". (This is an activity within a process)	A component of competencies are abilities, integrating, also the understanding of the situation, the critical consciousness, the spirit of challenge, responsibility for one's actions and performance based on quality indicators.

Dexterities	Originally, the term used to mean what is done with the right hand. Then it moved on to mean the motor skills required to perform certain activities with precision. Currently, are conceived in education as very specific performances to carry on certain tasks with efficiency and efficacy. They are the abilities put into action.	"José Leonidas has the dexterity to connect the projection equipment to the computer and make it work." (This is a task within an activity)	Competencies have dexterities in performance as a base, and differ from these since they are general actions with suitability and ethics.
Attitudes	There are affective provisions to action. They are the engine that drives the behavior in humans. Induce the decision-making and deploy a certain type of behavior according to the circumstances of the moment. They are not so observable directly. Are detected from how people behave, what they say and how is their non-verbal communication (gestures, corporal positions, signs, etc.).	"Clara Eugenia has motivation for studying computer networks, because she is observed on continuous self-development in this area."	Competencies are composed of three types of knowledges: know to be, know to know, and know to do. Know to be, in turn, is integrated by values, psychological and affective strategies and attitudes. Therefore, competencies are a wide process of action where attitudes are only one of their components.

The terms competencies and ability have equivalences in several languages, as can be seen in Table 6. In the English case, abilities are also referred to as skills, a term that has moved from meaning something that is reasonable to something that is practical, which is closer to competencies, reason for which Annett (1991) conceptualized skills as efficient behaviors to specific problems. This explains why, despite the word skills is still used in English, this is translated into other languages as competencies.

Table 6. Translation of the terms competence and abilities in various languages

Spanish	Portuguese	French	English
Competencias	Competencia	Compétences	Competencies
Habilidades	Habilidade	Habiletès	Skills

Differences of competencies with purposes, objectives, standards, criteria, indicators and evidence

In the educational field, there have been many changes in terms of how to approach curriculum processes. This is how it has gone from objectives to achievements, from achievements to competencies, and then curriculum standards have been incorporated (Table 7 presents the differences between these concepts and competencies). Such changes have brought many tensions and confusion due to the lack of continuity and evaluation of proposals, in which, in addition to changes in the pedagogical discipline itself, political decisions and socio-economic events (globalization, market, knowledge society) are involved. However, the solution is not to resist change, but to face it creatively and proactively seeking its link within the Institutional Educational Project.

This is consistent with what has been recently proposed by various researchers, who argue that objectives, accomplishments, indicators of achievement, standards and competencies, far from being opposite, they mutually complement each other (Smith, 2003; Murillo, 2003; Pereira, 2003) since all these concepts arise in the context of a "search for new educational horizons, new ways to regulate curricula, new functions of the state and an environment fraught with tensions that we still don't accept as proper of the social processes" (Pereira, 2003, p. 19). Furthermore, each of these proposals provides specific contributions to the orientation of the formative process towards the human and social development.

An example of how competencies and the other mentioned concepts relate and complement is presented in Table 7, in which we are taking into account the integral human development. The example is based on the competencies-based educational reform in Colombia, which began in the late nineties and many of these components are being considered in the educational reforms of other countries in Latin America.

Table 7. Differences and complementarities between competencies and other concepts of curriculum planning

Concept	Definition	Example in the area of mathematics
General Purposes	<p>They are general formation goals, which describe the essential purposes of education. Are established from the perspective of social, economic, political, cultural, historical and environmental challenges.</p> <p>Sometimes referred to as general processes of education or general objectives of education.</p> <p>May be in the national constitution, in laws, decrees and / or educational projects.</p>	<p>General Purpose:</p> <p>"The development of basic communicative skills to read, understand, write, listen, speak and express correctly in Spanish and in the mother tongue, in the case of Ethnic groups with their own linguistic tradition, as well as promoting the fondness for reading."</p> <p>Note: Observe this refers to the overall purpose of the education process.</p>
Competencies	<p>Competencies are general actions to activities and context problems with metacognition, suitability and ethics. Is the concretion of integral human formation and are integrated to the ethical life project. They consider the great purposes of education established in a country, state or institution.</p>	<p>Competence: oral and written communication.</p> <p>Description: uses the oral and written language to communicate with understanding and assertiveness in varied social and cultural contexts, using different codes and tools within the framework of the metacognitive process.</p>
Specific objectives and purposes	<p>The objectives and purposes are concrete goals of the learning process. They are in the field of curricular and micro-curricular planning. The difference between these two concepts, as Frade (2008a, b) well exposes, is due to the fact that objectives aim more towards the expected behaviors and learning purposes towards intentions of teachers from a constructivist framework.</p>	<p>Objective: learn to communicate through written texts from student's daily experiences.</p> <p>Purpose: that students construct relevant texts and employ them in their communications, based in problem addressing and the use of mind maps.</p>
Standards	<p>This concept is used essentially in the competencies –based reform of primary and secondary education.</p> <p>They are the specific goals to be achieved in competencies development in a given period of time.</p>	<p>Standard for elementary education grades 4th to 5th:</p> <p>Production of written texts responding to various communicative needs and following a strategic procedure for their creation.</p>

	<p>They are common goals for all learners of a country or state, and are expressed both in terms of knowing and doing. They are regulatory patterns for the education system to fulfill its purposes in accordance with common criteria, seeking for quality and equity.</p> <p>Standards seek to foster unity of a country, facilitate mobility of students from one to another educational campus and from one region to another, and become a tool to determine the efficiency and effectiveness of an educational institution. Standards are provided for sets of grades.</p>	<p>Produces the first draft of an information text, responding to the requirements (formal and conceptual) of written production in the Spanish language, with emphasis in some grammar aspects (agreement, verbal tenses, nouns, pronouns, use of prepositions) and spelling.</p>
<p>Criteria</p> <p>Note: Other similar concepts are: -Expected Learnings -Learning outcomes. -Achievements</p>	<p>Are specific guidelines to orient learning and competencies assessment. They establish the essential achievements that should be considered in an educational grade (elementary and middle education) or per academic period (technical-professional education and higher education).</p>	<p>Criteria for elementary 4th grade:</p> <p>Writes an informative text coherently and with correct spelling with the following structure: introduction, topic development and conclusions.</p>
<p>Indicators</p> <p>Note: in the Socio-formative Approach the indicators are structured in evaluation instruments (García Fraile and Tobón, 2009; Tobón et al. 2006).</p>	<p>Overt behaviors, signs, clues, observable traits or sets of traits of human performance, which thanks to a well-grounded theoretical argument, allow affirming that what was expected has been reached.</p> <p>They are very specific and attest for the progress present into achieving a criterion, within a given competence.</p> <p>In the socio-formative approach they are equivalent to "Indicators of achievement".</p>	<p>Indicator for the third term of elementary 4th grade (July-august-September): I write a report about a given problem of the environment, describing its causes and consequences, placing special attention to spelling and coherence of ideas so that the report expresses a clear message.</p>
<p>Evidence</p>	<p>They are concrete and tangible evidence that allow evaluating the criteria.</p>	<p>Written text.</p>

Taking into account the learnings achieved from the implementation of various projects to apply competencies from the socio-formative approach, we propose:

1. Establish criteria as a basis to guide formation and assessment of competencies.
2. Design expected learnings, achievements and learning outcomes within the same concept of criteria, not as different concepts, because its structure is similar and consist of guidelines to direct the formation and assessment of competencies. It is recommended the concept of criteria, as this is the term most used in different social, organizational and academic contexts, as well as in the field of human talent management.
3. Objectives and specific purposes are integrated into the criteria, without the need for them to be explicit in curricular and micro-curricular planning. Having objectives or purposes complicates curriculum management.
4. Keep the name of purposes only to indicate the overall goals of education in laws, educational policies and educational models, and not for specific aspects of learning, because this is addressed by the criteria.
5. The indicators are left as optional for use by teachers when deemed necessary in the construction of assessment instruments. Experience shows that there are times in which the criteria by themselves are sufficient to evaluate a competence without the need for any other component.

In summary, the socio-formative approach proposal is to describe competencies with three components: problems, criteria and evidence. Problems are context challenges; the criteria, the specific aspects that should be taken into account in mediation and evaluation; and evidence, concrete proof to analyze criteria and determine the process of competencies formation.

2.5 Classification

There are several ways to classify competencies. The first sets two broad categories: differentiating competencies and threshold competencies (Gallego, 2000; Goleman, 1999). The first refers to those characteristics that enable a person to perform in a superior way compared with the performance of others, under the same circumstances of preparation and under identical conditions (for this reason the person gives competitive advantages to the organization as a whole); the latter, instead, allows a normal or proper performance on a task.

Along the same lines are also proposed key or core competencies in an organization, consisting of a set of characteristics that cause a company to be inimitable, which is shown on competitive advantages in the market. They are the collective learning of an organization that makes it possible to enter a varied branch of markets and bring benefits to customers (Ogliastri, 1999). For example, the competitive advantage of the company Canon is not to fabricate printers and copiers, but to possess core competencies in handling optics, digital copying process and the use of microprocessor drivers.

Competencies can also be classified in labor and professional. The former are characteristic of skilled workers, are formed through technical education for the job and apply to very specific tasks, the latter, however, are unique to professionals who have studied higher education (technical and vocational) and are characterized by their high flexibility and range, also because their possibility to address contingencies and coping with problems of high complexity.

Another classification of competencies is the establishment of four general classes (Echeverría, Isus and Sarasola, 1999): technical competencies (required knowledge to address professional tasks in a large job environment), methodological competencies (analysis and problem solving); participatory competencies (know to collaborate at work and work with others) and personal competencies (active participation at work, decision making and acceptance of responsibilities).

In the reform of education in Colombia are proposed the following classes of competencies for the different educational levels: basic competencies, citizenship competencies, general labor competencies and specific labor competencies. Generic and specific competencies from the Alfa Tuning Project in Latin America (higher education) are also taken into consideration.

One of the most widespread classifications consists on dividing competencies by basic competencies, generic competencies and specific competencies (Tejada and Tobón, 2006; Tobón, 2001, 2006; Vargas, 1999a, 1999b). Basic competencies are essential for life; generic competencies are common to several occupations and professions and specific competencies are peculiar to a given occupation or profession (Tobón, 2006).

Basic Competencies

From different projects, the most consistent approach is that basic competencies are part of the generic and specific competencies; they express the essential axis for living in society and are addressed in elementary education. According to UNESCO (2012), basic competencies are the notions of reading, writing and arithmetic.

Basic competencies are characterized by:

1. Are desirable for all people living in a society, but there may be different levels of proficiency.
2. They are required to live fully in different contexts (Family, social, labor-professional, scientific, community, recreational, artistic, etc.).

Generic competencies

They are the fundamental competencies to achieve personal fulfillment, manage projects, contribute to ecological balance and perform on any occupation, job and / or profession. They are responsible to a great extent of success in life and in the professional world, hence the necessity to form them from the family and to make them the essence of both, basic education as well as middle education, technical and occupational education and higher education. These competencies are also referred to as transversal competencies for life.

Generic competencies are characterized by:

1. They are necessary for people to manage their education, personal fulfillment and continuous learning.
2. They are based on the ethical performance and human rights.
3. Respect individual and social diversity.
4. Are required for a peaceful and harmonious coexistence, to solve interpersonal and social conflicts, and for citizenship.
5. They are the basis for learning and consolidation of specific competencies as well as for their effective implementation.
6. They increase people's employability, since they allow people to easily switch from one job to another. They also favor the management, attainment and job retention.
7. Allow adaptation to different social, occupational, labor and professional settings, as they provide tools to address constant changes in the processes.
8. They are not tied to a particular occupation. Are common to different occupations.

9. They are acquired through systematic processes of teaching and learning in the family, society and educational institutions. Hence, one of the challenges of education today is competencies formation, general and broad (Delores, 1996; Scans, 1992).

Table 8 shows the proposal for generic competencies systematized by CIFE Institute from the application of various projects in Spain and Latin America. These competencies include, from a systemic scope of work, the competencies proposed by various international projects such as the Scans Project (1992), the Tuning Project (González and Wagenaar, 2005) and the DeSeCo Project (OECD, 2005).

Table 8. Essential Generic Competencies (CIFE Institute proposal)

No.	Definition	Definition	Definition
1	Formation Self-Management	Manages own formation along his or her life to attain personal realization and the established goals, coping with context challenges and considering opportunities.	<ol style="list-style-type: none"> 1. Plans her / his formation process according to context challenges and his or her own ethical life project. 2. Manages the necessary resources for her / his education, according to the possibilities of the context and her / his needs. 3. Addresses the educational processes with perseverance, until achieving her / his goals. 4. Evaluates her / his education and performs improvement actions according to certain goals.
2	Oral and written Communication	Uses the oral and written language to communicate with understanding in various social and cultural contexts, employing different codes and tools, under a metacognitive process.	<ol style="list-style-type: none"> 1. Writes reports in which analyzes processes and life situations and according to syntactic and semantic rules of the language. 2. Expresses ideas and concepts orally, achieving people's understanding of the message he/she wants to convey, considering the communication requirements of each situation. 3. Applies different communication strategies depending on who the interlocutors are, the context wherein lies and objectives pursued. 4. Identifies key ideas in a text or oral speech and inferred conclusions from them. 5. She/he communicates with respect and cordiality with others, considering the challenges of various social situations. 6. Communicates assertively managing the different communicative situations presented, which involves the proactive approach of conflicts.

3	Oral and written Communication in a second language	Employs a second language to communicate orally and in a written form, to have the possibilities of interacting with other societies, considering the criteria of that language, the ethical commitment and challenges of each situation and context.	<ol style="list-style-type: none"> 1. Writes reports in a second language in which analyzes processes and life situations according to the syntactic and semantic rules of that language. 2. Expresses ideas and concepts orally in a second language and achieves people's understanding of the message he / she wants to convey, considering the communication requirements of each situation. 3. Applies different communication strategies in the frame of a second language depending on who are the interlocutors, the context wherein lies and the objectives pursued. 4. Identifies key ideas in a text or oral speech in a second language and infers conclusions from them. 5. Communicates in a second language with respect and kindness to others, considering the challenges of the diverse social situations. 6. Communicates assertively in a second language managing different communicative situations that occur, which implies a proactive approach to conflict.
4	Team work and leadership	Carries on collaborative activities and leads projects in order to reach a certain goal, with well defined planning and objectives in different contexts and with ethical commitment.	<ol style="list-style-type: none"> 1. Conceptualizes what is teamwork, its characteristics and responsibilities, taking into account the context's challenges. 2. Understands the process for planning activities as a team, according to some methodology. 3. Contributes to the implementation of joint activities on a particular team, with acceptance of differences and assertive communication, consistent with certain objectives. 4. Contributes to the team to have a shared vision and a clear work program, participating in the analysis and creative resolution of conflict. 5. Possesses a sense of challenge for the team to reach ever-higher goals, according with the shared vision of the team. 6. Coordinates activities and projects planning processes, according to the contextual challenges and the ethical life project. 7. Identifies difficulties in teamwork and proposes clear, workable solutions, assuming his / her responsibility in overcoming these difficulties. 8. Shows ethical commitment in dealing with people. 9. Relates to others through assertive communication.
5	Information and knowledge management	Processes information related to a given area of real life, in order to generate understanding and	<ol style="list-style-type: none"> 1. Analyses contextual processes systemically and takes this into account in addressing activities and problems. 2. Identifies requirements of information and knowledges in the context, according to a certain goal. 3. Interprets information to understand it and generate knowledge that will enable him / her to act integrally to situations and problems. 4. Processes information to generate knowledge based on a particular methodology, the established goals, and the

		knowledge, having as a reference the challenges of the context, the planning and management tools and information and communication technologies.	<p>information and communication technologies, as well as ethical commitment.</p> <ol style="list-style-type: none"> 5. Argues how to address activities and context problems, considering certain knowledges. 6. Proposes systemic solutions to problems from the analysis of the information and certain knowledges. 7. Manages information and knowledge based on computer use at a basic level. 8. Performs collaborative activities performed by the use of Internet (email, chat, video chat, web pages, etc.) and fixed and mobile telephony. 9. Processes information and uses it with a high ethical commitment, according to the various challenges that arise in this field.
6	Entrepreneurship	Managing social and / or socio-economical projects to face new challenges in the context, with perseverance until achieving the proposed goals, taking into account the opportunities established.	<ol style="list-style-type: none"> 1. Identifies problems in the context that turns into opportunities to establish new relevant social and economic projects. 2. Designs new projects consistent with the requirements of the organization and the business context. 3. Carries on and achieves projects with reference to the proposed targets, the administrative process defined and conditions of the environment. 4. Acts ethically in the process of entrepreneurship, considering the various challenges of the context.
7	Research	Solves problems of the context through a determined research methodology to generate knowledge and act with more impact in reality, considering the accumulated knowledge, collaborative work and ethical commitment.	<ol style="list-style-type: none"> 1. Argues the different components of the concept of research, providing its definition, classification, core features, exemplification, differences, links to other fields, etc. 2. Plans an activity or research project (or intervention project with a research component), according to a specific problem and the project presentation methodology. 3. Executes the research process addressing proactively and strategically difficulties that arise in the process, making the appropriate adaptations, consistent with the expected results. 4. Systematizes the information provided by the project under a given method, according to the objectives and methodology of the project. 5. Socializes the results of the research through different strategies (lectures, videos, articles, books, etc.) providing information on the problem, methodology, results and conclusions reached. 6. Acts ethically at all stages of the research process, according to the nature of the project, research codes of ethics and anthro-poetic.

8	Quality Management	Manage processes and product quality in a project to generate the greater level of satisfaction and relevance internally and externally, considering the maximum standards in the context.	<ol style="list-style-type: none"> 1. Determines the criteria to be taken into account in the management of organizational quality, consistent with the goals of the organization and current regulations. 2. Presents self-motivation about quality management, allowing him / her to perform the activities with dedication, perseverance and the expected quality. 3. Plans quality management processes considering the organizational context and the established criteria. 4. Performs specific actions to improve quality in a given organizational process, addressing proactively and strategically difficulties that arise, making timely adaptations, consistent with the results expected. 5. Acts in accordance with the code of ethics in the field of quality management, having as a basis the metacognitive reflection. 6. Evaluates systematizes and socializes quality management, based on a certain criteria.
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An alternative proposal to address the competence of information and knowledge management is to divide this competence in three concrete competencies: interpretative competence, argumentative competence and propositional competence (see Table 9).

This model emerged in Colombia from the transformation of state examinations required for admission to higher education (Hernández Rocha and Verano, 1998) and from there, it has spread successfully to other massive processes of competencies assessment, such as the Ecaes tests (Tobón, 2006). Also, this model has allowed addressing the competencies of disciplinary areas in basic, middle and higher education from the interpretation, argumentation and proposition.

Table 9. Description of competencies of information and knowledge management.

Competence	Description	Criteria	Example of the application of the competence in the area of mathematics
Interpretative competence	Understands the information in order to determine its meaning and significance from the analysis of texts, graphics, musical expressions, schemes, theater, gestures and oral expressions.	<ol style="list-style-type: none"> 1. 1. I understand the messages consistent with the context. 2. 2. I relate new information to previous knowledges. 3. 3. I understand the sense within a context. 4. 4. I identify problems in the texts and recognize how they happened, their causes and consequences. 5. 5. I establish relationships among processes considering a certain goal. 6. 6. I identify relevant information to solve a problem according to the context. 7. 7. I identify ethical performance in a particular situation and understand unethical actions. 	Understands daily problems in order to determine their sense and significance, applying mathematics, and identifies the type of mathematical reasoning that should be carried out to solve the problems.
Argumentative Competence	Explains reality processes and problems that arise to understand their nature, causes, effects and systemic relations, putting in action subject knowledge and contextual challenges.	<ol style="list-style-type: none"> 1. I articulate concepts based on a specific communicative purpose. 2. I derive the implications of a theory in the framework of the analysis of a phenomenon or problem. 3. I theorize about a certain event according to the context, seeking consistency in arguments. 4. I explain a phenomenon or problem based on evidence and facts that others can verify. 5. I explain the ethical implications of a particular action, according to the social context and universal values. 	Explains reality processes and problems that arise in the context, based on the mathematical reasoning to understand their nature, causes, effects and systemic relationships.

Propositional competence.	Proposes solutions to problems, considering subject knowledges, context challenges, personal knowledges and ethical commitment, to generate impact on the environment with a systemic vision.	<ol style="list-style-type: none"> 1. I establish heuristics (short paths to solve a problem), corresponding to the type of problem and context challenges. 2. I present procedures for problem solving finding the best solution according to the context. 3. I elaborate maps to orient myself in reality according to the challenges of a given situation. 4. I build possible worlds at the literary level. 5. I establish regularities and generalizations coherent and consistent with the facts. 6. I propose solutions to problems considering the context. 7. I establish how to act ethically to various problems arising, according to the social context and universal values. 	Formulates solutions to problems through math to address them systemically, considering the challenges of the context, personal knowledges and ethical performance.
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Specific Competencies

Those competencies of a particular occupation or profession. They have a high degree of specialization as well as specific educational processes, usually carried out in technical programs, job training and higher education. For example, all medical doctors must possess competencies such as diagnosis of health and disease and implementation of appropriate treatments.

2.6 Link-up

Competencies have links to several social macro-processes: knowledge society, the movement for the quality of education and instructional design. These are links that allow us to understand the nature, origin and positioning of this approach at present, within the Latin American education systems.

Knowledge society

Society in general march towards a transformation of its structures and functions as a result of globalization (Carnoy, Castells, Cohen and Cardoso, 1993), the technical-scientific development and new mechanisms of business organization (UNDP, 1999). These processes begin now to be renamed with phrases such as information society, knowledge society and intensive learning production, and have an impact on culture and the state (Castells, 1999).

Significant changes are observed in the nature of work and the market. In the emerging knowledge society, most occupations require processing of information with technology, electronics and computers support, (Delors, 1996, ILO, 1998), which indicates that it is essential the formation of new skills that emphasize the management of information, rather than routine manual and operational processes, as it occurs in the traditional work model (OECD, 1989).

Education is a priority in improving the conditions and quality of life of people, in that education provides the essential tools to participate in the community and production environment. In this context, its challenge is to foster the management of complex technologies, the ability to adaptation and competitiveness of the labor force (Delors, 1996) in order to transcend the educational model based on the industrial society (López, 1994).

Management and quality assurance

Competencies were introduced strongly in companies and in education because they started to enable mechanisms to guide the quality of human talent management processes and learning, according to social, organizational and individual requirements. Specifically, in the field of education, competencies began to be assumed as central as a result of the movement for quality education, which was formed from a number of multilateral agencies and international meetings on issues such as efficiency, effectiveness, autonomy, accountability, solidarity and participation (Barrantes, 2001). In Latin America, the movement for quality of education was formally consolidated from the Fifth Ibero American Summit of Heads of State and Government (Bustamante, 2002). Education was taken then as an engine for economic development, referring to the causes of backwardness to poor quality education systems in people's formation.

Management and quality assurance processes are based on a series of standards that have been established in order to enable any social, educational or business organization to

continuously evaluate the quality of services rendered or products offered, establishing improvements in a timely and efficient manner. This requires organizational administrative processes to be implemented based in the consideration of who the users are, the systematic characterization and standardization of organizational, production and services delivery processes; continuous assessment; implementation of improvements; teamwork between the responsible for all processes and carrying out audits to monitor compliance with quality policies.

Competencies are linked to this management and quality assurance policy in educational institutions and also in social and entrepreneurial organizations. And it is what allows us to understand the competencies nature, their rigorous methodology of description and how they are put into action, since the introduction of this model, as we noted in various sections of this book, should be done based on: (1) an accurate and systematic identification of the challenges and labor, social, disciplinary and research requirements, (2) a precise description of each competence and flexible standards, (3) the implementation of a formation system based on methods, techniques, activities and strategies integrating theory and practice, (4) emphasis on each competence in the parameters for its formation and evaluation, (5) the establishment of systematic processes to certify competencies publicly, and (6) the establishment of feedback, monitoring and control mechanisms to ensure to put into place the planned processes and their objective assessment and an effective introduction of corrections.

If competencies are not assumed in connection with the management and quality assurance processes, it is very difficult to understand the rationale of their structure (see Table 3 of this chapter), the rigorous methodology on which are identified (chapter four) and systematized the teaching-learning processes based on public criteria. And the lack of understanding of this linkage is what makes many teachers and researchers assume these features as a rigid and mechanical way to frame education and to put education only to the service of external requirements. In this regard, it should be noted that the competencies-based approach does not impose a didactic based on rigid and detailed steps, but its essential axis basically help understanding the learning process and its goals, depending on the performance, enabling the application of various teaching strategies, in which exploration and self-learning are fostered.

Instructional design

It has been a tendency to criticize the competencies approach indicating that it responds to the traditional tenets of instructional design and educational technology based on behaviorism. To clarify this, is important to indicate what is each of these two educational models. Instructional design has been defined as the systematic process by which plans are prepared for the development of teaching materials and activities based

on the principles of learning (Smith and Ragan, 1993). Thus, instructional design is the process of planning learning activities in detail and in an orderly manner, and to this extent, the teaching in its various forms requires instructional design; it is through this process that the planning, design, implementation and assessment of formative experiences occurs. Therefore, instructional design as sailing chart requires considering all factors involved in learning together with the situation, the type of students and purposes when organizing the courses.

It can then be said that the essential purpose of instructional design is to facilitate learning of individuals, for which is based on the development of theories and teaching models. Thus, instructional design has changed as pedagogy has changed (Tennyson, 1993). The recent models of third and fourth generation incorporate dialectics, flexibility and the systemic, and basically rely on behavioral, cognitive, constructivist and systemic theories.

Behaviorism focuses on changing observable behavior of people through programs ranging in stages, sequence, and the use of repetition and reinforcement. Cognitivism, meanwhile, is based on guiding learning from the development and strengthening of the cognitive processes that are behind the behavior, from the frame of information processing, where there are input, processing, and output processes. Also, there is constructivism, which is based on the perspective that each person constructs their own reality through experiences and developed mental schemes, to which learning activities are oriented such to enable discovery, ambiguous problems solving and creativity. Finally, we have the socio-formative approach to instructional design, based on anthro-poetic, flexibility, problem addressing and development of complex thinking skills.

Hence instructional design cannot be equated with the behaviorist methodology of programmed instruction, because instructional design can be approached from different pedagogical models, which are those that give its focus and features. For example, the instructional design methodology, based on constructivism emphasizes programming learning activities with great flexibility, in which it is seek for students to learn by exploring.

Once we have understood what is instructional design, we can argue competencies-based formation is linked to this field to the extent that it attempts to determine which competencies are intended to be formed, in what context, under what purposes, in what areas, by what type of organization of the curriculum and strategies, and through what evaluation methodology. That is, the competencies-based formation has tools for planning, implementing and evaluating the educational process, common to all instructional design. And it can not be argued that such instructional design

is behaviorist, because as happens in this field, the design of competencies-based formation programs can not only be from this area, but also from constructivism and from the socio-formative approach.

The same must be said about educational technology. If in the sixties and seventies educational technology was based essentially in behaviorism (sought to apply this model to the teaching of specific behaviors), today educational technology assumes a much more spacious, flexible and general form, referring to the use of technological tools to mediate and facilitate learning, taking as reference different pedagogical models. Thus, it is understood for educational technology the use of computers, audio-visual equipment and information and communication technologies in the teaching and learning activities. Therefore, competencies also link to educational technology, but taken in this broad perspective and not the behaviorism perspective, as technological means are required to support education in various learning scenarios.

2.7 Methodology

The methodology described is proposed whereby addressing competencies in education plans and human talent management from the socio-formative approach. It begins considering the proposal of the functionalist approach, so to have a point of comparison in the analysis. As an example of competence is considered the competence of teamwork that seems critical in today's educational context.

Functionalist approach

The functionalist approach emphasizes on identifying and describing competencies from the analysis of functions, with the following components: competence units, competence elements, performance criteria, essential knowledges, range of application, evidence and assessment guidelines. This approach tends to focus on the results that should demonstrate a person in the context. Table 10 presents the specific components of a competence following the functionalist approach and Table 11 presents an example based on this approach.

Table 10. Structural components of a competence from the functionalist approach

<p>Competence Unit:</p> <p>It is a performance to a function and it's described by an infinitive, an object on which the action is performed and a quality condition.</p>	<p>Elements of competence:</p> <p>They are embodiments and specific performances that compose the identified competence.</p>
<p>Performance criteria:</p> <p>These are the results a person must demonstrate in real labor, professional or social life situations, taking as a basis certain quality requirements so that the performance is suitable.</p> <p>Performance criteria are set for each competence element.</p>	<p>Essential Knowledges:</p> <p>The required knowledges so the person can achieve the results described in each of the performance criteria.</p> <p>Knowledges are classified in know to be, know to know and know to do.</p> <p>Essential knowledges are set for each competence element.</p> <p>Note: In some methodologies they appear as knowledge and comprehension (Colombia) and in others they are integrated to the evidence (e.g. Mexico).</p>
<p>Range of application:</p> <p>Are the contexts in which the competence elements and performance criteria are applied.</p> <p>Note: also called application field, as in Mexico.</p>	<p>Required evidence:</p> <p>They are the evidence needed to judge and evaluate the competence of a person, according to the performance criteria, the essential knowledges and the range of application of the competence.</p> <p>Are set for each competence element.</p>
<p>Guidelines for evaluation:</p> <p>The most important guidelines are established to be considered in evaluating each competence element. The evaluators in the evaluation process should consider these guidelines.</p> <p>Note: In some methodologies, such as the case of Colombia, such assessment guidelines are not explicit in the description of the competence, but separate.</p>	

In the experiences of application of the functionalist approach to education and human talent management the following difficulties have been found:

1. Emphasizes too much on the formal aspects of how to describe a competence and this creates rigidity and lack of flexibility in their approach by teachers.
2. It tends to be rigid because teachers often cannot modify the competence elements or its components.
3. It focuses on the details and breakdown of the competence, which leads to fragmentation of the educational process.
4. Often requires a high level of training and qualifications of teachers and managers of human talent in order to use this model.
5. Determines the evaluation process from the same description of the competence, and thus removes the teacher leadership in planning this part.
6. Emphasizes on the results that people should have, and does not consider the process as such, which is very important in the formation and assessment of students.
7. It is based on the identification of functions in the present and tends to consider lesser the prospective analysis and problems of the various contexts.

Table 11. Example of the description of a competence from the functionalist approach.

Competence: teamwork	
Competency Unit: Teaming based on the philosophy and strategy defined by the institution.	Competence elements: <ul style="list-style-type: none"> • To form work teams taking into account the organizational strategy and scope of the assigned project. • Negotiate arising conflicts peacefully, considering the views of the different actors involved.
Competence element 1: Form work teams taking into account the organizational strategy and scope of the assigned project.	

Performance Criteria	Essential knowledges
<ul style="list-style-type: none"> • Work team participants are selected according to the specifications of the task or project. • The strategic direction of the team is established in a participatory manner. • The roles are defined and assigned considering the type of task and competencies required for the project. • The information and communication system in the team is established based on the defined strategy. • Decision-making is based in arguments and information valid and basic. • The criteria and performance evaluation procedures in the team are set and applied transparently. • Empowering of team members is performed in accordance with the project requirements. • Work team meetings are prepared and registered under established parameters. 	<p>Know to know and know to do:</p> <ul style="list-style-type: none"> • Teamwork: concept, importance, characteristics, advantages and function (all criteria). • Effective work teams: key roles, characteristics, models, aptitudes and competencies (a, b, c, d). • The group communication process: phases, actors, processes, results, feedback and models (all). • Technical and social division of labor: concept, characteristics, evolution, paradigms of centralization and decentralization (c, f). • Shared vision: concept, characteristics, implications and methods (all). • Organizational synergy: concept, characteristics, importance, method and procedures (a, b). • Organizational climate: components, characteristics, relationships with the organization and organizational behavior (all). • Paradigms of human interaction: concept, classification, characteristics and implications (all). • Empowerment: concept, characteristics, relationships with delegating roles and importance (e). • Techniques for organizing groups (all). <p>Know to be:</p> <ul style="list-style-type: none"> • Challenge spirit (all). • Motivation to achieve (all).
Range of application	Required evidence
<p>Work Team: Multidisciplinary, interdisciplinary and inter-institutional.</p>	<p>Evidence of performance: Observation of individual performance and people interaction in at least three events.</p> <p>Evidence of knowledge:</p> <ul style="list-style-type: none"> • Interview team members to verify criteria fulfillment: (c, d, e). • Required to review meetings records (minutes) of three different teams
<p>Guidelines for evaluation:</p> <ul style="list-style-type: none"> • Socialization of the portfolio of evidence. • General Interview on experience forming work teams and results. 	

Competence Element 2: Negotiate arising conflicts peacefully considering the opinions of different actors involved.	
Performance Criteria	Essential knowledges
<ul style="list-style-type: none"> • The situations of interaction and human interdependence within the team are characterized and evaluated. • The feelings, needs, interests, from oneself and others, are recognized and legitimized as a means to arrive to cooperative solutions. • Options for negotiation are sought in regards to the satisfaction of the parties' interests. • The criteria of legitimacy are used firmly and flexibly by both parties, considering the purpose to achieve. • Problems in relationships among negotiation actors are solved with constructive methods. • Difficulties in communication between the parties are made explicit and solved according to the agreements reached. • The commitment of actors are explicit and are valued based on the achievement of the agreement. • The negotiation process is systematically recorded according to a particular methodology. 	<ul style="list-style-type: none"> • Negotiation process: concept, negotiation systems; phases, tools and techniques (all). • Conflict: concept, characteristics, types and levels, potential for conflict, role of conflict in life, treatment and resolution (all). • Interests and needs: concept, classification, function and role in the negotiation (b). • Negotiation options: concept, assumptions, guidelines, function and significance (a, b, c). • Paradigms of human interaction: concept, classification, characteristics and implications (a, b). • Best alternative to a negotiated agreement: concept, assumptions, procedures and types of alternatives (c, d, e). • Legitimacy criteria: concept, types, how to use them and methods of persuasion (c, d). • Working relationships: concept, origin, development, functioning, problems in labor relations and procedure for solution (b, c, d, e). • Communication in negotiation: premises, active listening, tools and communication channels (d, e, f). • Commitments: concept, assumptions, guidelines for the formulation, and communication channels (c, g). • Dialogue: concept, features, functions, procedures, obstacles and skills (d, e, f). • Tools for recording information on agreements or consensus negotiation (h). <p>Know to be: Perseverance in conflict resolution (all). Self-motivation for pursuing expected achievements (all).</p>
Range of application	Required evidence
Negotiation: individual and group	<p>Evidence of performance:</p> <ul style="list-style-type: none"> • Observation of at least two negotiation processes. • Evidence of knowledge: interview to actors about the negotiation process to verify compliance with the posed criteria. • Collation of records: records on negotiation planning and negotiation meetings.
<p>Guidelines for evaluation: Socialization of the portfolio of evidence. General interview about the process of negotiation. Negotiating group dynamics.</p>	

Socio-formative Approach

This approach arises as a consequence of the application of systemic and complex thinking at different educational and organizational levels, and is based on identifying competencies by analyzing problems and the prospective study of contextual processes.

Competencies are described as flexible systems with the fundamental components to mediate their formation and assessment. Unlike the functional analysis approach, in socio-formative approach is given a great importance to the purposes of competencies within the context of personal development, the social fabric, the socio-economic development, artistic and cultural promotion, recreation and environmental balance. Table 12 describes the leading components of a competence from this approach.

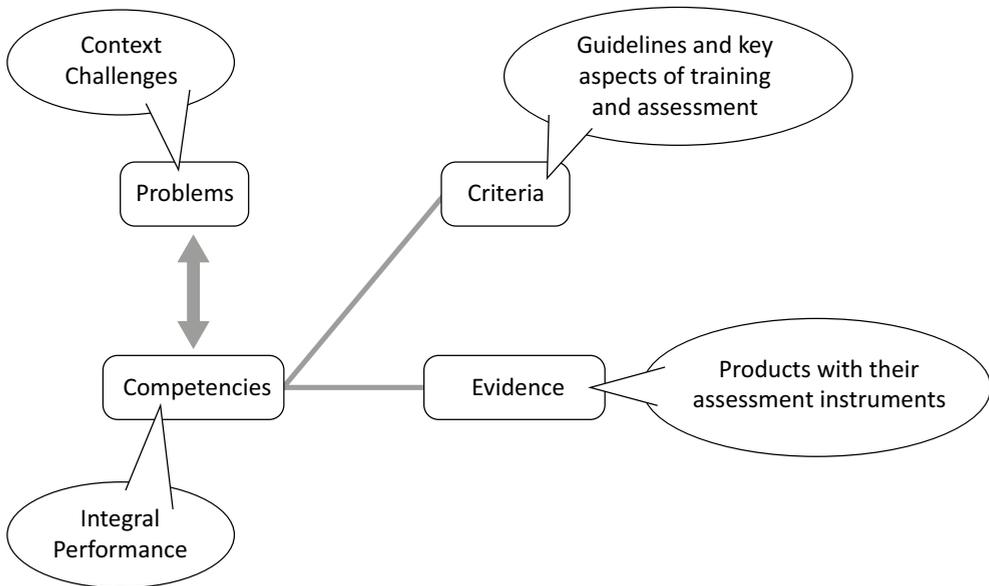


Figure 3. Key axes of the socio-formative methodology in identifying competencies.

Table 12. Structure of a competence from the socio-formative approach

Title of the competence: Competence is indicated synthetically to be identified.		
Problem (s) from the context: Context Problems that need to be solved through a competence are identified, considering the present and future trends.		
Description of the competence	Criteria	Evidence
<ul style="list-style-type: none"> The competence is described as an integral performance by using a performance verb (know to do), with a conceptual object (know to know), an objective and a reference condition (know to be). The order of the elements in the description can change, and other elements can be added, if deemed necessary, such as values and means to carry on the competence. 	<ul style="list-style-type: none"> The essential criteria are described to be taken into account to form and assess the competence. It is intended that the criteria refer, if possible, to the three knowledges: know to be, know to know and know to do. In the know to be is integrated the know to coexist. A criterion consists of two parts: "What is evaluated" and the "condition with which compares" (context). The criteria are described from the perspective of the students, not from the one of the teacher. For example, should not say: "the student must plan a project according to a specific methodology" but "plans a project according to a specific methodology." 	<ul style="list-style-type: none"> Evidence are concrete proof that the person effectively has the competence. One or several essential evidences are indicated, which must be taken into account to assess the competence.

Suggested methodology for writing competencies

From socioformation, competencies are determined based on context problems. This is one of the major difference points with the behavioral and functionalist approaches. These context problems are identified both in the present and into the future, taking on the review of literature and consultation with experts, employers, professionals, graduates, faculty, students and community leaders.

Writing the context problems:

1. A problem can be: An unmet need in the context, a lack of knowledge about a phenomenon, a contradiction between two or more approaches, theories or methodologies, the need to improve something, the challenge of creating, the challenge to innovate, etc.
2. The problems are determined both in the present and into the future (in the next 5, 10 or 15 years). This is essential to socioformation because is common

for traditional competencies-based plans to lose validity very quickly due to the lack of this prospective analysis.

3. There is flexibility in the wording of the context problems, posed as affirmative or in the form of a question.
4. The competencies of the graduate profile should consider context problems and the educational model of the institution as well as current policies.
5. It is not necessary to establish a competence for each context problem. We may have a problem and based on it identify one or more competencies. It is not required that each competence addresses directly all the components of a problem.

Table 13. Examples of context problems

Performance Area	Context problems
Entrepreneurship	<ul style="list-style-type: none"> • How to ensure that projects are sustained over time and achieve the expected goals, overcoming difficulties? • How to carry out creative and innovative projects that contribute to solve specific needs with the minimal resources possible?

Note: To arrive to these context problems a documentary study was performed, and then three experts in entrepreneurship were consulted. It was not necessary to apply surveys or interviews.

Writing competencies

Based on the problems of context, competencies are written as a comprehensive performance. Competencies can be drafted in multiple ways, which facilitates the implementation process both in education and in the area of human talent management. However, is proposed that the following components are taken into account: a verb in present tense, a conceptual object, a purpose and a reference condition or condition of the context.

Although in the examples given in this chapter competencies end with a verb in the present tense, it is important to note that for the socio-formative approach it does not matter how the verb ends, or the order of the components of the competence. It is not required that competencies always have a purpose, especially when there is an explicit educational model that presents such purposes. The socio-formative approach seeks, rather than good documents, best teaching practices. This makes the identification and description of competencies flexible, both in the curriculum and processes of

human talent management within social and business organizations. The same may be raised with respect to the conditions of the context in both, competencies and criteria. On certain occasions it is feasible not to consider them, for example: 1) when there is a high degree of resistance to employ them, 2) when impede agreements between curriculum committees, 3) when expressed clearly in other sections of the educational model and curriculum committees do not consider necessary to explain them.

Anyway, clarity and transparency around competencies and criteria will always be preferable, and the more complete the writing, more long-term satisfaction with the process will be achieved, and the results in the formation of students may be valued with more rigor.

But if the reason for not implementing the competencies model is difficulty with the writing methodology, they can be written only with a verb and a conceptual content, of course, looking for them to be comprehensive actions.

Table 14. Example of writing a competence from the socio-formative approach

Verb in present	Verb in present	Purpose	Condition of the context
Manages	Creative and innovative projects	To identify, pose and solve social and production problems	With perseverance, responsibility, systemic methodologies and considering the challenges of context.
Project management competence: Manages creative and innovative projects to identify, pose and solve social and production problems, with perseverance, responsibility, systemic methodologies and considering the challenges of context.			

Verbs of performance must be used in writing competencies. Below some fundamental verbs are described to take into account on the description and writing of competencies:

Table 15. Examples of performance verbs for the writing of competencies

Performance verbs for competencies of medium complexity	Examples of competencies of medium complexity	Performance verbs for competencies of high complexity	Examples of competencies of high complexity
To agree To encourage To advertise To support To attend To help To search To encode To check To communicate To build To consult To control To converse To show To say To dictate To design To divulge To choose To use To express To induce To inform To locate To handle To manipulate To observe To operate To prioritize To collect To recover To register To resolve To systematize To transmit To use To utilize	Operate office automation programs to comply with information processing activities, based on certain organizational goals. Records information so the organization can make decisions based on reliable facts, considering a given data capture system for all the processes.	To accompany To counsel To adapt To manage To advise To audit To train To comment To create To develop To diagnose To route To direct To discourse To build To run To undertake To teach To evaluate To explain To manufacture To form To arrange To innovate To intervene To investigate To improve To negotiate To organize To guide To plan To prevent To produce To schedule To propose To protect To project To publish To recreate To represent To provide feedback To socialize To transform To link	Manages organizational processes to achieve the vision, mission and strategic objectives of the company, taking into account quality assurance. Evaluates the execution of organizational processes to take timely and relevant decisions directed to the achievement of goals, based on information from different sources within the company.

Writing of criteria

1. After identifying and validating the competencies, criteria should be established. Criteria are the specific performances that guide both teaching and assessment of competencies. It is suggested to have between 3 and 8 criteria per competence.
2. The wording of the criteria is under the same way that competencies, but without the purpose.

Examples of verbs are given to write criteria considering the ten minimum processes involved in any competence, according with the socio-formative theory described in Tobón (2010). These processes include:

- 1) Awareness.
- 2) Conceptualization.
- 3) Problem solving.
- 4) Values and ethical project of life.
- 5) Collaboration with others.
- 6) Assertive communication.
- 7) Creativity, personalization and innovation.
- 8) Transversality.
- 9) Resource management.
- 10) Metacognitive assessment.

Table 16. Examples of verbs to write criteria following key processes of competencies (socio-formative approach)

No.	Process of the competence.	Suggested verbs	Examples of general criteria	Examples of specific criteria
1	Awareness	To admire To attend To encode To route To enjoy To observe To perceive To prefer To process To want To concentrate To be interested To be motivated To finalize To visualize	Gets motivated around performing activities and / or problems resolution, taking into account the established goals. Focuses on the analysis of problems according to the goals that are pursued. Finalizes the activities that initiates or problems that addresses, commensurate with planned.	Has motivation about the study of the role of mass media in the formation of values, which is shown in the depth of the argument performed. Focuses on the study of how mass media contributes to form values, successfully completing the different activities established for that effect.
2	Conceptualization	To Search (information) To characterize To categorize To classify To compare To conceptualize To define To determine To differentiate To exemplify To identify To investigate To justify (a concept) To process (information) To recover To relate To subdivide To systematize	-Defines in his / her own words the basic necessary concepts to address situations and problems of the area, considering certain literature. -Characterizes the core concepts of the area, considering several literature sources of the past three years. -Justifies the importance of the concept to address a given situation or problem, considering at least two bibliographic sources of the last three years. -Differentiates concepts from other close concepts that are within the same category or with which a concept tends to be confuses, using literature sources for it.	Defines with his/her own words the concept of ecosystem, considering a given reference work published in the last three years.

3	Problems resolution (interpretation, argumentation and resolution)	<p>Sub-process: analysis</p> <p>To analyze To argue To understand To contextualize To deduce To show To diagnose To explain To interpret To justify (the problem) To summarize To synthesize</p>	<p>Diagnoses situations and problems according to a particular procedure relevant to the area.</p> <p>Interprets situations or problems with concepts or theories relevant to the area, having support on at least one literature source.</p> <p>Explains the causes and consequences of a given problem, considering the context in which it presents and its background.</p> <p>Justifies the importance of analyzing the problem, taking into account certain facts and references from academic literature.</p>	<p>Diagnoses the most common types of violence within families on the basis of a relevant instrument in the area.</p> <p>Explains the causes and effects of family violence, considering various factors, such as personal, economic and cultural.</p>
		<p>Sub-process: resolution</p> <p>To apply To build To control To develop To play To design To edificate To make To run To elaborate To start To use To undertake To manufacture To form To do To implement To work To handle To manipulate To improve To operate To plan To produce To schedule To propose To project To collect To register To represent (a situation or problem) To resolve To use To utilize</p>	<p>Proposes solutions to problems, considering the underlying diagnosis and taking into account elements such as the resources, required human talent and time, among other components.</p> <p>Plans addressing the situations and problems considering a given diagnosis and relevant procedures in the area, with proper foundation.</p> <p>Resolves situations and problems by following established and substantiated, procedures considering also the goals.</p> <p>Produces solutions to situations and problems corresponding to diagnosis and expected goals.</p> <p>Records the process for the resolution of situations and problems having as a base a given relevant methodology in the context.</p>	<p>Proposes a solution to the obesity problem in youth between 12 and 18 years of age, considering the availability of resources, comfort, and the required time to be spent.</p> <p>Resolves a problem of inadequate nutrition in a person considering the previous diagnosis and resources available.</p> <p>Records the continuous improvement process in the diet based on healthy nutrition standards.</p>

4	Values and ethical project of life	<p>To assume To correct To care To comply To honor To act To practice (the values) To prevent To protect To recognize To guard To respect To submit To possess self-esteem To commit</p>	<p>Complies with the performance of activities, according to a particular schedule.</p> <p>Respects the basic rules in addressing a situation or problem, taking into account the laws and human rights.</p> <p>Answers for the consequences of his/her actions, preventing and repairing possible errors in the shortest possible time and with minimal secondary consequences, according with universal values and laws.</p> <p>Works with honesty in various situations and problems, according to the challenges of context.</p>	<p>Is responsible in delivering reports of problems solved applying mathematics in accordance to the schedule established.</p> <p>-Respects the rules of collaborative work in the process of problem resolution with the use of mathematics.</p>
5	Collaboration with others	<p>To accompany To advise To agree To encourage To assess To attend To help To train To collaborate To share To complement To coordinate To direct To lead To motivate To negotiate To guide To participate To challenge To integrate To socialize To tolerate To tutor</p>	<p>Agrees with others performing certain activities and achieving certain concrete goals, considering a need or unresolved problem.</p> <p>Collaborates with others in resolving such problems, according to a given planning and goals set.</p> <p>Participates in collaborative processes, performing activities that correspond, according to a given planning.</p> <p>Complements the actions of the others within the collaborative processes, considering the planning and the goals they pursue.</p>	<p>Collaborates with peers, in conducting a project to apply the technology in improving quality of life, according to the availability of resources and certain goals.</p> <p>Complements the wiki developed by his / her peers in the team around positive and negative effects of globalization, in order to explain as detailed as possible this phenomenon of global society.</p>

6	Assertive communication	<p>To advertise To advise To comment To communicate To converse To say To discourse To divulge To write To listen To express To report To manifest To notify To publish To write To provide feedback</p>	<p>Listens to others with a particular purpose and regulating his / her attention.</p> <p>Communicates different ideas and feelings with clarity and cordiality, respecting the rights, ideas and emotions of others.</p> <p>Acts following his/her assertive expressions, in function of certain goals.</p> <p>Provides feedback to others focusing on their achievements and areas for improvement, clearly, and respecting the ideas and emotions, and taking as a base common references.</p>	<p>Listens attentively to their peers in the team during the rehearsal of a play on drug use, allowing him / her to achieve the expected goals.</p> <p>Says "no" to the offering of drugs in the community, showing an assertive conduct and acting accordingly.</p>
7	Collaboration with others	<p>To accommodate To adapt To create To generate To innovate To personalize To recreate</p>	<p>Creates solutions to problems considering resource management and indicators of effectivity, effectiveness and efficiency.</p> <p>Adapts a theoretical model to the explanation of a situation or problem, considering the various factors influencing in an evolutionary framework.</p> <p>Customizes the realization of a procedure, considering the goals agreed.</p> <p>Innovates procedures that solve certain problems, from clear diagnostics and with precise argument of the achievements.</p>	<p>Creates an environmental management solution for home in order to prevent global warming, which allows savings in natural and economic resources.</p> <p>Adapts prevention strategies for global warming to the family context, considering the household environment and certain cultural factors.</p>

8	Transversality	<p>To harmonize To articulate To teach others. To pass To link To work (from the multi, inter or transdisciplinarity) To transfer To transmit To cross-reference To link</p>	<p>Articulates knowledges of different areas or disciplines in addressing situations and problems, seeking complementarity of such knowledges.</p> <p>Works from the interdisciplinarity on activities and problems, having as a base specific goals and achieving better processes and outcomes than through a simple discipline approach.</p> <p>Transfers certain procedures from one area to another, based on the goals pursued.</p>	<p>Solves domestic economy problems applying mathematics, principles of economics and opportunities for purchasing products in the context.</p> <p>Proposes an integral solution to an economic problem considering the theoretical and methodological contributions from at least two disciplines different to economics, looking for contributions to complement each other.</p>
9	Resources management	<p>To condition To adapt (resources) To adequate To mold To search (for resources) To adjust To scrutinize To explore To manage (resources) To organize (is recursive)</p>	<p>Finds the necessary resources according to the procedures and goals pursued, taking the context into account.</p> <p>Conditions the resources to activities and goals, considering the context possibilities.</p> <p>Adapts technological equipment to processes and goals pursued, considering identified needs.</p>	<p>Searches for the necessary resources to solve a historical problem relevant to the current context, given the possibilities of the context.</p> <p>Creates a mechanism to organize historical information around a problem, taking into account the goals pursued.</p>
10	Metacognitive Assessment	<p>To self-assess To self-examine To self-regulate To self-assess To check To co-assess To evaluate To hetero-assess To inter-assess To meta-assess</p>	<p>Self-evaluates his / her formation continuously, determining achievements and areas for improvement, and implements specific improvement actions in context, according to some specific goals.</p> <p>Co-assesses the performance of other people, having certain criteria as a base and using certain instruments.</p> <p>Meta-assesses processes and evaluation results based on certain criteria.</p>	<p>Evaluates the quality of public service to deliver potable water in a community applying certain principles and scientific laws, and the given context.</p> <p>Self-regulates his / her performance when diagnosing the public service to deliver water in the community, considering the goals set.</p>

Writing evidence

Some evidence is determined to achieve the assessment of criteria. It is important to describe the basic evidence, searching for them to enable the evaluation of established criteria.

Some suggestions for writing criteria:

1. The evidence is described as products, reports or performance records.
2. To construct evidence context problems are reviewed, as well as competencies and criteria.
3. Writing is synthetic, no need to explain in detail.
4. The graduate profile can describe some key or fundamental evidence, if necessary.
5. Ensure that the wording of the evidence is no adjectives.

2.8 Exemplification

To understand competencies from socioformation, it is necessary the analysis of an example. Table 17 shows the analysis of the example of a competence: teamwork and leadership. In Tobón (2009a, 2010) can be found other examples of competencies.

Table 17. Example of a competence from socio-formative approach

Identification of the competence: Teamwork and leadership.		
Context problem: How to achieve a certain goal through collaborative work, based on the establishment of agreements around the essential elements, such as complementing the strengths of the members, assertive communication and proactive coping of difficulties that arise?		
Competence	Criteria	Evidence
Carries out collaborative activities and leads projects to achieve a given goal, with planning, defined objectives, responsibility, and addressing different contexts.	<ol style="list-style-type: none"> 1. Conceptualizes what teamwork is, its characteristics and responsibilities, taking into account the challenges of the context. 2. Supports the planning process of team activities according to a methodology and a purpose. 3. Contributes to the implementation of joint activities on a particular team, with acceptance of differences and assertive communication, consistent with objectives determined. 4. Contributes to the team to have a shared vision and a clear work program, participating in the analysis and creative resolution of conflicts. 5. Coordinates activities and projects planning processes, according to the contextual challenges and the ethical life project. 6. Submits clear and workable solutions to problems arising in the teamwork, assuming his/her responsibility in overcoming these difficulties. 7. Possesses a sense of challenge for the team to reach ever-higher goals, consistent with the shared vision. 8. Has ethical commitment in dealing with people considering universal values. 9. Relates to others through assertive communication considering a particular purpose. 	<ol style="list-style-type: none"> 1. At least three reports of teamwork in different situations. 2. Observation log of the person in at least three teamwork situations. 3. Registry of the observation of the person addressing difficulties and conflicts in teamwork in at least two situations.

Source: CIFE (2009)

Writing competencies with procedural axes

In certain cases, when criteria are numerous, procedural axes can be used (if deemed useful). These consist of areas or dimensions of the competence that help organize criteria. They have been useful in educational practice for teachers to better understand the systemic structure of each competence and more coherently organize the criteria (See Table 18). However, in many cases they are not used and this does not affect the work when the structure of competence is understood.

The main benefits of procedural axes in the socio-formative approach are described below:

1. Procedural axes make possible to identify leverage points of each competence (Senge, 1994), understanding competence as a systemic process. These leverage points are the central nodes that structure all system and allow managing change better. Criteria, in turn, are also leverage points because they describe essential aspects of the competence that must be taught and evaluated.
2. Procedural axes allow to coherently integrate several components posed by some educational reforms that fall outside the criteria, such as: the "areas of study", "dimensions", "blocks", etc. This is the case of the basic education reform in Mexico.
3. Procedural axes facilitate work on the socio-formative approach with the competence rules established under the functionalist approach, because they articulate the elements of competence within processes. For this reason, procedural axes also allow a better transit from a curriculum or micro-curriculum with a functionalist approach to a curriculum with a socio-formative approach.
4. If the curriculum is addressed by subjects and it is desired to approach it by competencies from the socio-formative approach, having procedural axes enables that a competence can be addressed in several subjects, distributing among them the different procedural axes.
5. When having a subject, module or formative project that lasts more than a school year or term, procedural axes allow to dose teaching and the assessments of the competence at the end of each year or term. This can also be done without procedural axes, but the process is less systematic.

Table 18. Example of competence from the socio-formative approach with procedural axes

Identification of the competence: Teamwork and leadership.		
Context problem: How to achieve a certain goal through collaborative work, based on the establishment of agreements around the essential elements such as: complementing the strengths of the members, assertive communication and proactive coping of difficulties that arise?		
Competence	Criteria	Evidence
Carries out collaborative activities and leads projects to achieve a given goal, with planning, defined objectives, responsibility and addressing different contexts.	<p>Procedural Axis 1: Conceptualization. Criteria:</p> <ul style="list-style-type: none"> • Conceptualizes what teamwork is, its characteristics and responsibilities, taking into account the challenges of context. • Supports the process of planning team activities according to a methodology and a purpose. <p>Procedural Axis 2: Participation in team work processes. Criteria:</p> <ul style="list-style-type: none"> • Participates in joint activities in a particular team, with acceptance of the differences and assertive communication, according to certain objectives. • Contributes to the team to have a shared vision and a clear work program, participating in analysis and creative solving of conflicts. <p>Procedural Axis 3: Leadership.</p> <ul style="list-style-type: none"> • Possesses a sense of challenge for the team to reach ever-higher goals, consistent with the shared vision. • Coordinates planning processes of activities and projects, according to the contextual challenges and the ethical life project. • Submits clear and workable solutions to problems presented in teamwork, assuming responsibility in overcoming these difficulties. <p>Procedural Axis 4: Human relationship with ethics.</p> <ul style="list-style-type: none"> • Has an ethical commitment in dealing with people, considering universal values. • Interacts with others through assertive communication considering a given purpose. 	<ol style="list-style-type: none"> 1. At least three reports of teamwork in different situations. 2. Observation logs of the person in at least three teamwork situations. 3. Observation registry of the person addressing difficulties and conflicts in teamwork in at least two situations.

Source: CIFE (2009).

Note: teamwork and leadership competence presented complemented with explicit procedural axes.

3. Cautions in the use of competencies

All educational model should be used with caution in order not to fall into the extreme of reductionism and partial views that educational institutions have had, traditionally influenced by simple thought. So, below is presented a series of caveats that must be taken into account in the use of competencies:

- We must avoid falling back into the pedagogical optimism of the sixties and seventies, as well as in addressing education for human resources formation, a trend that was in place between the 50's and 80's (Hallack, 1991). In the social discourse is increasingly common the emphasis on forming a citizen that is a competent worker (Braslavsky, 1995), which goes back to reductionism, because competencies require to be approached from the integral human development, in which the work area is just one of the many dimensions that conform it, bearing in mind that human beings are not resources but talents.
- Competencies involve passing from professional general categories to specific attributes of each person, with the consequent risk of falling into competencies administration and not of integral persons, leading to a fragmentation of work and further isolate this from the process of self-realization of people. As clearly exposed by Cardoso (2001), labor competencies have the risk that people are not hired for a job or a profession, but to perform specific tasks in which they are certified.
- The emphasis on individual attributes propitiates among people and among organizations to assume the competence in terms of competing with, in order to excel above others. To be forewarned of this ominous trend, it is essential to take the professional-labor work in the framework of integral and systemic processes, where people have the vision of the part and the whole, and where humanity of each member who is part of the business organization is recognized.
- Competencies are a perspective to guide educational processes and are not the panacea to school or research problems. They should be assumed with a critical and flexible spirit, far from all fundamentalisms. It is possible that in a few years this model loses validity, but taken with caution and thoroughness, can contribute elements to improve the quality of human formation.
- It is important to recognize the contribution of competencies in guiding processes of learning and teaching, but must be prevented the current tendency to assume all the activities and processes of educational institutions under this

one aspect (Granés, 2000), since this is a fragmentary and reductionist view of the educational act. Many pedagogical processes are beyond the gaze of competencies such as school culture, identities building, the sense of life, the functioning of the school institution and spiritual life.

- It is often noted that teachers tend to use a single approach when teaching competencies. We must be prevented from this and look for the combination of approaches in teaching. E.g., "Beside the competence in the application of rules in situations and various contexts that provides a language-game approach, historical perspectives and criticisms should be developed to enable enriching the meaning and role of science in the world today" (Granés, 2000, p. 216).
- Competencies came to education from the field of learning evaluation, and it is this in which its use has been privileged, which has led to an impoverishment of the philosophy of education (Zubiría, 2002), because the assessment is only one of many processes composing the education act. Therefore, educational institutions should review how competencies are used, seeking for this to be a structural part of the whole educational process, not only in evaluation.
- It is necessary for the formation of competencies to settle on complex thinking, where all elements involved in the educational community learn to relate information within it, and with other data sources, depending on the context, seeking to overcome the tendency to fragment reality. Involves gathering knowledge to have multiple perspectives on the issues, realizing their common axes and performing prevention against the tendency of human mind to error and illusion. In this regard, it is important to remember the current period of transition towards an unknown future entails an education for uncertainty, a forward-looking education, towards innovation and imagination, which contains features untold until today (Unesco, 1993).
- Competencies-based formation has the risk that any new knowledge, value, attitude or skill, that in a given time is valuable to society and then becomes a new competence and, therefore, a new demand for the education system (Barrantes, 2001) and, therefore, a new demand for teachers and for the students themselves, which can lead to a crisis and collapse of the system as currently the curriculum at all education levels is overloaded with a lot of content and information. The solution to this problem requires setting limits for the formation of competencies in educational institutions, for the family, the media, the community and companies also take responsibility in this matter.

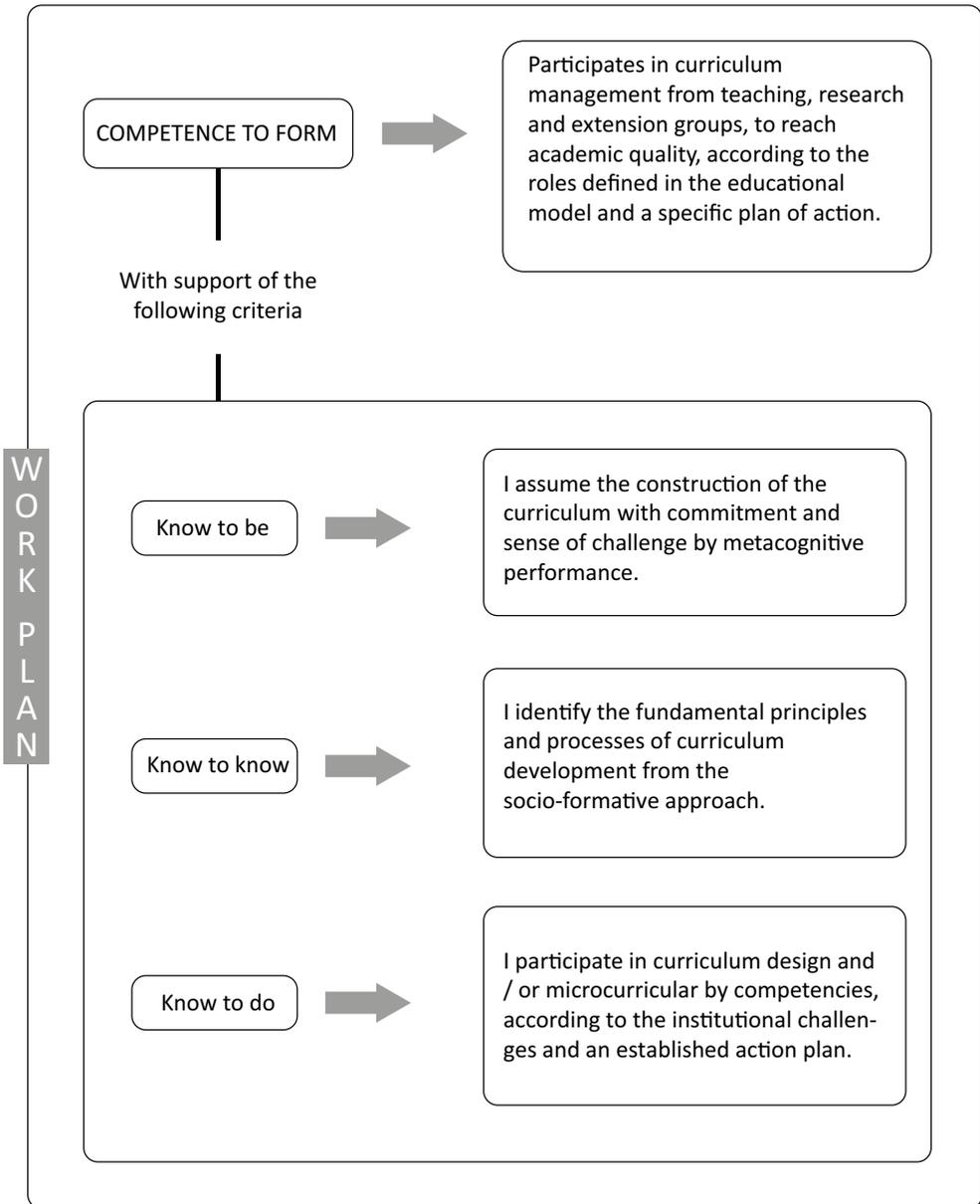
4. Suggested Activities

- 1) Think: In your environment and context, what elements of the paradigm of simplicity appear in the design and addressing of competencies?
- 2) Draft a mental or conceptual map of the essential components of competencies, taken from the complex and socio-formative perspective. Incorporate in your map other elements that you think are essential to its epistemological approach.
- 3) Analyze your institution's curriculum and assess: how is it regarding the formation of competencies from the proposal presented in this chapter?
- 4) Build a set of guidelines for you and your institution around addressing competencies from the socio-formative approach, looking to take precautions to avoid falling into reductionism.
- 5) Take as a reference a particular course or subject and identify the competence to be formed in that course. Describe the subject it belongs to, what problems allow to solve, how could it be evaluated, what type of ethical performance implies and what uncertainty factors should be considered.
- 6) Finally, we invite you to share with others the products of the various activities proposed, in order for you to know the point of view of your colleagues and also receive feedback from them on your contributions.

Chapter four

General guidelines for socio-formative curriculum design.

Wanderer, your footsteps are the road, and nothing more;
wanderer, there's no road; the road is built by walking.
By walking one builds the road, and upon glancing behind
one sees the path that never will be trod again.
Wanderer, there is no road, only trails upon the sea...
Machado (1998, p. 19).



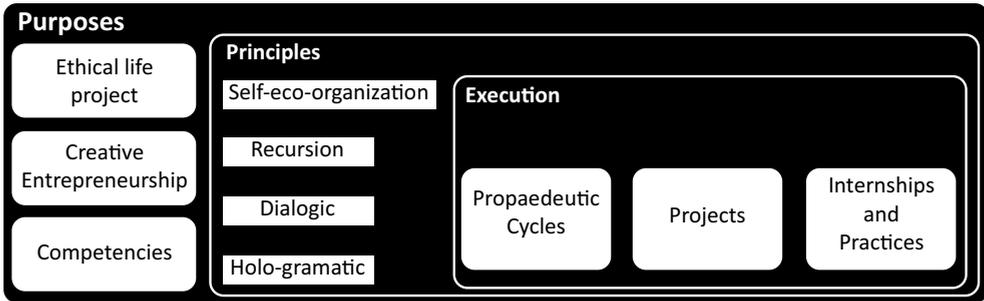
1. Curriculum: A socio-formative approach.

In the educational plan, each institution makes a selection of the fields of knowledge in line with what people need to know in order to solve a set of problems present in the social system (González, 2000). The role of teaching will be to make knowledge acquisition more effective and efficient. Both, curriculum and teaching relate the educational world with the real life world, with specific purposes to form a type of man and woman that will make such society different from others.

Curriculum design has traditionally had the following problems: (1) low degree of participation of teachers, students and the community in educational planning; (2) following curricular design methodologies uncritically; (3) low degree of integration between theory and practice (Díaz, 2002); (4) lack of systematic studies on the requirements of human resources formation in the community, society, culture, business, social organizations, labor-market and professional market and by interested people themselves; and (5) tendency to make curriculum changes in form more than substance, where it is not uncommon to find educational institutions in which curriculum reform is reduced to change some subjects for others, modify the subjects' name, update content, change objectives for achievements, and, recently achievements for competencies.

This explains "why academic plans and programs are structured that if certainly meet the standard, don't foster processes of creation and innovation on education that promote real changes in the design and formation of students at different educational levels and modalities" (López, 1999, p. 16-17). More than lack of opportunities and training on curriculum design, what are in the background of all these problems are a rigid mindset, academic and simple blocking awareness and contextualization around integral human formation.

According to Román and Díez (2000), curriculum is a cultural selection that consists of processes (capacities and values), contents (ways of knowing) and methods / procedures (ways of doing) that society demands at a given time. From this definition, the socio-formative approach (see chapter one) takes the curriculum as a specific process of agreement and negotiation between the needs of society, the educational institutions and individuals with respect to the integral formation and learning of competencies in different areas of action, having as purpose to encourage self-realization, the construction of the social fabric and economic development.



Curriculum design from the socio-formative approach, therefore, seeks to implement strategies that facilitate in all members of the educational institution a complex mindset, based on essential aspects such as self-reflection, self-criticism, contextualization of knowledge, multi-dimensionality of reality, understanding what we want to know and intervene, and coping strategically with uncertainty. It promotes that members of the educational community are educated in an integral manner (with a solid ethical life project, creative entrepreneurship and competencies), based on the support of four key principles of complex thought: self-eco-organization, organizational recursion, dialogic and holo-gramatic. These principles are put into action through the curricular structure, which is by propaedeutic cycles, projects, practices and internships.

1.1 Purposes of the curriculum from socioformation

Regarding the purposes, curriculum from socio-formative approach suggests that principals, teachers, administration staff, families and students manage integral human formation through a strong ethical life project, through creative entrepreneurship and by learning the fundamental competencies for which thus has a contribution to the consolidation of the institution as to personal fulfillment, the strengthening of the social fabric, the increase of the economic and business development and the generation of culture for social cohesion, environmental balance and sustainability. In this regard, the curriculum is not only a formation space for students, but for all the educational community, and a commitment to social revitalization in order to increase the quality of life. The three key purposes of the curriculum in the socio-formative perspective can be explained as follows:

1. Ethical life project: it means to ensure that members of the educational community live life with clear purposes, from an ethical commitment to themselves, others, animals and plants, and the environmental-ecological balance and sustainability, looking for own and collective wellbeing, with historical consciousness and for the future.

2. Creative Entrepreneurship: it means to initiate and carry on projects of a diverse nature (personal, social, community, business, cultural, recreational, sports, ecological, scientific, etc.) creating ideas, methodologies, goals, perspectives and resources, and putting all of them into action in the context with ethics. This means that at the end of all formative programs (elementary education, middle school, higher education, continuing education, etc.) students should verify in their being and their actual experience the performance of creative activities to make some contribution to improving life in all its forms.
3. Competencies: it means to act comprehensively to solve or contribute to solve certain context problems, with flexibility, expertise and ethical commitment. This will necessarily lead to a profound paradigm shift in education, in the sense that it is no longer only about teaching and learning, but about taking advantage of educational settings as real opportunities to live better, be happy and contribute to social and environmental well-being.

From the socio-formative approach, we've understand the curriculum from the beginning as a systemic macro-process in continuous change and self-organization, which is evident in the practices that managers, administrative staff and teachers perform, rather than on a written document. Thus, in the socio-formative approach, curriculum is achieved through leadership and mediation of principals, teachers and students in the context of educational management (Direction, educational management, educational planning, etc.), considering the challenges of context and taking into account the formation and prior knowledges of students (Figure 2).

1.2 Principles of complex thought applied in the curriculum

On the principles, the curriculum must be based on self-eco-organization, organizational recursion, dialogic and holo-gramatic.

The principle of self-eco-organization

The auto-eco-organization means a living system must pursue certain purposes consistent with its structure from constructive and changing dependency relationships with the external environment. In this regard, systems that focus only on themselves, or which are deployed to respond only to external demands, do not fully comply with their objectives. Morin explains this clearly when he says that to be independent it is necessary to be dependent, but the dependency relationships must be changing to undertake new challenges and not remain stagnant.

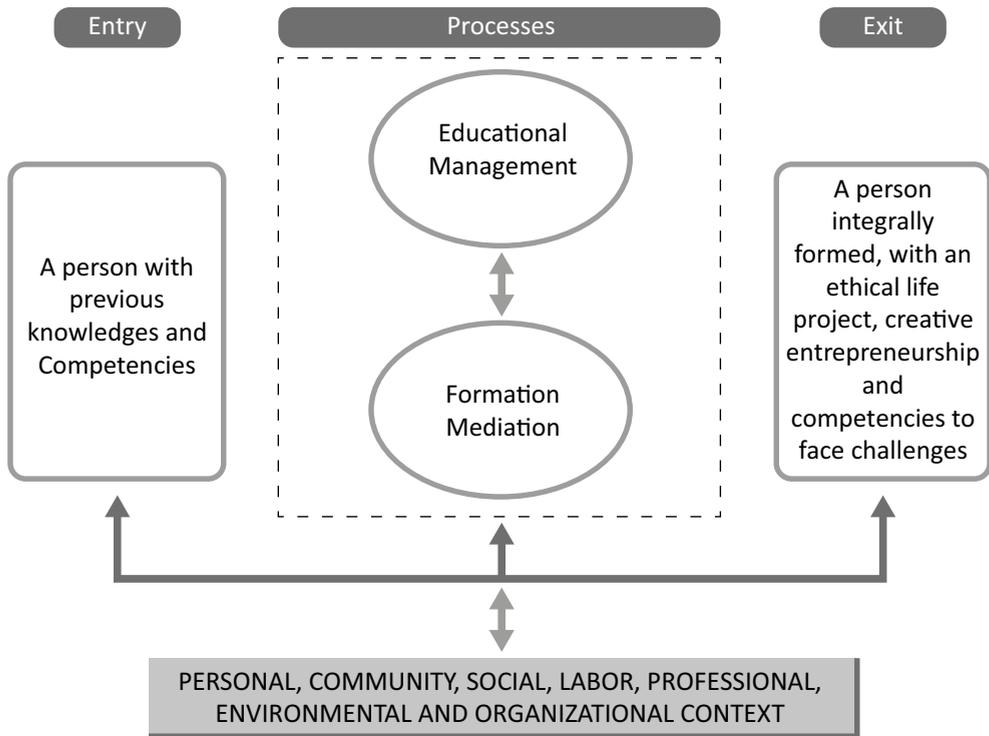


Figure 2. The socio-formative curriculum as a system

Educational institutions are living systems that work tirelessly to maintain themselves, which requires for them to continually renew and take the challenges of the integral formation of students. For this, in turn, institutions need to rely on the context, in order to be fed back about the challenges they should embrace, and ensure their formative proposals always possess relevance and enable people to be creative and entrepreneurial. The lack of quality in education is due, in part, to the fact that institutions have not yet assumed their dependency relation with the context and this has led them to be isolated.

Educational institutions require, then, clear goals from their relationship with the context, so that in this way their structure is consistent with current and future challenges of the outside world, and the potential for autonomy is created, from within their educational model. The competencies model tends for educational institutions to assume the dynamics of the integral human formation with quality, considering the current and future problems that are necessary for people to learn to cope with. However, it is not only about an institutional re-organization, but primarily about a change in principals, teachers and students toward the pursuit of excellence, with the necessary competencies to meet current challenges of the world.

The curriculum is part of the internal structure of educational institutions guiding how to achieve the general purposes, based on the institutional education model (global formative purposes) and the relationship with the context through continuous research of the problems to be addressed in personal and family life, as well as in social, economic, business, cultural, environmental areas, among other. Thus, the curriculum will change as the context changes, but having an internal autonomy that gives it identity and stability. Therefore, it is always necessary to address the curriculum management in an institution from this intertwined two-fold: the curriculum should have internal identity but, at the same time, must take into account the challenges of the external environment.

This is essential to give a new dynamic to the curriculum, aiming to go beyond the traditional design, which has been given by setting rigid study programs with a set of actions to be executed without variation in environments, assumed as stable. This in practice has resulted in curricula that tend to block as time passes, because they do not have the conditions to cope with change and the uncertainties of the context and all educational process.

The principle of organizational recursion

This principle transcends the linear causality of positivist epistemology which has had and still has traditional science, and instead proposes three aspects: 1) causes act over effects, but at the same time, effects act over causes; 2) phenomena have not a single cause, nor a unique effect, but generally, they have several causes involved, as well as several effects, all of which are necessary to analyze to build understanding and thus enable a performance in reality more effective and relevant to the global system; and 3) the processes are regulated and improved from information, and this information should come from several sources, not just one.

With respect to the curriculum design, we have the following implications of the principle of recursion: 1) to have a quality curriculum is not sufficient to achieve integral human formation and having competent students, but it is also required to have other aspects, such as competent principals, highly suitable teachers, adequate resources and a high degree of commitment from the students (multiple causes); 2) it is necessary to look for different sources to evaluate the curriculum, not just the directors, for example interview teachers, students, alumni and people from the community, and on that basis, implement continuous improvements that lead to having highly relevant plans and flexible formative offers, as well as highly relevant; and 3) it cannot be expected that students only reach the graduation profile, but also is necessary to seek that their training be wide, and in addition to the graduate profile, they manage to satisfy their needs of knowledge and education, within a universal context as citizens of the homeland.

The dialogic principle

In traditional science, knowledge is produced opposing a phenomenon to another. This has led to processes of creativity and entrepreneurship to be created by opposition to something. So, many times, greater problems arise than the ones pretended to solve, such as the case of the ecological environment, scientific research, agricultural development and coexistence. Dialectic made possible a relevant advance by proposing the union of opposites, but it has not been enough, because there has not been clarity around the purpose of uniting opposites. Complex thinking suggests an improvement on the proposal from the traditional dialectic by establishing that not only we must unite opposites, but we also have to establish the best ways or means by which such contrary or opposite should complement from specific purposes, considering the overall system as such, looking to take processes to reach greater development, creativity, positioning and strength to deal with the context. In addition, we must transcend the common idea that opposites are two and move on to consider the possibility of having multiple opposites. It is also necessary to identify opposites there, where apparently there aren't, because that enables better processes of systems' revitalization, when managed appropriately. The latter is also a contribution made by complex thinking versus traditional dialectic.

In curriculum design, there are several challenges that must be assumed from the linkage and complementary of aspects and principles often antagonistic or opposed, such as:

- Complementing the expectations of principals, teachers, students and the community regarding the curriculum, which are often different and opposite, and require to be articulated and agree on the essentials, in order to generate creative and innovative processes in the institutions regarding integral human formation. This would avoid unnecessary conflicts implicitly and explicitly, which require time, energy and resources to be solved, and which could be used instead to reach levels of increasing academic quality.
- Complementing scientific research with research about the quality of teaching and applied research. Sometimes, there is an opposition between people who follow these types of research in educational institutions, and is necessary to promote the agreement to ensure integral formation, by establishing research as a transverse axis in the curriculum, based on problems and projects.
- Complementing formation for personal fulfillment with scientific, social and environmental formation and formation for professional workforce. From the competencies based model, there are strong clashes between those seeking

an emphasis in one of these types of formation. From complex thinking, we must move quickly to complement these types of education in any educational institution, for education doesn't only focus in personal development or formation for work, but must be really integral and contribute to the problems that afflict humanity.

- Complementing the flexibility that should be in the syllabus and the need for structure and linearity. The curriculum should enable options for students to set their education pathway and deepen on aspects of interest, with access to time and use of resources, but at the same time it must be ensured there is a basic and common addressing for all, with a logical sequence of a number of formative spaces (modules, projects, units of curricular organization, etc.) so that the program has identity.

The complex approach to curriculum requires the integration and complementation of all these aspects, not taking them as rivals, but as possibilities to generate higher quality in formative proposals and ensure students are in better circumstances to meet the challenges of the current and future context. For this it is essential to have clarity of the purposes of education and to possess flexibility of thought. It is very common to find the speech of complex thinking in educational institutions, but there is often a rigid thinking, which prevents the processes to occur.

The holo-gramatic principle

A hologram is that the whole is present in each part. For example, human beings form a society, but the structure of society is present in each person. Also, we have a body shaped by cells, and in each cell the structure of the whole body is present in the genes. Morin (1995) invites us to understand phenomena seeking to determine how the whole is present in each of the parts, and this allows us to address phenomena better.

In the area of curriculum design under competencies, this means, for example:

- The educational model (part) must integrate the essence of educational policies from a region, country and the world (whole).
- The graduate and entry profiles (parts) must articulate the essence of the educational model (whole).
- The design of modules, formative projects or curricular organizational units (parts) must articulate the institutional educational model, as well as the macro-education policies (whole).

1.3 Structure and implementation of the curriculum from complex thought.

Under the framework of complex thinking, it is proposed to address reality from the lay out of strategies and not of programs, as happens in simple logic. Strategies are a set of steps to accomplish certain objectives, which are based on the analysis of the certainties and uncertainties in scenarios where aspired to be implemented. As they are implemented, changes are made in accordance with the setbacks, chances or opportunities encountered along the way.

When planning a strategy, guidelines are provided to address potential factors of uncertainty. "The strategy, like knowledge, is still navigating in an ocean of uncertainties through archipelagos of certainties" (Morin, 2000a, p. 70). That is why "(...) education is obliged to provide nautical charts of a world that is complex and is in perpetual agitation and, at the same time, the compass to navigate it" (Delors, 1996, p. 95). However, the establishment of programs is not abandoned: these are considered from the strategies built.

The main strategies for implementing curriculum under competencies from complex thought are the propaedeutic or preparatory cycles, transverse projects, practices and internships.

Propaedeutic cycles

Consist of building all processes and educational levels in an articulated and concatenated way, so that enable students to have continuity in their formation and achieve ever-higher levels. Specifically, the cycles consist of articulating preschool, elementary, middle, high school and higher education cycles and continuous education, to favor the transition from one level to another. Today it is no privilege to have middle education or higher education, because what should be pursued is that all people reach the middle and higher education, or an equivalent education in occupational and technical formation, and for that the articulation of cycles and generation of mechanisms to ensure continuity, is necessary.

The curriculum for propaedeutic cycles contains (Tobón, 2010):

- The articulation of different formative cycles.
- The preparation of students in a cycle to help them overcome successfully the challenges of education and learning in the following cycles, so as to have a

successful continuity in following or superior levels, until they obtain a degree and graduate with the competencies needed to address the problems of context.

- The assessment of students at the beginning of each cycle around the competencies and prior knowledges they possess.
- The possibility of students to obtain an anticipated accreditation of competencies, to advance grades, semesters or further cycles.
- Offering activities to reinforce the competencies required to succeed in the degree, level, or cycle in which students are enrolled and they do not have, though supposedly should have formed in previous processes.
- The possibility that previous studies are recognized in a cycle for their concatenation, and this allows students to progress faster on that cycle.

Formative projects

The curriculum, from the socio-formative perspective and complex thought, we propose is carried out through formative projects (Tobón, 2009b), which are formative spaces for learning or contributing to learn at least one competence of the graduate profile, consistent with the educational model the institution has. Formative projects can be simple or highly complex. Are simple when they address a very specific and familiar problem for students; and are complex when they focus on problems that involve a large number of variables, demand resource management and must address processes of uncertainty.

Although the ideal is to work with formative projects across all educational spaces, the structure of the curriculum is flexible and can be also addressed by integrating subjects, workshops or modules, or based on a combination of these different methods. What is essential is that, regardless of the methodology used, context problems are addressed.

Training and Internships

Another structural component of great relevance in the competencies-based curriculum from complex thinking, is the establishment of practices and internships in various scenarios from the beginning of each cycle in order to ensure the integral formation of students and facilitate learning the competencies of the graduate profile. Experience in working under competencies has demonstrated that competencies learning requires necessarily for students to put their competencies into action in contexts in which competencies are required, and to perform internships at various settings to reinforce such learning environments and generate transfer.

2. Systemic Management of Competencies Education (GesFOC)

There are multiple methods for curriculum design under competencies. Some focus on functionalism, others on behaviorism, others on constructivism, and others are eclectic or inclusive (see, for instance, Maldonado, 2001).

Since 1998 it has been applied in various educational institutions the socio-formative approach to curriculum design, which is characterized by assuming formation from the vital needs for personal fulfillment and coping with social challenges, from a collaborative spirit. This means that curriculum is not the document with a studies' plan, but the actual practices to have with students in an area of social and cultural representation. This has led to teachers acquiring a new competence: academic management, which has traditionally been in the hands of experts and education managers.

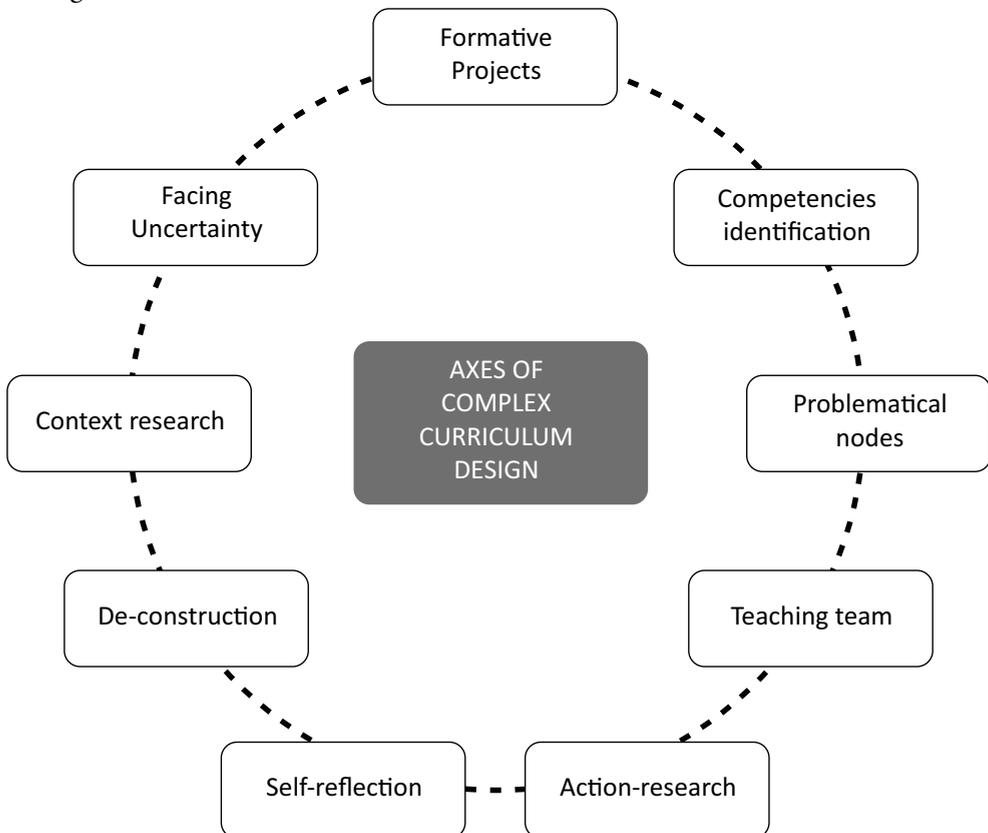


Figure 3. Axes of curriculum design. Traditional Proposal (Tobón, 2005)

To achieve new teaching competencies, the socio-formative model is based in the metacognitive practice and educational action research, because it is the method of choice for identifying, analyzing and changing educational practices through collaborative processes, seeking for people in the coordination of the curriculum to have as a basis their own experiences.

From socioformation, the curriculum is carried out based on the reflection on educational practice and flexibility; it seeks to face the great challenges of humanity, emphasizes the ethical project of life and seeks to learn to undertake. This model traditionally has been applied through nine interrelated axes (Figure 3), and emphasizes self-reflection, and deconstruction processes and the change of rigid mental models.

The methodology of curriculum design from socio-formative approach has been applied in various educational institutions from preschool education, elementary education, middle school education, technical education and higher education, in more than eighteen countries and it has allowed teachers to be actively involved in this process reflecting, systematizing their practices and changing them, which has opened a possibility to transcend the curriculum as a mere activity of syllabus design.

However, in a series of projects to implement the socio-formative approach was reached the conclusion that curricular design under competencies was due taking on new challenges, which are implicit in the original proposal of the complex socio-formative approach (Tobón, 2005) but had to be more explicit and put them into action formally. These challenges are:

1. Articulate curriculum design from a more global perspective, as it is curriculum management.
2. Integrate curriculum design as part of the academic quality management.
3. Relate the curriculum design process with other processes of educational institutions such as resource management, establishment of partnerships, talent management and performance measurement.
4. Set up curriculum design in an easier way than traditionally has been done in competencies, in order to facilitate for the teachers to engage in a better way and can assist in the process.

From the challenges identified above, we reached the construction in the socio-formative approach of the curriculum methodology called Systemic Management of

Competencies Formation (GesFOC, for its acronym in Spanish) (Tobón et al, 2006. Tobón, 2010a), which is based on:

1. The curriculum design from complex thinking (Tobón, 2009a).
2. The general structure of various excellence management models, such as the EFQM model and the European model of quality (Tobón 2010a).
3. The process of accreditation of academic programs.
4. The certification of academic processes using ISO standards.
5. The overall quality management based on the Deming quality cycle.

A summary of the curriculum model is shown in Figure 4, which consists of twelve minimal processes (other processes can be articulated or integrated according to the needs). The model applies systemic thinking in the sense that there is information input, processing and reporting out, and everything is interconnected. It is necessary that all this take place based on the guidelines for accreditation and / or certification both, national and international, relevant to the program.

The curriculum management starts by having a team that leads formation in all stages. It is necessary that this team is formed in collaborative work and possesses mechanisms for reaching agreement on the fundamental (process 1). Then should follow the planning and / or improvement of the educational model, which will be the support of the program (process 2).

The design of any formative proposal begins with the study of the internal and external context in which the needs and challenges of the environment are identified (process 3). With this study other processes are carried out, starting with the graduate process, which has the necessary competencies to be formed in students and follow-up and support actions for the graduates (process 4). This also provides the basis for planning the entry process, with the necessary competencies students should possess at the beginning of their formation in order to be successful, which is accompanied by reinforcement actions of those competencies, if necessary (process 5).

With all of the above, the curriculum (process 6) is constructed through interrelated formative spaces, practices and credit systems (the latter only if necessary). The learning spaces are environments in which students will be formed and amount to what traditionally has been named subjects. From socioformation, it is pretended that formative spaces are projects, but can also be modules, learning units and, ultimately,

subjects. The most important thing is that formative spaces are interrelated and ensure the formation of the competencies in the graduate profile.

What follows is the establishment of guidelines and rules around how will be the competencies formation and assessment (process 7) and the academic management represented in research, community outreach and welfare of students, teachers and administrators (process 8). These two processes are addressed closely following the educational model.

The pathway continues with the micro-curriculum, that is to plan each of the formative spaces proposed in the curriculum, which can be with the methodology of projects or other methodology (process 9). Formative projects can be addressed separately or within modules, subjects, etc.

To achieve the graduate and entry profiles, it is necessary that administration staff, teachers and principals are competent, which implies planning talent management by competencies and ensures continuous education (process 10). In this planning is necessary to establish clear actions for selection, evaluation, education and remuneration of staff, based on criteria and evidence that are consistent with the challenges of the formative program and the educational model of the institution. This process is accompanied by the management of financial resources, infrastructure, etc., based on the planned formation processes (process 11).

Finally, it is planned how to implement the curriculum with students in the classroom, so it does not remain on paper. Herein is the process 12, which portrays the mediation that is necessary for teachers to conduct, so students achieve integral formation and possess the necessary competencies to meet the challenges of the context. Here is essential to have strategies to ensure changing traditional educational practices, to make teaching relevant.

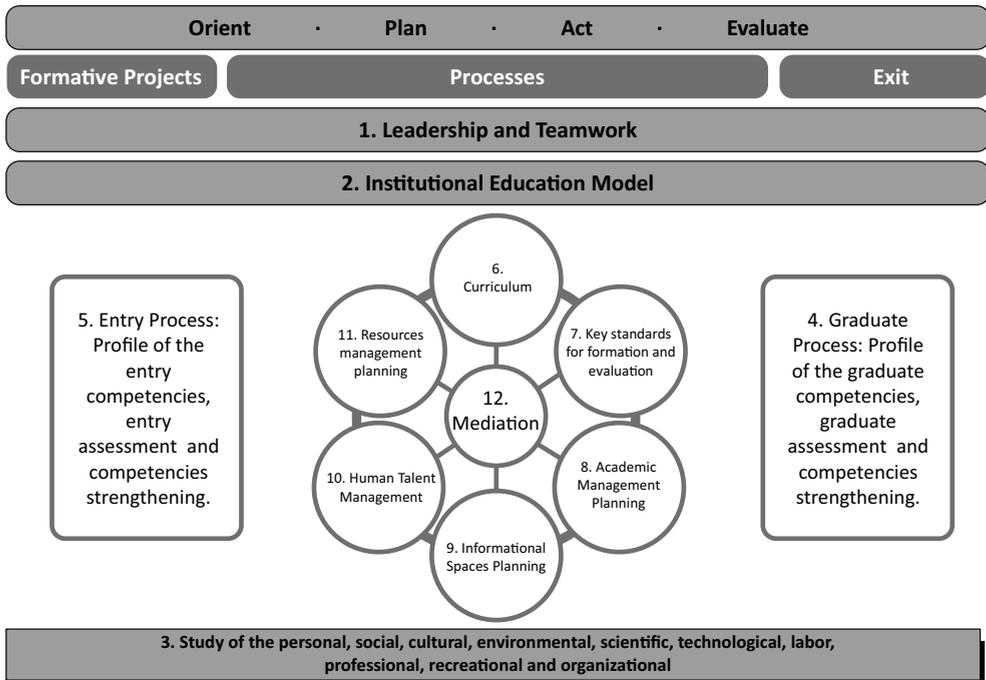


Figure 4. Synthesis of the GesFOC model

In the GesFOC model, each of the twelve core academic processes established from competencies, are addressed through a continuous cycle of orienting actions (setting goals), planning (determining the necessary activities to achieve the goals), action (implementation of activities) and evaluation (assessment of activities performed and goals achieved). This allows achieving a continuous quality assurance in program design (Figure 5).

These key actions give account of the planning, execution and evaluation that must be carried out in every process; but additionally, it adds orientation, for clear goals and criteria to assist in the quality of formative proposals. Also, with the four key actions described, the model is considering the Deming quality cycle (plan, do, check and act), but reformed.

Why Deming quality cycle was reformed? In the experiences of competencies curriculum, the Deming cycle has been insufficient because of the following reasons:

1. It is a cycle intended for the organizational world and not for the educational world, which has a different dynamic in some cases.

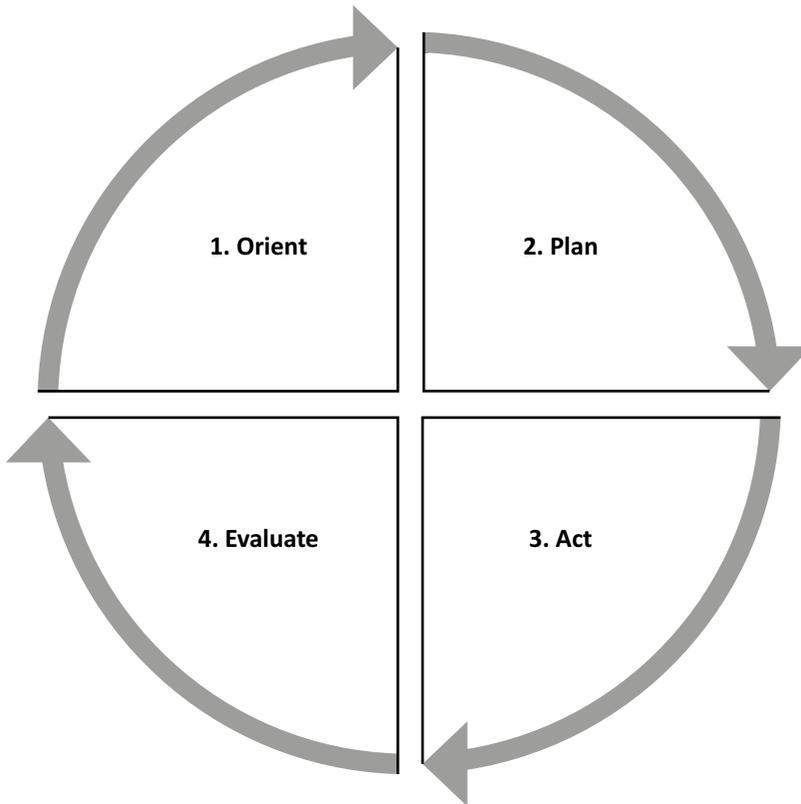


Figure 5. Key actions in managing the quality of academic processes based in the metacognitive practice

2. In academic management it has been found that the clarity of the criteria which should direct planning should be present before planning, so that planning meets the established policies of quality, such as the accreditation process, as it has been very common that curriculum design is established without taking into account the criteria and then has to be changed so that criteria are taken into consideration. Deming cycle tends to overemphasize the planning and underemphasize the establishment of criteria that express the goals to achieve and, at the same time, the guidelines to assess progress in the academic management.
3. The Deming cycle focuses on verifying if the performance matches planning, and this is limited in the educational world, just because there are many situations in

which one must determine the relation of the execution with what was planned, but there are also events in which rather than verifying, it assesses how the new challenges are being faced, and look that there is awareness to generate change, and all this is not included in the term verify but the concept of evaluation, which is much more comprehensive and systemic.

Table 1 describes the four essential actions that must be carried out in each of the academic processes established in the GesFOC model. These four actions make up a circular cycle that can start at any point and has no end, but an action raises another action. For example, the action, in turn, leads to a new cycle with the orientation. Sometimes it is not necessary to follow all the actions.

Table 1. Actions to build and improve educational processes in the GesFOC model

Actions	Description
To orient	Criteria are established for determining what goals are intended to be achieved in the process and how to evaluate them concretely. It takes into account the challenges of the academic system.
To plan	Concrete actions to be undertaken are determined, with the corresponding resources and human talent.
To act	Put into action planned activities seeking compliance of the criteria, conducting a continuing reflection that enables improvement and prevention of errors.
To evaluate	An analysis of the process is performed based on the criteria to determine achievements and areas for improvement.

3 Metacognitive practice and educational action-research activities in the curriculum design by competencies

3.1 From metacognitive practice to educational action-research

From the GesFOC model, it is proposed to design the curriculum at any education level considering each of the processes established in Figure 4. Before describing in detail these processes to have them as reference in curriculum design, it is necessary to note that curriculum design should be a metacognitive and research process, and from the beginning, it should be based on quality management (García Fraile, Tobón and López, 2009, 2010).

One of the biggest lessons that we have reached in implementing education reforms from different approaches and models, is that it is not enough to design an innovative curriculum, or to have new forms of lesson planning and assessment, or professional development of teachers, to generate change. In many institutions in which this has been done, not always change in teaching practices has happened, and learning continues being addressed in the same way, even if they have a different educational speech.

There are various strategies that have been established to create change in practices of principals and teachers, such as the awareness and motivation, verification of planning, assessment and certification, peer audit every certain period of time, etc. However, the strategy with best results is the metacognitive reflection, which means principals and teachers reflect before, during and after academic activities about how they can improve their practices regarding the curriculum and make change happen at various formation scenarios. Then, this must actually be verified on evidence of integral formation and in students' competencies learning.

When metacognitive practice is conducted formally, in a collaborative environment, with systematization and socialization, we are in front of Educational Action-Research (IAE, for its acronym in Spanish). Therefore, IAE should be verified in the rigorous registry of professional development sessions, in its analysis from a theoretical framework and in the publication of results, whereby the mere documentation of improvements in curriculum and teaching cannot be categorized as IAE.

3.2 Metacognitive Teaching Practice

Metacognition is, simply, to continuously improve our performance from reflection. If improvement is not verified in reflection, that's not metacognition. To do this, it needs to be monitoring and self-regulation of action (see chapter six). Integral formation and effective learning of the competencies of a graduate profile requires a continuous metacognitive practice to be carried out in the academic leadership and teaching, that enables identifying the areas for improvement and, in turn, enabling the means for real change, which necessarily require an institutional management model that is suitable, flexible and in continuous improvement. Only then we can move from words and paperwork, to real and effective practice based on competencies.

This is similar to what is sought in the students, for the essence of forming competencies is to guide them to act facing real context problems, aware of how they can do better, to prevent errors, to identify possible errors that may be committed and correct them, and to be in continuous improvement (Tobón, Pimienta and García Fraile, 2010). Then, for students to practice metacognition is a must that also managers and teachers

practice it and be models of continuous improvement based on reflection (Schon, 1987, 1992, 1998).

The IAE is defined as a continuous process carried out by principals and teachers in an educational institution in order to build (think critically) and rebuild collaboratively and systematically the pedagogical knowledge to improve learning processes (Elliot, 1994; Restrepo, 2002; Stenhouse, 1981, 1993). The IAE is, then, a formal investigative process to improve and innovate teaching in an institution and generate knowledge useful for teachers of other institutions.

In IAE, the research object is the management and teaching practice, and while performing investigation is also sought to transform and innovate practice, considering new academic, teaching and assessment strategies. Thus, the pedagogical knowledge is made based on the academic socialization of processes of transformation of educational practices, identifying common and distinctive elements.

3.3 Characteristics of Education Action-Research

The IAE has the following features:

1. Integrates subject and object, since principals and teachers are researchers observing themselves analyzing their pedagogical practice and that of others.
2. The goals of the research process are constructed in a participatory manner with members of the educational community, without impositions.
3. Integrates academic knowledge with knowledge of the context.
4. It takes place in teams, networks or collaborative work scenarios.
5. It is an ongoing recursive process, i.e., does not end at any stage.
6. It is an activity carried out by principals and teachers who integrally assume three roles: researchers, observers and managers of integral formation.
7. It seeks to identify patterns, representations or implicit mental models leading to irrelevant pedagogical practices or practices that block change, and the way to modify them to facilitate improvement or innovation is recorded.
8. It is based on the systematic recording of academic activities through a field journal.

9. The analysis of educational and management practices have as basis a particular conceptual framework.
10. Both the process and the results, are systematized and published to guide other principals and teachers, and thus contribute to generate pedagogical knowledge, just as in other research methods.

In curriculum design it would be ideal to implement educational action-research to generate solid knowledge and systematize processes of change in teaching practices as they are investigated. However, if the conditions are not set to perform this process, metacognitive practice can be followed, which dealt with the four key actions of the GesFOC model, orientation, assessment, planning and action, this model has a general research perspective and is essential to ensure change actually is more likely to happen, but there is no guarantee that it actually occurs, due to the complexity of the processes involved in the formation.

Spare not say that is necessary to have restraint and rigor when exposing and socializing the process of curriculum management, because sometimes it happens that institutions claim to follow educational action-research, when in fact they just perform a metacognitive practice (or sometimes a mere reflection). Figure 6 shows that the initial step is the reflection (analysis to understand); then, progress in metacognitive practice (articulates reflection with real change in actual performance); and finally, gets to the educational action-research (systematic process of generating relevant and transforming knowledge of teaching actions through metacognitive practice).

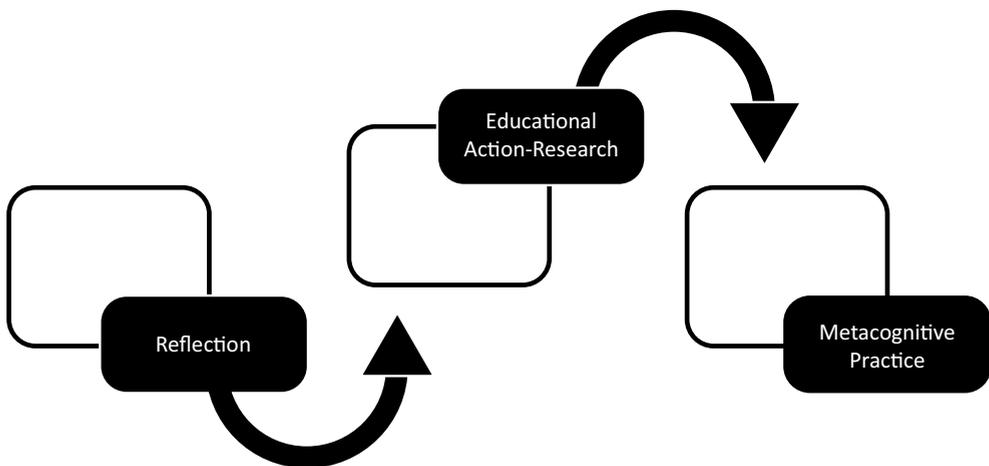


Figure 6. From reflection to educational action-research in curriculum design from the competencies model

3.4 Self-evaluation and modification of irrelevant mental models

Mental models are deeply ingrained assumptions. They are generalizations towards which we have a low degree of consciousness. Approaching mental models involves turning the mirror inward: learning to exhume our internal pictures of the world, bring them to the surface and subject them to rigorous scrutiny.

For the most part, all the great ideas that fail do so, not because intentions were weak, or because will falter or even because there wasn't a systemic understanding. Great ideas fail because of negative mental models that block the emergence of new perspectives and projects.

In metacognitive practice and educational action-research is necessary to conduct ongoing self-reflection (Schon, 1987, 1992), to create awareness of our negative mental models and modify them in order to guide education from integrality, commitment, anthro-poetic and full self-realization (Tobón, 2009a). "If we find that we are weak, fragile, insufficient, lacking beings, then we can find that we all have a mutual need for understanding. Critical self-examination allows us to de-center ourselves relatively with respect, and therefore to recognize and judge our egocentricity" (Morin, 2000a, p. 76). Complex thinking invites us to serve from our reasoning to rethink our thinking structure. Otherwise, our mental structures will continue blocking any possibility of change.

One of the great difficulties encountered in the construction of curriculum is that members of the educational institutions are driven so unaware and uncritical by certain ideas, policies and principles. In this regard, Morin (2000a) makes us the following invitation: "Ideas are by and for man, but man also exists by and for ideas; we can serve of them only if we know also to serve them. Wouldn't it be necessary to be aware of our alienations to be able to discuss with our ideas, control them as much as they control us and apply tests of truth and error?" (P. 24). In another section, the author states categorically: "We should take on a crucial fight against ideas, but we can only do so with the help of ideas" (Morin, 2000a, p. 25). Therefore, contrasting negative mental models can only be done from new mental models that are open, critical and contextualized.

Curriculum design process, then, requires continual problematization and interrogation towards its contextual, pedagogical and philosophical relevance, because the curriculum never has an end, but it is something that is always being done, creating and meaning. Its nature is not the arrival, but the pathway.

Metanoia is also essential in curriculum design. This term comes literally from meta (beyond) and noia (of mind) and means transcendence. Metanoia is a change of focus from one perspective to another and helps us in two ways: (1) to see relationships between the parts rather than linear chains of causes and effects, and (2) to see processes in their dynamic of change rather than as still photographs. Creative learning involves transcending our mindsets and look at things from new perspectives. Curriculum design in competencies model requires continuous practice of metanoia, for which reflection is the main instrument.

Also, the construction of both the curriculum and the micro-curriculum, is a process that needs to be addressed from within the framework of quality management of formation, in order to comply with the purposes of the educational institution, to achieve an impact on teaching and assessment. This is important to ensure the accreditation of the institution and its academic programs. In this regard, there are various methods, but from the socio-formative approach, quality management is integrated with the educational action-research, through the four key activities outlined in Table 1.

The quality assurance of the institutional curriculum seeks to have mechanisms that promote appropriate, timely, effective, efficient and efficacious formation of students. Such curriculum quality management is based in the documentation of all processes of learning, teaching and assessment, with an appropriate public validation.

3.5 General procedure for implementing educational action-research

It is recommended to follow the general process below for IAE in the curriculum work, according with competencies:

1. Conduct educational action-research from the same team of curriculum management, either at the institutional level or within a concrete program.
2. Build a solid reference frame around the integral formation, competencies learning and the process of curriculum management to have it as a base in the observation of the practices of administrators and teachers, reflecting and building pedagogical knowledge.
3. Conduct a process of personal and group reflection on the achievements and areas for improvement in the curriculum design, according to the competencies model and challenges of internal and external context.

4. Systematize such reflections, analyze schemes or implicit models and develop strategies for change to implement them with commitment in the curricular practice as such.
5. Consider in the analysis of the achievements and areas for improvement the four key actions in action-research, such as orientation, assessment, planning and action (Table 1).
6. Socialize in the curriculum management team and the various sectors of the educational community, the progress of the metacognitive and research process through regular meetings.
7. Record and document all activities undertaken.
8. Analyze the results and publish the final report.

In GesFOC model, educational action research and quality management are integrated into the Reflective Constructive Workshop, (TRC, for its acronym in Spanish) as a method to manage the curriculum under competencies in their processes. This method has been systematized based on multiple experiences of curriculum design carried out in educational institutions and universities. This method is characterized by emphasizing processes of reflection, deconstruction, planning and evaluation.

4. Construction of academic programs using the method of Reflective Constructive Workshop, TRC

4.1 Constructive Reflective Workshop

There are a number of traditional methods that have been applied with frequency in curriculum design, some of them are: DACUM, ETED, functional analysis and focus group. These methods have provided valuable assistance in building competencies programs worldwide and are the main reference in this field.

However, the competencies perspective has had many evolutions since 2000 until now, result of massive applications in all levels and types of education, as well as various human talent management processes in organizations. That is why through the same experience, adaptations have been made in the methods, starting with the DACUM method and then following with the functional analysis, the ETD and the focus group, until a time when it became impossible to continue with the approach of traditional

methods and had to establish a new method that could address the complexity of the educational process under competencies from the socio-formative perspective. The new method is called Constructive Reflective Workshop, (TRC, for its acronym in Spanish) and combines some contributions of the traditional methods with the metacognitive practice and its formalization in the educational action-research.

Also, the world is changing at giant steps and requires that curriculum development be a dynamic, effective, efficient and agile process, and can not be possible for an institution to take three, four, eight or ten years to design a curriculum under competencies, as we are observing in multiple educational institutions in Canada, USA, Europe and Latin America. Changes in social, labor-professional, scientific, environmental and cultural contexts, etc. require us to develop formation proposals with an efficient use of time, because many times it has happened when curricula take more than three years in the making, once its implementation begins it has already become obsolete and requires a new reform. The TRC is designed to help making the curriculum construction a streamlined experience that takes place within a reasonable time and contains the most fundamental aspects of an educational project.

Table 2. Key Elements of Constructive Reflective Workshop, TRC, and differences with other working methods

Aspect	DACUM (Developing a Curriculum)	Functional Analysis	ETED Method	Focal Workshop or Focus Group	Focal Workshop or Focus Group
Orientation	To determine functions and tasks.	Identify the key purpose and functions in detail from the context.	Analyze occupational processes in its organizational, relational and evolutionary dynamics.	Determine needs, problems, gaps and performance areas.	Build the program project with its graduate profile, entry profile and curriculum map, from problem analysis.
Curriculum	To determine abilities, knowledges and attitudes.	Build or help complementing the graduate profile through units of competence and elements of competence.	Helps to identify competencies of the graduate profile.	Helps to identify competencies of the graduate profile.	Determine the components of the competencies according with the socio-formative approach, using the educational action-research.
Analytical method	Group workshop with 8-12 experts in the field.	Meetings with experts (Groups composed by 5-10 experts in average).	Workshops and inquiries with experts. Observation of the environment. Analysis of occupations in its relations with the organizational context.	Group workshop with various sectors: students, teachers, alumni and experts.	Highly participatory group workshop, face to face or online, with experts and representatives from various sectors. Students, teachers, alumni, area experts and representatives of organizations, etc. participate.
Length to construct curriculum	3-6 sessions of 8 hours to develop graduate profile.	10 to 20 sessions of 8 hours to prepare the graduate profile.	10-25 sessions of 4-8 hours to prepare the graduate profile.	8-15 sessions to build the graduate profile.	8-12 sessions on average of 4 hours each until having the study of the program referents, the graduate profile, curriculum map and the essential structure of the formative spaces. This is spread over a semester or year (sometimes requires less time).

<p>Work Mechanics</p>	<p>The experts are asked about what general functions do they perform, these are registered in paper sheets on a board and then described for each function the activities, knowledges, skills and attitudes necessary.</p> <p>Phases:</p> <ol style="list-style-type: none"> 1. DACUM Workshop Planning. 2. Workshop Execution. 3. Description of competencies. 4. Validation of Competencies 5. Final Review. 6. Publication. 	<p>There is a moderator guiding all the process.</p> <p>Experts that know very well the area for which the program is built, are selected.</p> <p>There is training about the methodology they will work with.</p> <p>Experts are consulted about the key purpose and competence units.</p> <p>After they agree on the key purpose and units of competence, the competence elements are identified with the contributions from the experts.</p> <p>Competencies are described through the functional analysis map.</p>	<p>One or more coordinators.</p> <p>A study of labor and professional dynamics in their evolution and systemic relationships with the context are performed.</p> <p>Competencies Profiles are determined.</p>	<p>Representatives of various sectors related to the program are consulted about the context needs and the required competencies.</p>	<p>Appointment of the project leader.</p> <ul style="list-style-type: none"> - Identification of participants and call to participate. - Construction of an action plan. - Agreement of work standards. - Assigning roles to promote group dynamics. - In sessions, each of the components of the educational project of the program are addressed. - The contributions of attendees are organized in a board or screen for all participants to visualize them. - Brainstorming, peer assessment and ongoing review of products are present during the whole process. <p>The progress is published continuously and submitted to the review of all participants.</p> <p>Before each session some basic activities are performed individually or in sub groups, according to the action plan.</p>
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Constructive Reflective Workshop, TRC, is the method being used today more frequently in curricular management under competencies from the socio-formative perspective. The TRC can be applied alone or in coordination with one or more methods of curriculum design. Everything depends on the purposes, the work focus and the views of the curriculum design team members.

At no time is the idea to formulate recipes to serve all institutions and that can be followed step by step without modifications. This, in practice, has shown impossible and doesn't allow for each institution to manage their curriculum according to the conditions and challenges of their internal dynamic and external context. Hence, the only objective in this work is to propose reflections and general ideas that could help each of the curriculum management teams either in the design of the curriculum, its management and / or its continuous improvement.

4.2 Steps to be considered in the design and / or improvement of a competencies based educational program

Below are presented the key steps in the design or improvement of a formative program based on competencies, following the Reflective Constructive Workshop. This workshop can be applied to some or all of the steps described below. Also, is not required to follow the TRC as it has been presented, but can be addressed with adaptations, to make it simpler, or supplement it with other actions deemed necessary.

Step 1. Planning of leadership and teamwork

The first action to be performed is to form the team that will carry out the curricular management under competencies. This involves search for the most suitable persons who are committed to the process, establishing the key roles members should play.

Then, it is necessary for the team to develop an action plan, with the deliverables to be obtained in the process of curriculum management and activities to perform.

Deliverables to be obtained:

Document with the action plan on the design and / or improvement of the syllabus, with team members.

Table 3. Key aspects of the action plan

Members of the team:	Key roles in teamwork:				
Deliverables to present on the curriculum management:	Date of delivery of the products:				
Activities	Date of the realization of activities	Required resources			
		Description of the resource	Do we have the resource	Is it necessary to seek for the resource	Is it necessary to adapt the resource

The key roles in teamwork are:

- 1) Coordinator
- 2) Monitor
- 3) Systematizer
- 4) Quality manager
- 5) Facilitator
- 6) Experts
- 7) Participants in general

Coordinator:

Is the person who leads the process of the program's curriculum design. Responsible to form the team, looking for experts and leading the establishment of the action plan.

Key activities	Special criteria for the selection	Aspects that must be taken into account.
<ul style="list-style-type: none"> • Explains the methodology in a clear and simple manner. • Encourages participants to express their ideas without fear. • Creates an environment of trust in which the ideas of every person are respected. • Makes key questions regarding the purposes of the workshop. • Generates brainstorming around problems, competencies and education guidelines. • Seeks agreement on the products to achieve and the action plan in the curriculum management. • Directs the works of curriculum management. • Gives voice to the team members. • Manages the organization of information on a graphic map visible to all, through a computer and a projector. • Searches for the contributions of people attending the workshop to complement each other to generate group products. • When facing contrary positions of attendees focuses on commonalities to generate agreements and advance. • Guides the construction and / or improvement of the academic project of the general program, according to a given methodology. 	<p>It is important for the coordinator of the process to possess the following competencies, at least at the resolving level:</p> <p>Team work and leadership</p> <p>Information and knowledge management</p>	<p>Aspects that must be taken into account.</p>

Monitor:

Is an assistant in the curriculum design process whom is responsible for operational activities.

Key activities	Special criteria for the selection	Aspects that must be taken into account.
<ul style="list-style-type: none"> • Keeps a record of attendance. • Is pending of the logistics of the entire workshop: space, equipment, comfort, food, etc. • Presents the agenda. • Is pending of the delivery of tasks and fulfillment of commitments. 	<p>The monitor should be a person with a great practicality and responsibility around the logistical actions of curriculum design.</p>	<p>This role can be played by a specific person or can be assumed by any member of the team.</p>

Systematizer:

It is the person who is responsible to document, store and retrieve information around the activities and outputs of the program’s curriculum design.

Key activities	Special criteria for the selection	Aspects that must be taken into account.
<ul style="list-style-type: none"> • Drafts the contributions of all the experts and participants in detail, as well as those of people who have a specific role in the workshop. • Performs graphical maps with the agreements that are reached. Indicates the points at which there is no agreement. • Systematizes products of the workshop with the mediation of the facilitator. • Officially registers products of curriculum management. • Submits reports of the agreements. • At the end presents a report of the agreements reached and the points under discussion. • Ensures product protection against loss, damage and unauthorized use. 	<p>It is necessary that the person holding the role of systematizer possesses the following competence:</p> <p>Information and knowledge management.</p> <p>Minimum level: resolving.</p>	<p>This role can be played by a particular person or may be assumed by any other member of the team.</p>

Quality manager:

Is the person who is responsible to look that the products have the characteristics expected according to the institution’s educational model and criteria for accreditation, at the national and international levels.

Key activities	Special criteria for the selection	Aspects that must be taken into account.
<ul style="list-style-type: none"> • Seeks for the TRC to meet the four steps set out in the GesFOC model: orientation, planning, action and evaluation. • Evaluates the dynamics of the workshop and makes suggestions for improvement. • Verifies the quality of the products. • Provides suggestions to improve activities and products from the curriculum management. • Presents periodic reports of compliance with the action plan and the achievement degree of the goals set in the criteria. 	<p>It is necessary that the person occupying the role of systematizer possesses the following competence:</p> <p>Quality management.</p> <p>Minimum level: resolving.</p>	<p>It is important that this role is played by a specific individual to achieve more clarity around the actions involved.</p>

Facilitator (s):

Is the person who is responsible for generating a good atmosphere in teamwork and implementing actions to overcome any resistance that might arise.

Key activities	Special criteria for the selection	Aspects that must be taken into account.
<ul style="list-style-type: none"> • Implement actions to achieve teamwork. • Provides suggestions to have a favorable environment for teamwork. • Implements actions to overcome resistance in curriculum management. 	<p>It is necessary that the person holding this role possess the following competence.</p> <p>Teamwork and leadership.</p> <p>Minimum level: resolving.</p>	<p>A person who already has another role can perform this role.</p>

Participants in general:

People who do not have any role can attend working sessions. In this case, at least are expected to support the following activities:

1. Make contributions around the established goals.
2. Perform assigned and agreed tasks for the workshop.
3. Perform reflections on the competencies aimed to develop on students and their approach.
4. Review progress in curriculum development and provide suggestions for improving the academic program.

Notes:

1. The proposed activities can reduce or expand according to the goals set.
2. The same person can assume several roles.
3. In addition to these roles, other roles are possible according to the needs.

Step 2. Planning for establishing or improvement of the institutional educational model.

Is to create or improve the institutional educational model from the participation of the different sectors of the organization, considering the competencies and to generate the necessary actions to achieve its appropriation by the educational community.

Product to obtain:

Document with the Institutional Educational Model oriented by competencies.

From socioformation, an educational or pedagogical model should primarily give account of the minimum aspects identified in Table 4.

Table 4. Minimum aspects that must contain an institutional educational model.

Key aspect of the educational institutional model	Description
What kind of person does it aim to form?	
What kind of society does it aim to form?	
What approach or approaches to education aims to form?	
Under what educational principles it aims to form?	
What is the role of teachers?	
What is the role of students in the formative process?	
What scenarios are intended to form in?	
What should be the basic structure of the formative programs?	
How to carry out the linkage with society?	
What are the guiding axes of the research?	

Step 3. Study of internal and external context

In the curricular management under competencies it is essential to conduct a study of the internal and external environment to identify problems (challenges) students and graduates of the education program must be in a position to address. To do this, we suggest using the Constructive Reflective Workshop with the participation of the leadership team and other people invited. Based on the problems, the graduate and entry profile are determined, as well as the curriculum.

Products to obtain:

- Document with the study of the internal context.
- Document with the study of the external context.

Study of the internal context

Is to identify the problems to be solved in the current formative program regarding:

- Level of student dropout and teacher turnover.
- Level of graduation with a degree.
- Non-degree graduation level.
- Average academic performance.
- Courses or modules with higher failure rates.
- Employability rate of graduates.
- Average time for graduates to get their first job.
- Areas, subjects or elements of the current program that increase employability.
- Areas, subject or elements that are perceived as of little value for education.
- Student satisfaction with the current program.
- Graduates satisfaction with the current program.

- Satisfaction of teachers with the current program.
- Satisfaction of managers with the current program.
- Recommendations of students, teachers, administrators and alumni to improve the program.

If the program has not yet been created, it is not mandatory to study the internal context. However, in order to have elements for constructing the curriculum, some general factors in other programs that the institution has can be studied, if it has already programs.

Study of the external context

The study of the external context is carried out by identifying the problems students and graduates of the program should be able to solve, both at present and in the future (over the next five to fifteen years or so). These problems are formative needs respect to personal development, family, community, society, organizations, business, labor and professional world, the environment, recreation, sports, culture, politics, communications, technology and science.

To determine the problems of context that students need to learn to solve, the following strategies can be applied, below are discussed the strategies in order of priority and importance. According to the focus of the program, it is necessary to take into account the local, national and / or international environment:

1. Review of documents on occupational trends.
2. Review of published job offers.
3. Review of documents about relevant competencies for the program.
4. Review of scientific and / or academic papers about the research trends.

If the above activities are not sufficient to identify context problems to which the program must respond, then we must seek a group of experts with clarity about such problems. It is necessary for these skilled persons to understand the various areas in which graduates of the program can serve. (see Table 5).

Table 5. Characteristics of experts for the study of the context

Key activities	Special criteria for selection	Aspects that must be taken into account
<ul style="list-style-type: none"> • Provide information around current formation needs, based on the knowledge of the context. • Present the formation challenges for the next five to fifteen years approximately. • Help identify the key elements to improve the quality of formation in the program. 	<p>Meet at least two of the following conditions:</p> <ul style="list-style-type: none"> • Have at least 8 years of experience in the professional practice, according to the academic program to be structured by competencies. • Have worked in at least two areas of the profession to have a more global view. • Have participated in processes of human talent management with professionals of the same area, in selection, training, evaluation, compensation and / or promotion processes. • Have participated in a study of the context that is relevant to the program curriculum. 	<p>Is required to have at least one expert who knows the projection of the profession for the next five to fifteen years.</p>

If the above is not sufficient, then it can be found a sample of students, graduates, experienced professionals, employers and teachers, whom are given an interview or survey. According to CIFE experiences, is not recommended to start with interviews or surveys without having done first an accurate documentary study, or consulting experts in the subject. This, because sometimes the relevant information to identify context challenges is already in certain documents or has been clearly identified by people engaged in this work, and begin with interviews or surveys can lead to information duplication. Among the experts there may be professionals with great experience, researchers, teachers and, in some cases, even students. It is not necessary for them to hold certain degrees.

Step 4. Planning the graduate profile and the graduation process.

In this step the competencies expected to form in students enrolled in the program are determined, to respond to the problems identified in the context study.

Also, the necessary actions are established to evaluate graduates in the achievement of those competencies and strengthening mechanisms of such competencies.

Product to obtain:

Document with:

- Graduate Profile by Competencies.
- Methodology for accreditation of graduation competencies.
- Actions to reinforce the graduation competencies
- Actions to support graduates.

A graduate profile by competencies is the base of curriculum design and consists in the description of the specific and generic competencies that will be formed during the educational process, in a given period of time and with precise criteria. Based on the profile, the curriculum map is prepared and the learning and assessment activities are planned.

Table 6. Format to present the graduate profile under competencies from Socioformation.

Graduation Profile by Competencies	
Specific Competencies	Key criteria
Generic competencies	Key criteria

Note: competencies are drafted considering the components described in Chapter 3: performance verb, conceptual object, purpose and condition of context or reference.

Step 5. Planning of the admissions process by competencies

The entry profile is given by the competencies necessary for the students to possess at the beginning of the education program, in order to succeed in the development and achievement of the graduate profile. This is key to reducing student dropout rate and to enhance the academic performance in students. It is not mandatory to possess the entry profile before entering the program, although it is desirable. If students have access to the program and lack one, several or all of the entry competencies, the institution should implement actions to form them or enhance them, if possible in the first academic term or in the first third part of the time period of study (maximum).

The admissions process is planning how the admission of students is going to be carried out, the evaluation of competencies of entry, strengthening of these as necessary, and adaptation to the educational institution and the academic program as such.

Product to obtain:

Document with:

- Entry profile by competencies.
- Methodology for assessing entry competencies.
- Actions for strengthening entry competencies.
- Activities for adaptation to the program and the institution.

Table 7. Format to present the entry profile by competencies from socioformation.

Admission Profile under Competencies	
Competencies	Key criteria

Step 6. Planning the curriculum map

The curriculum map is the set of formative spaces hinged together by which it is intended students meet the graduate profile in a formative program. The experience in the socio-formative approach has been showing that what matters is not the structure of the curriculum, but the way in which teachers mediate the formation and assessment of competencies in the classroom. In this sense, the work can be done by modules, learning units, curricular organization units, projects, etc., or a combination of such methodologies. The important thing is that in the process relationships are established between different components and links are made with other areas and disciplines.

An option to highlight from socioformation is formative projects, which may be the key structure of the curriculum or be addressed within the learning modules or units. A formative project is a set of activities hinged together to solve a context problem and hence develop or contribute to develop one or more competencies of the graduate profile.

In the curriculum there are several possibilities regarding the relationship between the formative spaces and competencies to form. These possibilities are:

Model 1. A competence, a formative space

For each specific competence of the graduate profile it is established a formative space. Then, there will be as many formative spaces as competencies in the graduation profile.

Advantages of this model:

- There is great clarity about the competencies to develop in the formative spaces.
- Improved opportunities to develop competencies because each formative space has a competence as a goal.

Model 2. A competence, several formative spaces

Several formative spaces form a specific competence in the graduation profile. This can be done according to the following:

- In each of the formative spaces criteria is distributed, and as criteria is formed, the established competence is formed.

- In each of the formative spaces a certain performance level is distributed from the competence to form. For example, in a space students and teacher work to achieve the resolving level; in another space, the autonomous level, etc.
- Each of the formative spaces addresses a particular procedural axis of the competence, when working with procedural axes that organize criteria.

Model 3. Several competencies, a formative space

A formative space can develop more specific competencies of the graduation profile.

Advantages of this model:

1. They may have few formative spaces and make formation more comprehensive.
2. In a formative space, students learn to be competent in several areas.

Model 4. Several competencies, several formative spaces

Several formative spaces contribute to develop more specific competencies from the graduate profile, for which the criteria are taken into account. Then are criteria helping determine the specificity of each formative space in the curriculum.

Advantages of this model:

1. High degree of flexibility in the approach to the curriculum.
2. Possibility that in a subsequent formative space pending criteria from a previous formative space can be accredited.

Regardless of these options, each formative space contributes to developing one or more generic competencies. It is advisable to have one or two generic competencies in order not to complicate the process.

Product to obtain:

Program curriculum with the articulation of the formative spaces.

Step 7. Formation and assessment normative

In this step the essential rules that will guide the formation and evaluation of competencies in students are determined. These rules are set on the basis of the study of the internal and external context, the graduate profile, the entry profile and the curriculum.

Product to obtain:

A regulation with the following minimum features:

- Key standards for entry, permanence and graduation.
- Key standards around the recognition of previous studies.
- Key standards about the formation of competencies.
- Key standards around the process of competencies assessment.
- Key standards around practices.
- Key standards about scholarships, awards and incentives for academic work.

Step 8. Planning academic management

Policies needed are determined to implement the curriculum by competencies, seeking assurance to obtain the expected achievements. For this, guidelines and regulations regarding the administration management, teaching management, research, extension and wellness are established.

Product to obtain:

Document with:

- The administrative management.
- The teaching management.
- The management of research.

- The management of extension.
- The management of processes for student welfare.

These policies must be consistent with competencies.

Step 9. Planning formative spaces

Is planning each of the formative spaces set on the curriculum map, which can be by modules, learning units or projects. When working by competencies, the intention is to transcend subjects and have more integrative formative spaces. It is not necessary to completely plan all formative spaces from the beginning, but the key components can be determined and, as the work with students advances, more concrete aspects can be planned. This enables education to be more relevant and responsive to learning needs, considering the graduate profile.

Product to obtain:

Document with the essential structure of each of the formative spaces defined in the curriculum map. This structure must contain at least:

- Title
- Number of credits (if applicable)
- Competencies to form (at least consider a generic competence)
- Prior competencies required
- Problem to be solved (a general description)
- Some criteria and evidence.

Step 10. Talent management by competencies

The competencies principals, staff managers and faculty need to possess are determined, and based on that processes of selection, training, evaluation, promotion, compensation and quality of life are planned. The ideal human talent on all fronts is essential to ensure high impact in the education of integral and competent students to solve problems of life.

Product to obtain:

Document with:

- The actions for the implementation of talent management by competencies.
- The planning of selection, training, evaluation, promotion, remuneration and welfare process for principals, teachers and administrative staff of the institution from the competencies.

Step 11. Planning and management of resources

In this final process overall resources needed are planned to implementing and managing the academic program by competencies, considering learning scenarios, equipment and materials. Additionally, strategies to have the necessary resources and to ensure its quality are established.

Product to obtain:

Document with:

- The description of essential resources to implement the formative process.
- The policies for resource management.

Step 12. Mediation for integral formation, competencies learning and quality of life

Is to establish how to specifically address each subject and ensure that students actually learn. This requires considering the pace of student's learning and plan evaluation tools, taking into account the direct formation with the teacher as mediator, and the process of independent study.

Product to obtain:

Portfolio with evidence that teachers are themselves forming the competencies expected in the students, considering at least the Ten Essential Actions in Competencies Articulating Metacognition (DAEC-M, per its Spanish acronym) described in chapter six of this book. Evidence can be: videos, audios, student records, minutes of colleagues, evaluation evidence by the students themselves, etc.

4.3 Validation of the curriculum

It has become customary in the curriculum design by competencies, to set up the processes of internal and external validation for the graduate profile and the syllabus mesh, as well as for the planning of formative spaces. It is time to make of validation a meaningful, simple and practical process, different from what happens nowadays. Often, the validation is done by pure formalism. It also happens that some academics are devoted to this work that they tend to neglect the most important point: to actually put the curriculum into action and continuously improve it.

From socioformation it is considered essential to agree on the fundamental elements of the curriculum and put them into action, and as the process goes on, make improvements through successive agreements. For this, first the members of the leadership team must agree and then should seek key agreements with principals and the academic community in the program, if any. Regarding the latter, it may be relevant to submit the complete curriculum for review to principals, teachers, students and graduates, and they can send their suggestions. This can also be done with at least two experts.

Table 8. Recommendations for the validation process in the case of programs already in use

It is recommended	It is not recommended
<p>Finding essential agreements on the leadership team regarding the curriculum.</p> <ul style="list-style-type: none"> • Upload the document with the complete curriculum on a web site accessible to the entire academic community in the program, in order to submit it to discussion and get feedback to improve it based on arguments with due support. • External experts that assess curriculum could be the same that study context. The profile would be the one proposed in Table 5. 	<ul style="list-style-type: none"> • To vote the curriculum because what this often does is to mobilize power and pressure groups, leaving aside the argument and clarity of the goals. • Validate each component of the curriculum separately, because it affects the analysis of coherence between different elements.

4.4 Elements of organization in the Constructive, Reflective Workshop, TRC

In the TRC the following methods of organizing people can be addressed.

1. ***A single team session:*** all participants act as a team, with defined roles. This type of session is recommended when the number of attendees is very low.

2. **Teams session:** The group is divided into teams to address specific issues of curriculum construction and at the end; there is a socialization of the achievements in plenary.
3. **Sessions with two opposing teams:** is to assign one team a task and ask another team to find the errors and gaps in order to improve a process.
4. **Sessions with a court:** in these sessions a court is set up that assess the work of the members to generate higher quality.
5. **Sessions with opposing moderators:** the two moderators take, deliberately, opposing concepts to generate discussion.

Besides the above, the sessions can be held with the following options:

1. **Teleconferencing and video chat sessions:** sessions are conducted via telephone or Internet.
2. **Sessions open to the public:** sessions where the attendance of other people, who are not formally part of the group, is allowed.
3. **Broadcasted sessions on radio and television.**

The choice of a particular option depends on the needs the institution has at every certain time, and the number of people attending the sessions.

The TRC is done with the following spatial organization and resources:

1. It requires a large space, ventilated and mobile chairs that allow taking notes.
2. It is required to have a computer with a projector on a wall or screen.
3. People are organized in a "U" around the projection screen.
4. The facilitator is in the center of the "U" or on the side, guiding the process.
5. The people acting as monitor and systematizer are on one side of the "U".
6. In the back of the room or out should be a space with coffee, water, etc.
7. It is necessary to hand out a folder with the agenda, purposes, the TRC

methodology and the main referents of the documentary analysis to the audience.

4.5 Key actions in metacognitive practice and in educational action-research for designing and / or improving an academic program by competencies

At the beginning of this chapter it is proposed that each of the key academic processes of curriculum management should be approached from four key actions: orientation, planning, action and evaluation. What is addressed in this section is how to carry out these four actions from the design or improvement of the curriculum (Table 9).

There is not set order of the key actions, and although it is suggested to start with addressing and end with evaluation, there are cases in which the order established in Table 9 can change.

When one has an academic program and seeks to improve and innovate it following competencies, is recommended to guide the evaluation as a profound process of deconstruction of the curriculum, which is to observe, record and analyze teaching practices for a given curriculum process at the institution or at another institution, in order to identify irrelevant pedagogical practices from the perspective of competencies and clarify mental models that are implicit in the bottom of such non-relevant practices, and simple thinking processes: rigidity, resistance to change and fragmentation of teaching. To deconstruct (critical reflection) the process must begin from the foundation in competencies that will serve as a reference.

Table 9. Key actions in the planning of academic processes from the GesFOC model

Actions	Description	Suggestions
Actions	Essential criteria are established that will guide the planning of each of the basic academic processes, and others deemed necessary.	<ul style="list-style-type: none"> • Determine the purpose of the academic process regarding the overall program project. • Appoint the leader of each sub process and sub-teams responsible. • Look for and have the necessary resources for the development or improvement of the overall academic project in the program. • Establish a general work schedule in each process. • Have feasible and workable criteria to guide the overall academic project of the program. • Search criteria that is relevant and responsive to educational policies and the educational model of the institution. • Criteria should be socialized, validated and / or adapted by the team. • Document the criteria and socialize with the educational community. • Perform a diagnostic analysis of the current curriculum, if available.
To plan	Academic processes are built with the contributions from teachers, students and principals. It should be noted that is not about establishing how the academic processes will be designed, but to actually work in their design as such. E.g., is not about planning the actions to be taken to develop the curriculum structure, but to establish the curricular structure as it would be in the final program.	<ul style="list-style-type: none"> • Designing products according to the orientation, considering institutional resources. <p>Plan at least:</p> <ul style="list-style-type: none"> • Leadership and teamwork. • The educational model and its improvement. • The curriculum structure. • Formation, evaluation, research, extension and welfare policies. • Modules and / or projects. • The management of human talent. • Resources. • Initial assessment and adaptation to the academic program. • The final evaluation and the process of working with graduates. • Mediation of integral formation and competencies learning. • Inform the program's academic community on progress in the academic processes, receive feedback and implement the respective improvements. • Document the planning carried out in each academic process.

To act	<p>Academic processes are put into action with students in real formative scenarios and adjustments will be made when deemed appropriate. It is recommended that the actual action happen little by little, and in stages. The execution may be by part of the curriculum management team or by the teachers. Also, in the execution is necessary to address new problems that arise, making the necessary adjustments.</p>	<ul style="list-style-type: none"> - Run each process planning with students. - Reflect from time to time about how planning is working, to introduce improvements and changes. - Consider changes although not consistent with planned, if that contributes to better achieve the goals set in the orientation. - Perform actions on a larger scale in the educational institution. - Search for new developments and innovations in the process. - Document the process of acting and socialize it with the educational community.
To evaluate	<p>Determine the achievements and aspects to improve from the criteria in the orientation, considering, if the case, other reference criteria that has been identified during the process.</p>	<ul style="list-style-type: none"> - Evaluate the achievements and areas for improvement in curricular practices that happen in the institution or other institutions based on the criteria set in the orientation. - To promote self-reflection on the practices of academic administrators, students and teachers. - Establish major strategies to increase achievements and effectively address areas for improvement, along with the monitoring process. - Compare the activities performed with the planning and reference criteria, and determine the level of compliance. - Assess the use of resources, human talent and time according to the plan. - Document the evaluation process and socialize it with the educational community

In each of the four actions performed in the different academic processes, a continued documentation of all activities is recommended as well as the documentation of the results achieved, describing the challenges and solutions taken to face these difficulties. It is also necessary to socialize the progress and results of the different processes of curriculum development inside the educational institution, as well as the changes in teaching practices. This leads to new experiences and practices in other people, and allows accumulating knowledge.

5. Suggested Activities

1. Make a mental or conceptual map of the steps that must be followed in the review, update or change to the curriculum in your institution. Consider the GesFOC model addressed in this chapter.
2. Develop a curriculum design proposal by competencies to present to your institution or another institution, based on the socio-formative perspective and complex thinking. Take into account the suggestions provided in this chapter and the review of the literature on this topic.
3. Determine how you can, from your daily activities, contribute to strengthen the curriculum by competencies at your institution. Record concrete commitments.
4. Address the competencies curriculum in your institution based on the establishment of strategies, considering the fact that action and transformation system (human formation and social context) is complex, and as such its nature implies continuous change, organization, order and uncertainty. In this regard, each one of the strategies that make up the curriculum should be established with a view to adjusting to changes and requirements from the context, according to an ongoing assessment to be carried out from the institutional and the daily teaching practice. Here is important to note that such strategies should be developed with prudence, but also boldly, so they impact the achievement of educational purposes.
5. Add in your curriculum design the concept of uncertainty, as part of reality and as part of the different formation processes, recognizing the various risks involved in pedagogical decisions, with openness to make the changes that are required when unexpected circumstances appear. This is what in complex thinking is known as betting, which refers to the recognition of possible unexpected effects of actions that are put in place. "In history (...) the impossible becomes possible (...) but we have also seen that the unexpected becomes possible and is performed; we have often seen that the improbable happens more than the probable; know, then, to expect the unexpected and work to the improbable" (Morin, 2000a, p.70).
6. Guide the curriculum design based on general formative guidelines (González, 2000; López, 1999) and based on this structure strategies to attain such guidelines; then develop specific programs consistent with these strategies.

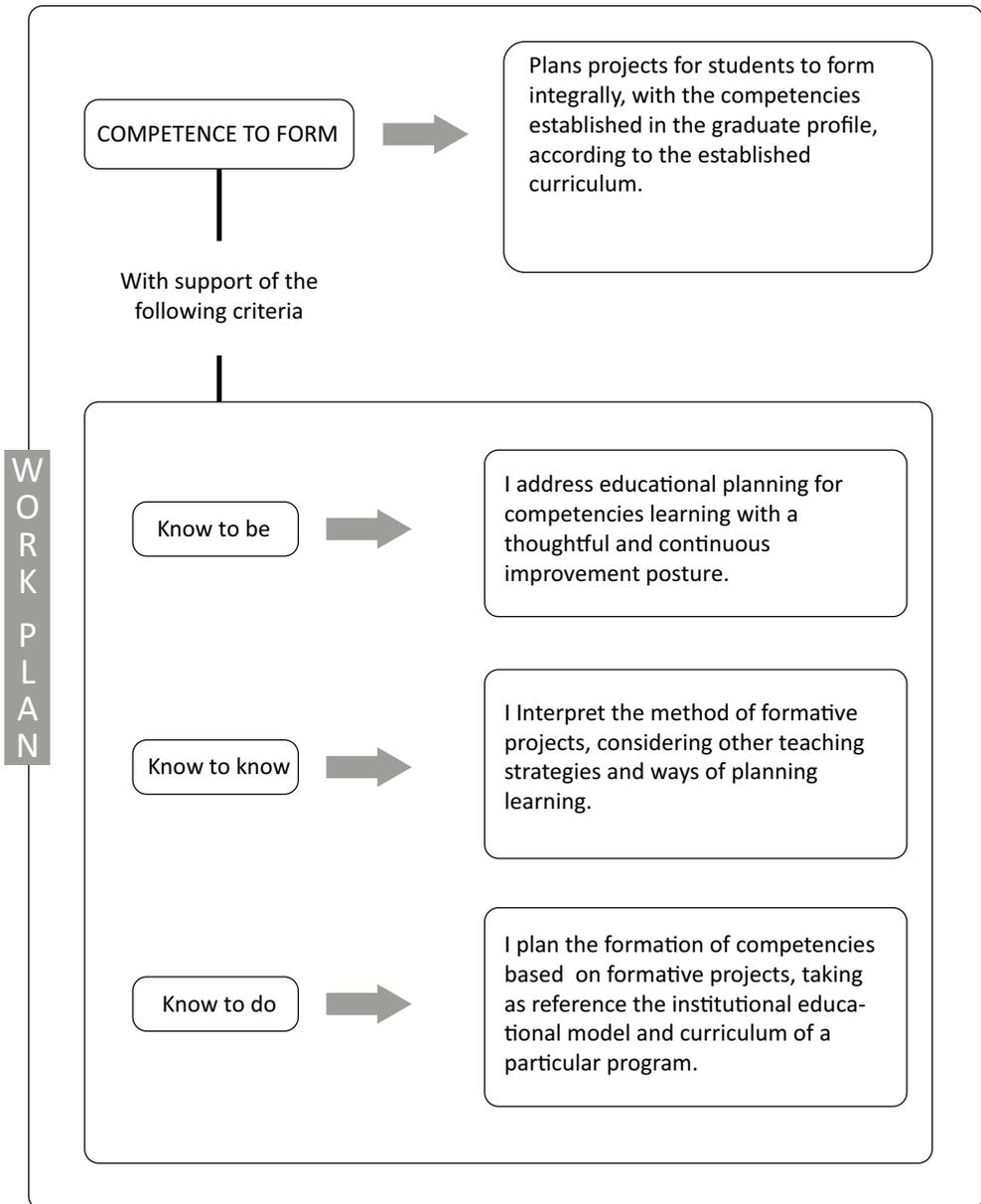
7. Finally, we invite you to share with other people the products of the various proposed activities, so that can know the points of view of your colleagues and receive feedback from them on your contributions.

Chapter five

Formative projects: general methodology

Existence, as human, cannot be mute, silent, nor nourished by false words, but by true words with which men transform the world. To exist, humanly, is to pronounce the world, is transforming it. The world pronounced, in turn, returns problematized to the subjects that pronounce it, demanding of them a new pronouncement.

Paulo Freire (1980, p. 100).



1. Formative Projects (PF): general concept

Formative Projects (FP) is one of the most complete methods in the process of formation and assessment of competencies. Within this methodology other methodologies can be integrated such as problem-based learning, mapping-based learning, role-play, internships, etc. Below is the general conception of formative projects from socioformation.

The project method has a long history. Its origins are found in the organization of agricultural education in the U.S. and was conceptualized and systematized by Kilpatrick (1918) as a dynamic method to organize teaching activities with real vital meaning for students. This author sees a project as a work plan, integrated and freely chosen, which objective is to perform a set of actions framed in real life that interest both students and teachers, thus arouse enthusiasm about its execution.

The project method, according to Kilpatrick (1918), has the following characteristics: (1) the central purpose of a project is not the verbal information memorized, but the application of reasoning and the search for solutions to realities; (2) the information cannot be learned and transmitted by itself, but is sought in order for students to be able to act and resolve the situation detected in reality; (3) learning takes place in the real-life environment and involves the lives of students; (4) teaching is based on problems, so these are before principles, laws and theories.

Kilpatrick's conceptions were later taken up by educators and have been expanded, resignified and articulated to different pedagogical models and teaching strategies. The formative projects (FP) have its nature in this approach and consist of articulated activities to identify, interpret, argue and solve one or more context problems, in order to promote integral formation and competencies learning in accordance with a specific graduate profile, for which integrates the know to be with the know to do and know to know. For this, FP are based on the general project methodology, but in articulation with the competencies model and the complex thought.

Project work goes beyond the tenets of active learning, in the sense that it is not only to create and solve problems, but also to understand the context and articulate knowledge (Hernández, 1998; Hernández and Ventura, 1992). To understand is to go beyond the information; is, in turn, a cognitive and experiential activity, which allows addressing the depth of reality and feel it; these aspects linked to the flexibility in which human being is given the opportunity to assume different positions, recognize others and share with them their opinions, views, stories and speeches.

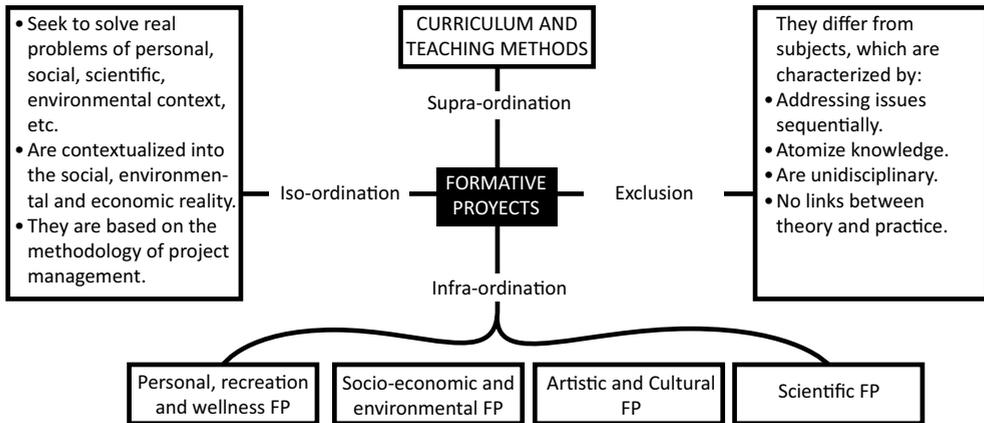


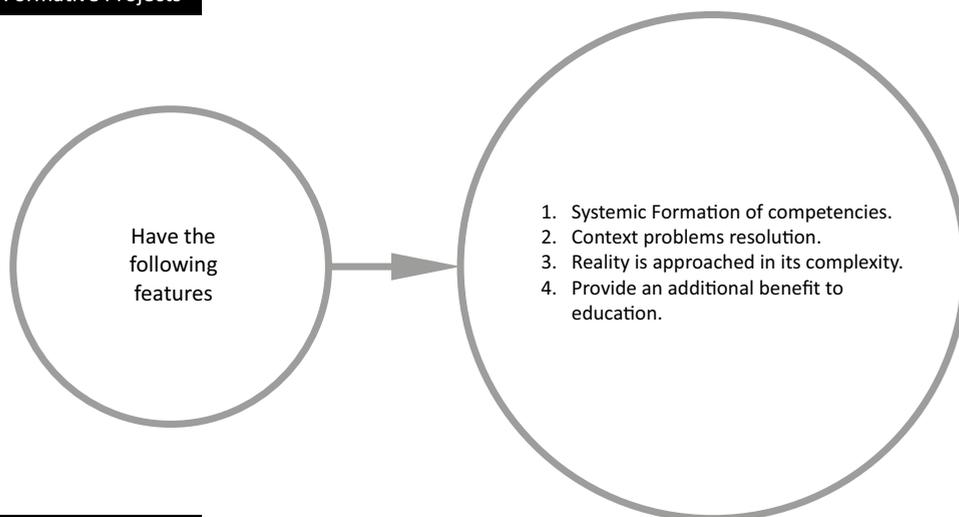
Figure 1. Mentefacto (flowchart) of a formative project

From the complex thought, a FP has an articulated set of strategies they are deployed in time to solve a contextualized problem in a network of constantly changing and organization situations, where there is a continuous assessment that enables the necessary feedback to perform the appropriate adjustments (see Tobón, 2001). The strategies are characterized by being systematic, aimed at obtaining certain flexible, valuable products in a particular cultural context (can be modified in the course of action).

Current research in the field of psychology shows how children at early age begin developing scientific tools to construct knowledge (Puche, 2000). Therefore, education has as one of its fundamental challenges to form the scientific spirit of people from the early grades (Castillo, 2000). In this regard, FP enable the acquisition and consolidation of creativity, imagination, self-esteem and reading ability from preschool to higher education.

FP intend to carry out a systematic formation of the competencies established in the graduate profile of a program, by the integration of the know to do with the know to know and know to be. For this, formative projects address significant problems of reality, which seek to resolve by addressing, planning, implementation and socialization. In this process, is intended that students learn to understand and construct reality as a problematic fabric given by a continuous order-disorder organization, recognizing and coping with uncertainty strategically.

Formative Projects



Ethical Life Project

Creative Entrepreneurship

Figure 2. Characteristics of a formative project

2. General Structure of a Formative Project (FP)

There are multiple ways to structure a FP. A mid-level complexity methodology that is proving successful in education is that presented in Table 1. There the Formative Route (FR) is described by seven articulated and systemically interrelated components, which have as a goal to guide the competencies learning process and assessment process from the resolution of relevant and meaningful context problems.

The seven components are: formal structure of the formative project, project to conduct, description of competencies, approach to activities, elaboration of the assessment process, determination of resources and standards essential to follow. These components have not a linear relationship, but they are interdependent and are set in parallel. Also, the formative route is based on contributions from students for the project to respond to their needs and interests.

Table 1. Description and explanation of each of the components of a formative project (Formative Route)

<p>1. Formal Structure</p>	<ul style="list-style-type: none"> - Title: Indicate the summary of the title of the formative project so that students can understand what will be done. - Program name: indicate the academic program within which the formative project is integrated. In elementary and middle school the grade is added. - Period: the grade, semester, or quarter in which the formative project is performed. - Code: Indicate the code assigned to the course by the administration (if any). - Name of the teacher or teachers: Indicate the name of the teacher or teachers. - Credits: Indicate the number of credits the formative project has been assigned, which should correspond to the nature of the competence or competencies expected to form. If the system does not work with credits, there is no need to include this item. - Previous Competencies: The necessary competencies students should achieve in advance to undertake the formative project. - Hours of direct instruction: the total number of hours in which the teacher will advise the student in a direct way. Includes face-to-face time in the classroom, as well as the hours they spend attending businesses and institutions, participating in chat sessions, online teaching, videoconferencing and audio conferencing. - Hours of independent work: are the corresponding work hours the student devote from his / her own autonomy, without direct mediation from the teacher. - Grading Scale: The grading scale is indicated and the maximum number of points obtainable by students.
<p>2. Competence. or competencies</p>	<p>Describe the competencies or competencies that are expected to be learnt through the project. Sometimes it is useful to distinguish the specific competencies (disciplinary) of the generic competencies (cross-curricular).</p>
<p>3. Context Problem</p>	<ul style="list-style-type: none"> - Addressed problem(s): Describe the problem or problems the formative projects seek to solve or help to solve. Sometimes the project title is similar to the problem formulation. A problem is a situation that occurs when the circumstances do not match with what is desired or expected.

4. Project Activities	<p>The first thing is to identify and describe the criteria that will be addressed in the competencies, which are the learning goals. These criteria are organized according to the phases of the project, and later, for each phase, the learning activities necessary for students to achieve these criteria.</p> <p>Activities should be concatenated together, have a project sequence and consider the different knowledges of the competence or competencies through the criteria.</p> <p>One way of organizing the activities of a general formative project is through four phases:</p> <p>Phase 1. Addressing the Project: the formative route is agreed with students and the necessary criterion that must be taken into account in the project is established.</p> <p>Phase 2. Project Planning: students plan with the teacher a specific project in accordance with the general project of the course.</p> <p>Phase 3. Performance-implementation of the project: students carry out the project with the teacher's mediation.</p> <p>Phase 4. Project socialization - final evaluation: students, with the mediation of teacher, present a comprehensive report of the completed project including its impact.</p> <p>In each phase, it is suggested to organize the activities by activities directly related with the teacher and independent learning activities of students (no direct support from the teacher).</p> <p>Direct learning activities with teachers take into account the hours of synchronous teaching, i.e. online (chat, video chat, online whiteboard, video conferencing and audio conferencing).</p> <p>If the project is very short (two to five sessions), the phases can be:</p> <ul style="list-style-type: none"> - Motivation phase: start, motivation and agreement of the work plan. - Development Phase: the activities take place in an interrelated way according with the motivation conducted. - Completion Phase: completion activities of the process are performed, reporting the achievement of the goals established in the motivation phase <p>Metacognition: concrete suggestions and strategies are provided around how students can improve their performance from reflection before, during and after each activity undertaken in the project.</p>
5. Evaluation process	<p>According to the established criteria, evaluation matrices are planned (rubrics), which should reflect the learning map through which students are to achieve these criteria. In the socio-formative approach we have the following proficiency levels: preformal, receptive, resolving, (also called basic), autonomous and strategic (see chapter eight).</p>

6. Resources and human talent	<p>The resources required for formative and assessment activities are described in the formative project: materials, equipment and infrastructure.</p> <p>It describes in detail the literature and related resources: videos, tapes, multi-media materials and web resources.</p> <p>It is enlisted what kind of people are required to consult within the formative project and the type of support needed (advice, information, validation of instruments, coordination, implementation, implementation of activities, etc.)</p>
7. Work Standards	<p>Major rules that must be met in the formative project are described so that students can achieve the educational goals expected.</p> <p>This is important to ensure a spirit of discipline that facilitates learning.</p>

In planning a FP is important to understand its nature, to clearly guide the whole process. This nature can be determined using Table 2, which should be read from left to right. First, we establish whether the FP has emphasis on some kind of competence or equally addresses the different types of competencies, for which we have the following possibilities: Global FP; FP with emphasis on specific competencies and FP with emphasis on generic competencies. For example, when a FP addresses equally generic competencies of teamwork and communication, and specific competencies of physics and mathematics, we say it is a global FP; when the FP emphasizes on the competence of problem solving based on physics in secondary education, is a project focused on the specific, while a FP centered on teamwork tends to be more generic. However, although a FP has an emphasis, it may address one or several competencies of other type.

Once the focus of the project is determined, the next step is to address its relationship with disciplinarity and set whether to work the FP from a single subject, or area (disciplinary project), or if it will be addressed in the context of a relationship of several subjects, areas or disciplines. The latter may be from the multi-disciplinary (multidisciplinary project), the inter-disciplinary (interdisciplinary project) and transdisciplinary (transdisciplinary project).

Then, we analyze whether the FP can have a wider application or investigational character. A FP focuses more on the application when it seeks to apply knowledge in solving practical problems. Instead, it focuses more on research when its purpose is to generate theoretical and / or methodological knowledge.

It is also important to analyze what context or contexts the project targets. Here are many possibilities. A FP can be directed toward the person, family, the community, the labor-professional world, organizations, art, sports, recreation, etc.

For example, to analyze the nature of a FP related to the formation of the competence of software design, we go first to column number 1 and identify what general class of FP it belongs to. Software design is a competence relevant to professionals working in the area of computer sciences, which means is specific and therefore the FP tends to be specific. However, in this FP the competence of entrepreneurship will be addressed in a complementary manner. Then, we go to column number 2 and we determine its relation to the disciplinarity. Since this FP relates to multiple disciplinary areas (it is planned to program software for education, sales and accounting) without cooperation (interdisciplinary) or integration (transdisciplinarity), we classify it as multidisciplinary. Then we go to the third column and we determine if it is a project that emphasizes application or research. Because the software design course will focus on the use of tools already developed in the field, its approach is basically application and not research. After this, we review column 4, related to the sector in which it is intended to impact the FP. In this case, the FP of software design is aimed at the business because it seeks to improve the information processing in a particular company or organization. Consistent with this, the type of FP to carry out is a "FP with emphasis on the specific, multidisciplinary in character, with an approach to application and in the scope of business. "

Table 2. Analysis of the nature of formative projects

1. General class of a formative project	2. Relationship with disciplinarity	2. Relationship with disciplinarity	2. Relationship with disciplinarity
<ul style="list-style-type: none"> -Generic FP (Emphasize in one or various competences basic - generic). -Specific FP (Emphasize in one or various specific competences). -Global FP (address equally specific and generic competencies). 	<ul style="list-style-type: none"> -Disciplinary (from a single discipline). -Multidisciplinary (of two or more disciplines). -Interdisciplinary (cooperation between two or more disciplines). -Transdisciplinary (Coherent and logic integration of two or more disciplines). 	<ul style="list-style-type: none"> -Applied (the concepts, theories and methodologies of a field of knowledge are applied towards the resolution of a problem). -Research (new knowledge is produced). 	<ul style="list-style-type: none"> -Individual (addresses the individual being). -Family (environment and family relationships). -Community (impacts problems of the community). -Work Labor-professional (Impacts the labor-professional area). -Organizational (impacts a particular organization, social or business). -Art (music, visual arts, performing arts, etc.) -Recreation and Sports (Various possibilities to recreate and practice sports).

3. Conducting a formative project step by step with students

Below are suggestions as to how to approach a FP with students, seeking competencies learning from the perspective of integral human formation and the ethical life project. It is important that each teacher makes the adjustments that considers relevant, to what is proposed here.

Basically, the experiences carried out in this area show that often it is important to consider the following minimum phases in a formative project:

1. Orientation
2. Planning
3. Performance-execution
4. Socialization

Phase 1. Orienting the formative project

Is to agree with the students the path of the formative project to be carried out (formative route) (see Table 1). To do this the teacher or teachers must present the competence or competencies expected to be learned and / or strengthen, and the time for the learning process, according to the given curriculum. Contributions from students around the formative route, as well as related to other FP phases, can occur in five levels of participation, which are described in Figure 3. Thus, in pre-formal and receptive levels students make a little contribution to the formative route, while at the strategic level, practically the students propose the entire formative route, with very general advice from the teacher or teachers working the FP.

In this first phase, it should be clear for students the competence or competencies that will form and the project to be undertaken as well as the evaluation process. Also, students should have an understanding of the context or contexts in which they will be formed (disciplinary context, interdisciplinary context, transdisciplinary context, institutional context, social context and economic context). Finally, this phase is the ideal place to start facilitating the encounter, closeness and trust between teachers and students.

Methodology

- Perform a short presentation and integration dynamic of students
- Analyze the context in which the FP is proposed, as well as the competence or competencies that are expected to be formed according to the graduate profile and the curricular map.
- Agree with the students the formative route that will take place according to the expected level of participation (Figure 3), seeking to establish: the project to develop, competence or competencies to be formed, activities (including metacognitive work activities), assessment process, resources and standards that must be met.
- Consider the reflections made in Table 3 regarding the levels of student participation

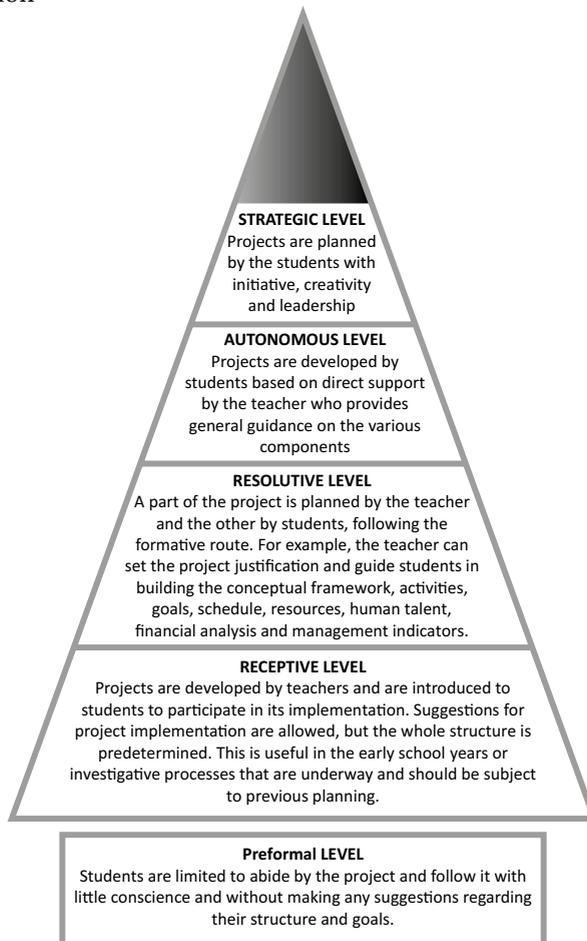


Figure 3. Levels of student participation in the development of the formative project

Table 3. Some thoughts on students' levels of participation in planning a formative project

<p>1. Formal Structure</p>	<p>FP Title. <i>Reflections:</i> -Students may participate in the determination, particularization and / or improving the title of the FP, provided it is not predefined from the curriculum map. -When the title is predetermined from the curriculum map, what students can do is to specify the title of particular projects to carry out within that FP.</p> <p>FP identification data. <i>Reflections:</i> -Generally, the formal data of a FP is established from the curriculum when it is equivalent to subjects or formative spaces in general. -When it comes to more specific FP to perform within a course or module, students themselves can contribute to establish aspects such as the type of project to develop, duration, previous competencies required, etc.</p>
<p>2. Competence or competencies to form</p>	<p><i>Reflections:</i> -In this part, the teacher must establish the competence or competencies that are essential to consider in the FP according to the program's curriculum. -Students can participate suggesting the minimum performance level to obtain, as well as the ability to address other competencies in the FP in a complementary manner.</p>
<p>3. Context problem description</p>	<p>Problem (s) addressed by the FP. <i>Reflections:</i> -The teacher, according to the degree of participation expected from students, should seek to achieve a project that motivates them and takes them to the learning of competencies. -Regarding the project, the teacher may propose one or more general problems and then pinpoint the problem or problems to be addressed with the contributions of students. -At a high-level of participation (strategic), teachers seek to be the students themselves who determine the project and the problem or problems to address in the FP.</p>

<p>4. Project Activities</p>	<p><i>Reflections:</i></p> <ul style="list-style-type: none"> -In this part all five levels of student participation are allowed in establishing activities, from the pre-formal (no student participation) to the strategic level (high participation: students are proponents and lead activities and the teacher only provides general advice). -Regardless of the level of student participation, is important that the teacher plans some general activities before class, consistent with the competencies to be formed, to boost or supplement student participation, if necessary. -Also, the teacher always has as central role searching that the activities necessary for the formation of competencies are generated, and that such activities are relevant to the problem or problems in the FP. <p><i>Reflections on metacognitive practice:</i></p> <p>In this part it is recommended that if students are unfamiliar with metacognitive strategies, give greater prominence to teachers in addressing metacognition, and thus have a level of student participation receptive or resolving; if students have already worked metacognitive strategies, then could be themselves who help plan this component in an autonomous or strategic level. Ideally the group should reach the latter, because this way students learn to plan their metacognition in different areas of life.</p>
<p>5. Assessment process</p>	<p><i>Reflections:</i></p> <ul style="list-style-type: none"> -Unlike what has traditionally happened, when planning the evaluation process in a FP, students play a central role, whether reflecting and becoming aware of the assessment (receptive level); helping to adapt or improve the process and tools (resolving level or basic); developing some assessment tools with teacher support (autonomous level); or actively participating proposing the assessment process and developing themselves the instruments with minimal teacher support (strategic level). -Regardless of the level of student participation, the teacher should seek that the assessment is consistent with the nature of the competence or competencies set, as well as that it is consistent with the project to be addressed. -It is also necessary to integrate the evaluation to the learning activities established in the previous component.
<p>6. Resources and human talent</p>	<p><i>Reflections:</i></p> <ul style="list-style-type: none"> -Resources can be established in any of the five levels of student participation established in Figure 3. E.g., at the strategic level, students propose different resources and then help to manage them to carry out the planned activities, with the general advice of the teacher or teaching team. -In a FP students not only make contributions in determining the most relevant resources for the activities, but also help find and / or develop these resources as part of the learning process itself.

7. Work standards	<p><i>Reflections:</i></p> <p>-At the beginning of all FP is very important to establish clearly the main standards that must be considered in the educational process, so that this helps to have a better working environment and enables errors prevention due to lack of knowledge or commitment.</p> <p>The establishment of the rules can be given in the five levels of participation. In pre-formal level, students follow the rules established by the teacher or another instance without any reflection; in receptive level, students assume the rules proposed by the teacher consciously; in the resolving level, students make suggestions to the rules proposed by the teacher; in the autonomous level, students are the ones who set the rules, based on the direct and continuous support of the teacher; and in strategic level, students propose rules with minimal teacher support, and they themselves suggest strategies to facilitate compliance with these rules.</p>
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Table 4 shows a description of a FP example. This FP has been designed for one semester, it is approached by a teaching team, has an emphasis competence ("application of educational action research") and two complementary competencies ("teamwork and leadership," and "oral and written communication"). Each competence will be evaluated separately. The emphasis competence will be evaluated 100% in this FP, while the teamwork competence will be addressed with a 20% and communicative competence with 10%. The remaining percentages of evaluating these last two competencies are part of other formative projects in the program.

In the example, we can see how the project activities relate to the competence's criteria and this is essential to effectively address the competencies and to achieve an impact in their formation. Sometimes, it happens that in a formative space, competencies are established but then the activities focus on topics not clearly related to those competencies.

It can also be verified in the example of Table 4 the assessment process is based on the criteria, then the performance levels are described in which students can achieve these criteria. This is a learning map for each criterion, from the most elementary to the most complex, which guides students around the challenges to achieve in the formative process.

In some performance levels the word "essential" appears, which means all students must be at least at that performance level in the respective criteria to accredit the formative project, regardless of the total percentage obtained. For example, if a student earns 90% but did not reach a criterion to the performance level established as "essential", the student must carry out a reinforcement activity until he / she get that achievement; Otherwise, can not academically accredit the formative project.

To ensure greater relevance of formative activities with competencies, it is recommended that criteria be established at the time of carrying out the development of the FP as such, and not before.

Another aspect to note is that the example of Table 4 is planned by students participation in an autonomous level (Figure 3), and this is an improvement on the traditional approach in which the most common was the teacher planned the project and students were engaged only to carry out whatever was proposed. In FP, however, students have a central role in planning the activities, so that they consider their interests.

The planning of a FP is done with the participation of students, following each of the components described in Table 1. To do this, the teacher must be dynamic, in order to facilitate the students showing curiosity, interest and sense of challenge for the project.

Based on the participatory construction of the formative route, the frame is developed, which is the agreement of the core work rules with students. This is an essential aspect to ensure an active participation from them and create conditions to facilitate the work.

Methodology:

- Identify the main rules that must be taken into account in the learning process, according to the activities to be performed in the FP.
- Accord respect for the basic rules of coexistence and academic work, such as: taking turns, cooperating with peers, perform assigned activities, respect the opinion of others, respect collective habits, etc.
- Write the agreed rules, fix them in a visible place in the classroom and seek that each student has them as reference.

Table 4. Example of a formative project planned with students

1. FORMAL STRUCTURE			
Career: BA in education			
Title of the formative project "Improvement and innovation of teaching practices based in educational action research."			
Semester	Code	Credits	Prior competencies required
			Time
Semester 6	E2324	Credits (Colombian model) 6 (288 hours) 1 credit = 48 hours ECTS credits: 12 (300 hours) 1 credit = 25 hours	<p>Direct learning time with teachers</p> <p>Student's Independent and autonomous work time</p>
		- Curriculum management competence (receptive level). - Learning mediation competence (receptive level).	96 hours (Colombia credits model) 192 hours (Colombia Credits Model)
Nature of the formative project: is specific, with emphasis on inter-disciplinary, research and the educational context. Authors: Dr. Carlos Valencia López Ochoa and Dr. Patricia Carmona.			
2. COMPETENCIES THAT ARE INTENDED TO FORM			
Generic competence of emphasis:		The following criteria are considered:	
1. Educational action research Applies educational action research to transform teaching practices, considering the cumulative knowledge, collaborative work and ethical commitment.		<ol style="list-style-type: none"> 1. Understand the criteria of educational action research according to the referents of the area. 2. Build a theoretical framework to guide the process of transformation of teaching practices according to educational action research. 3. Plan an educational action research project according to certain goals. 4. Carry out the process of educational action research proactively and strategically addressing the difficulties encountered. 5. Act ethically in all stages of educational action research according to the code of research ethics. 6. Socialize the results of educational action research through different strategies (lectures, videos, articles, books, etc.), presenting the problem, methodology, results and conclusions reached. 	
2. Teamwork and leadership Performs collaborative activities and leads projects to achieve a particular goal, with planning and well-defined objectives, in different contexts and with ethical commitment.		<p>The following criteria will be considered:</p> <p>2.3 Participate in joint activities as part of a team, with acceptance of the differences and assertive communication, according to certain objectives.</p> <p>Weighting: 20%</p>	

<p>3. Oral and written communication</p> <p>Use oral and written language to communicate with understanding in various social and cultural contexts, using different codes and tools, within the framework of a metacognitive process.</p>	<p>The following criteria will be considered: 3.1 I write reports in which I analyze processes and situations of life consistent with syntactic and semantic rules of the language. Weighting: 10%.</p>
<p>Expected performance level: it is intended that students build the emphasis competence of the formative project at least to the autonomous level. It is the responsibility of students to continue strengthening their formation to the strategic level.</p>	
<p>3. CONTEXT PROBLEM</p>	
<p>Problem the FP seeks to address:</p> <p>More than half of teachers from different educational levels continue using practices not relevant to current and future challenges in society. Reforms are not implemented in the classroom and in society. That is why the question arises: How to generate changes in educational practices based on educational action research among teachers?</p> <p>Key aspects of the project:</p> <ul style="list-style-type: none"> - Select an educational setting (can be an educational institution, a household, a business or a community organization). - Establish a project to improve learning or innovate learning in the selected environment. - Implement improvements or educational innovation in the environment and assess the impact, through the implementation of educational action research. 	
<p>4. PROJECT ACTIVITIES</p>	
<p>PHASE I. Orientation</p>	
<p>Learning activities with the teacher.</p>	<p>Autonomous and Independent learning Activities by students.</p> <p>EVALUATION STRUCTURE</p>

<p>1. Understand the essential competencies to be addressed in the formative project and, based on this, agree to the project activities that will be carried out and the rules that must be met. This will be done through a group meeting of students themselves with continuous support of the teacher, which is equivalent to the autonomous level of participation (see Figure 3).</p> <p>2. Learn to apply the metacognitive technique of the self verbalizations before, during and at the end of each of the activities to be performed in the formative project. For this, the teacher makes a simulation and then will seek that students perform the strategy in a particular case.</p> <p>3. Form teams of five members to mutually support each other in the development, implementation and socialization of the research project. The teacher will guide the integration of the groups.</p> <p>4. Understand and appropriate the essential criteria to consider in an Educational Action Research project (IAE) through an example in video and the development of individual mental mapping and by team, considering the analysis of previous knowledges. To do this, the teacher will seek that students learn to work with mind maps.</p> <p>5. Determine the theoretical framework of reference in the Educational Action Research project and the way is prepared, based on the teacher's explanation and the analysis of an example.</p> <p>6. Share on class the project to be carried out and its theoretical framework through an explained mind map. The evaluation by the teacher will be based on this socialization and the analysis of the entire document containing the theoretical framework.</p>	<p>1. Read the agreed program for the formative project and understand the activities to be carried out.</p> <p>2. Determine the project to be carried out during the semester from the Educational Action Research. This is done individually, but should be co-assessed in each of the formed teams and submit the pertinent report on the face-to-face class.</p> <p>3. Build the theoretical framework of reference for the project to be carried out by inquiry in at least a book and an article. This will be based in a working guide given by the teacher. As this is done, students should practice the strategy of the self-verbalization and record the process and results in the format delivered by the teacher.</p> <p>4. Consider in the construction of the theoretical framework of reference at least one academic article in a different language on the issue addressed. This should be evident in a direct or not textual quote.</p> <p>5. Prepare a mind map of the project and the theoretical framework of reference to be presented in class.</p>	<p>1. Read the agreed program for the formative project and understand the activities to be carried out.</p> <p>2. Determine the project to be carried out during the semester from the Educational Action Research. This is done individually, but should be co-assessed in each of the formed teams and submit the pertinent report on the face-to-face class.</p> <p>3. Build the theoretical framework of reference for the project to be carried out by inquiry in at least a book and an article. This will be based in a working guide given by the teacher. As this is done, students should practice the strategy of the self-verbalization and record the process and results in the format delivered by the teacher.</p> <p>4. Consider in the construction of the theoretical framework of reference at least one academic article in a different language on the issue addressed. This should be evident in a direct or not textual quote.</p> <p>5. Prepare a mind map of the project and the theoretical framework of reference to be presented in class.</p>	<p>1. Read the agreed program for the formative project and understand the activities to be carried out.</p> <p>2. Determine the project to be carried out during the semester from the Educational Action Research. This is done individually, but should be co-assessed in each of the formed teams and submit the pertinent report on the face-to-face class.</p> <p>3. Build the theoretical framework of reference for the project to be carried out by inquiry in at least a book and an article. This will be based in a working guide given by the teacher. As this is done, students should practice the strategy of the self-verbalization and record the process and results in the format delivered by the teacher.</p> <p>4. Consider in the construction of the theoretical framework of reference at least one academic article in a different language on the issue addressed. This should be evident in a direct or not textual quote.</p> <p>5. Prepare a mind map of the project and the theoretical framework of reference to be presented in class.</p>	<p>1. Read the agreed program for the formative project and understand the activities to be carried out.</p> <p>2. Determine the project to be carried out during the semester from the Educational Action Research. This is done individually, but should be co-assessed in each of the formed teams and submit the pertinent report on the face-to-face class.</p> <p>3. Build the theoretical framework of reference for the project to be carried out by inquiry in at least a book and an article. This will be based in a working guide given by the teacher. As this is done, students should practice the strategy of the self-verbalization and record the process and results in the format delivered by the teacher.</p> <p>4. Consider in the construction of the theoretical framework of reference at least one academic article in a different language on the issue addressed. This should be evident in a direct or not textual quote.</p> <p>5. Prepare a mind map of the project and the theoretical framework of reference to be presented in class.</p>	<p>1. Read the agreed program for the formative project and understand the activities to be carried out.</p> <p>2. Determine the project to be carried out during the semester from the Educational Action Research. This is done individually, but should be co-assessed in each of the formed teams and submit the pertinent report on the face-to-face class.</p> <p>3. Build the theoretical framework of reference for the project to be carried out by inquiry in at least a book and an article. This will be based in a working guide given by the teacher. As this is done, students should practice the strategy of the self-verbalization and record the process and results in the format delivered by the teacher.</p> <p>4. Consider in the construction of the theoretical framework of reference at least one academic article in a different language on the issue addressed. This should be evident in a direct or not textual quote.</p> <p>5. Prepare a mind map of the project and the theoretical framework of reference to be presented in class.</p>
<p>Criterion 1.1. Understand the criteria of educational action research according to the referents in the area.</p> <p>Evidence: Mind Map explained.</p> <p>Weighting: 5%</p>	<p>Preformal</p> <p>Identify two criteria of educational action research.</p> <p>1%</p>	<p>Receptive</p> <p>Identify 3 to 4 criteria of educational action research.</p> <p>2%</p>	<p>Resolutive</p> <p>Identify 5 to 7 criteria of educational action research.</p> <p>3%</p>	<p>Autonomous</p> <p>Identify between 2 and 5 criteria of educational action research in my own words.</p> <p>4%</p>	<p>Strategic</p> <p>Explain 6 or more criteria of educational action research in my own words. Support with examples each criterion.</p> <p>5%</p>
<p>Criterion 1.2. I build a theoretical framework of reference to guide the process of transformation of teaching practices in line with educational action research.</p> <p>Evidence: document with the theoretical framework of reference for the project.</p> <p>Weighting: 10%</p>	<p>Preformal</p> <p>I submit an unorganized text, without elaboration. Everything is almost literal. There is no consistency with the project to be carried out.</p>	<p>Receptive</p> <p>Present a theoretical framework of reference organized in its parts, but is not relevant to the project to be carried out.</p>	<p>Resolutive</p> <p>Present a theoretical framework of reference relevant to the project to be carried out, supported in references from literature. Essential.</p>	<p>Autonomous</p> <p>Present a theoretical framework of reference following determined rules of writing style. The argument of the contents is understandable. I used as a base a document in a language other than English.</p>	<p>Strategic</p> <p>I present a theoretical framework of reference with personal contributions in the interpretation, argumentation and organization of the information. For example, I have created or adapted schemes and graphs to present the information.</p> <p>There are less than five spelling errors and the references used are of high relevance.</p>

Time: 24 hours teaching time:	Time: 40 hours independent work.	1%	2%	6%	9%	10%
PHASE 2. Project Planning						
Learning activities with the teacher.	Autonomous and independent learning activities by the students.	EVALUATION STRUCTURE				
<p>1. Present in class the personal experiences regarding the project planning. From this, identify learnings to take into account during the planning of the Educational Action Research Project that will be carried out.</p> <p>2. Observe and analyze an example of an Educational Action Research project and compare it with an example of research performed under a different methodology. The teacher will present the two samples using slides and then students will present their analysis.</p> <p>3. Identify the essential components of the Educational Action Research project by submitting mental maps elaborated on independent study time from the document "Educational action research and the formation of competencies." This will be complemented with the case analysis by teams. The teacher will assess teamwork and keep a record of this for evaluation.</p> <p>4. Determine how to plan an Educational Action Research project based on teacher's guidance. In independent work, students will plan in detail the project, following a guide.</p> <p>5. Present during face-to-face class a synthesis of the project planned through an executive summary. The teacher will advise students about how to prepare the summary.</p> <p>6. The evaluation in this phase will be based on the record of teamwork and the analysis of the projects planned by the students, with their respective support in class.</p>	<p>1. Read the document "Communicative action research and competencies formation" and develop a mind map. Share this mental map during the face-to-face class.</p> <p>2. Plan an Action-Research Project according to certain goals, considering an educational context (school, company, social organization, family, etc.).</p> <p>3. Establish in the project what ethical standards will be followed, according to the qualitative research ethics.</p> <p>4. Share in teams the planned projects and perform a co-assessment of each project from the evaluation matrix of this phase.</p> <p>5. Each team must prepare a report of the co-assessment process and bring it to the face to face class to be shared.</p>	<p>5%</p>	<p>10%</p>	<p>22%</p>	<p>28%</p>	<p>30%</p>
		<p>Preformal</p> <p>I plan some aspects of a research project but do not consider educational action-research.</p>	<p>Receptive</p> <p>I plan some aspects of educational action-research.</p>	<p>Resolutive</p> <p>I plan one educational action-research project with a methodology that is relevant and complete. Essential</p>	<p>Autonomous</p> <p>I clearly plan The methodology of action-research.</p>	<p>Strategic</p> <p>I plan an educational action-research project with relevant tools for the information analysis.</p>
	<p>Further Competence: teamwork and leadership: Criterion 2.3: I participate in joint activities in a particular team, with acceptance of differences and assertive communication, according to certain objectives.</p> <p>Evidence: record of teamwork during the co-assessment of project implementation.</p> <p>Weighing: 20% for the generic competence in the major.</p>					
		<p>Preformal</p> <p>I meet with a team but I make no contribution.</p>	<p>Receptive</p> <p>I meet with a team and share my work.</p>	<p>Resolutive</p> <p>I meet with a team, share my work, receive feedback and take it into account to improve.</p>	<p>Autonomous</p> <p>I meet with a team, I share my work, I improve my work with the contributions of my peers and provide feedback to my teammates.</p>	<p>Strategic</p> <p>I meet as a team and provide feedback through assertive communication, respecting the opinions of others.</p>

Time: 30 hours working with the teacher.	Time: 56 hours of independent work.	0%	5%	10%	16%	20%
PHASE 3. Performance - project implementation						
Learning activities with the teacher.						
Autonomous and independent learning activities by the students.						
<p>1. Read the document "Educational Action-Research as an experience of pedagogical transformation" and develop a mind map with a written support. This should be done during face-to-face class.</p> <p>2. Implement the Educational Action-Research project planned in Phase 2, addressing proactively and strategically the difficulties encountered in the process. Do any adjustments deemed necessary according to the expected results.</p> <p>3. Systematize the information provided by the project under a given method, according to the objectives and methodology of the project itself.</p> <p>4. Perform an ethical reflection before, during and after execution of each activity of the project. Record this in the personal journal, which you must submit to the teacher as an evaluation activity.</p> <p>5. Co-assess as a team the process of implementation of the Educational Action-Research and record the process to be socialized in class with the teacher.</p>						
<p>1. Present positive learning experiences around the implementation of projects and activities throughout life. Analyze the following question: Why is it that sometimes projects are not completely implemented?</p> <p>2. Analyze several cases of Educational Action Research projects in practice, to identify successes and errors that present, and prevent this during the implementation of own Educational-Action Research project. Case analysis will be done through videos illustrating experiences in this area.</p> <p>3. Exhibit on class the concept map of the text "Educational Action-Research as an experience of pedagogical transformation" carried out during independent study time. From this, teacher will deepen in some aspects to consider during the implementation of students' projects.</p> <p>4. Clearly identify how to carry out the Educational Action-Research project through a general guidance of the teacher. Lay down how to perform the co-assessment inside the work teams.</p> <p>5. Socialize achievements and difficulties in the process of implementation of the Educational Action-Research project and receive advice from the teacher and peers to be more successful.</p> <p>6. The teacher's evaluation will be based on the record of the implementation of the projects by students, keeping in mind the reflection about ethical behavior during the process.</p>	<p>1.4. I carry out the process of educational action-research addressing the difficulties that arise proactively and strategically.</p> <p>Evidence: report of the implementation process of Educational Action-Research project step by step.</p> <p>Weighing: 20%</p>	<p>Preformal</p> <p>I occasionally carry out an activity of information inquiry and register it.</p>	<p>Receptive</p> <p>I carry out some activities without a systemic approach.</p>	<p>Resolutive</p> <p>I carry out some tasks from the project with pertinence. I systematize coherently Essential.</p>	<p>Autonomous</p> <p>I carry out most of the activities in the project with pertinence.</p>	<p>Strategic</p> <p>I carry out activities with proactivity and perseverance. I face the problems and this helps to improve the project.</p>
<p>1.5 I act ethically in all stages of the educational action research process according to the code of ethics in research.</p> <p>Evidence: record of performance and analysis of life history.</p> <p>Weighing: 20%</p>	<p>Preformal</p> <p>I do not violate ethics in research, but I have no awareness of it.</p>	<p>Receptive</p> <p>I meet the standards established in the code of ethics for research. I am aware of some of the standards in the code of ethics.</p>	<p>Resolutive</p> <p>I comply with awareness with the standards set in the code of ethics of research, in the education field. Essential</p>	<p>Autonomous</p> <p>I act on research following social values and the code of ethics in research. I reflect and correct errors.</p>	<p>Strategic</p> <p>I establish strategies to assure following ethics in research. I prevent potential errors. I act based on universal values.</p>	

Time: 18 hours of work with the teacher.	Time: 50 hours of independent work.	1%	4%	10%	14%	20%
PHASE 4. Project Socialization						
Learning activities with the teacher.	Autonomous and independent learning activities by students.	EVALUATION STRUCTURE				
<p>1. Present in class, with the teacher, positive experiences and learnings achieved around the socialization of some project or activity performed throughout life. Analyze the following question: Why is sometimes hard to finish projects and socialize them?</p> <p>2. Analyze various video examples on the preparation of the final report and the socialization of Education Action-Research projects. This is important for students to be familiar with the process and this is carried out effectively in practice.</p> <p>3. Analyze in teams the criteria to follow in preparing the final report of the Education Action-Research project executed and the criteria for the socialization process. For this, the teacher shared with students some Education Action-Research final project reports.</p> <p>4. Present a summary of the Education Action-Research project conducted during the course, based on a mental map. The time set for the presentation is 10 minutes. There will be a co-assessment by a jury of three students, who will rotate. Furthermore, teachers will use the presentation as a complement for the evaluation of the socialization process of each student.</p>	<p>1. Prepare the final report (a written document) of the Education Action-Research carried out, indicating the planning, execution and results.</p> <p>2. Share with teammates the research report, to receive feedback about how to improve it before submitting to the teacher, in class and presenting to the whole group. From this, there will be a final assessment.</p> <p>3. Read the document "How to make an effective presentation.". This document should be considered in the preparation of the presentation of the final report of the project in class time.</p> <p>4. Prepare the class presentation of the final project conducted. It is important to show some pictures and testimonials of students with whom the project was implemented.</p>	<p>Preformal</p> <p>I socialize an aspect of the performed research but without relevance.</p>	<p>Receptive</p> <p>I socialize the results on a very general way. I express the addressed problem with clarity.</p>	<p>Resolutive</p> <p>I socialize the process and results through a written report. The performed research is understood with clarity as well as its benefits.</p>	<p>Autonomous</p> <p>I socialize the research through an article or presentation in a blog or general web page. The writing follows style guidelines.</p>	<p>Strategic</p> <p>I socialize the research as an article in an academic magazine, on paper or digital, that has writing rules. It is not necessary that the magazine be indexed.</p>
		1%	5%	12%	14%	15%
<p>Additional Competence: oral and written communication</p> <p>Criterion 3.1.1 write reports that analyze processes and life situations, consistent with syntactic and semantic rules of the language.</p> <p>Evidence: final report of the research project.</p> <p>Weighting: 10% for the generic competence throughout the career.</p>						

		Preformal	Receptive	Resolutive	Autonomous	Strategic
		I socialize an aspect of the research performed without relevance.	I write a text with a clear message.	I write a text consistent in its three parts: introduction, developments and conclusions. I am punctual delivering the text report.	I socialize the research through an article or presentation in a blog or general web page. The writing follows style guidelines.	I write a text with high clarity in all the ideas and has less than three spelling or style errors.
Time: 24 hours of work with the teacher	Time: 46 hours of independent work	0%	4%	7%	9%	10%
6. RESOURCES						
Resources: - Access to a computer. - Printer. - Internet access. - Videos of educational action-research application cases, about transforming teaching practices. - Fernández J. (2001). Guía de trabajo con mapas mentales. Medellín: CIFE. - Tobón, S. (2009). La investigación acción educativa y la formación de competencias. Medellín: CIFE. - López, D. (2002). La investigación acción educativa como experiencia de transformación pedagógica. Madrid: CIFE. - Posada, I. (2008). Cómo hacer una presentación efectiva. Mexico: Póiesis. - García Fraile, J.A., and Tobón, S. (2009). Estrategias didácticas para formar competencias. Lima: AB Representaciones Generales.						
Human talent required: Consult at least one teacher with experience in the project that will be carried out, to receive feedback to better planning and execution.						
7. AGREEMENT OF RULES						
- Attend a compulsory session of methodological explanation, as well as socialization activities of progress and final project report. - Presenting the progress of all phases is compulsory to accredit the competencies of the formative project. - Respect turns to speak in the group sessions. - Respect the opinions of others. - Work together with tolerance and proactivity. - Bring the progress of each phase of the project to the teamwork sessions. - At minimum, it should be at least one session of teamwork in every phase in which members must present their progress and achievements in the action project and receive peer feedback to improve.						

Phase 2. Planning the project to be carried out.

Once progress has been made in the process of orientation, the class moves to the project planning with the participation of students, according to the established in Figure 3 and Table 3.

The design of the project can be done considering the following components: diagnosis and problem definition, objectives, rationale, location, conceptual basis, activities, schedule, required human talent, necessary resources, beneficiaries, goals and performance indicators (see Table 5). These are the most common aspects of a project. Each teacher can decide whether to follow all the elements described or remove some of them based on the specific purposes and the prior learning of students.

Methodology:

1. Review Figure 3 and determine what level of participation students will have in the design of the specific project. For that, you must take into account the components of a project established in Table 5 (some or all).
 - At the pre-formal level of participation, students develop the project the teacher asks them to perform, without any suggestion as to the activities.
 - At the level of responsive participation, teachers also plan the project, but, unlike the previous level, looking for students to provide suggestions on the best way to carry out the activities.
 - At the resolving, autonomous and strategic levels of participation, the students themselves make project design, with advice from the teacher, which decreases as the performance level increases.
2. Orient the development of the project so that this activity contributes to form certain knowledge or the competence or competencies involved.
3. Look for the activities contained in the project design to help forming the competence of emphasis and additional competencies, considering their criteria.

Table 5. List of project components

Component	Description	Methodology	Recommendations
Name of the project	Identifies the project.	Please enter the project title having the general objective as a	-Look for the name to be synthetic and clear. -Do not exceed, if possible, fifteen words.
Diagnosis	It is the determination of favorable and unfavorable aspects in a situation.	Based on the formulated Problem in the Formative Route, collect information to determine different difficulties inherent to this and the positive factors by which can be addressed.	Use the SWOT analysis for diagnosis. To do so identify the strengths (positives aspects within the situation), opportunities (positive aspects external to the situation that favors it), weaknesses (Negative aspects within the situation) and threats (external negative aspects that cause or aggravate problems).
Problem	Is the specific difficulty that we want to solve.	Retake the problem formulated on the formative route and adapt it to the context analysis and students' interests.	-Look for clarity and conciseness in the problem. -Take into account the time, resources and human talent available.
Justification	Answer the question: why is this project going to be carried out?	Determine the importance of the project regarding the solution to the identified problem and the proposed competencies development included in the formative route.	-State the justification with clarity. -Describe one by one the arguments. -Present, if possible, statistical information to support the arguments.
General goal	It aims to describe the project's objective at its broadest sense, that is, the what for. Specifies the change intended.	Describe the goal in such a way that involves the solution to the presented problem.	-Look for the goal to be achievable with the resources, human talent and time available. Describe the goal starting with a verb in infinitive, then indicate the object and the means to be employed.
Goals	Are concrete aspects that are expected to achieve in the project.	Determine what goals are expected to achieve with the project, considering the competencies formation and resolution of the problem.	- Describe each goal with precision and clarity, in a concise way. - If possible indicate quantities expected.

Location	Indicates the physical place where the project is going to be applied.	Describe all the spaces that will be employed in the implementation of the project, taking as reference the diagnosis.	-Describe the physical place clearly and concisely. -Write down important information. -If possible, attach a map of the place.
Conceptual Framework	Consists of the description of theories, categories, concepts and principles allowing to understand the problem, methodology and expected results.	-Determine what is needed to know to understand the problem, methodology and goals. -Find bibliographic sources and acquire the information required.	-Create a map which synthesizes all required knowledge. -Use different resources to find the information: books, magazines, Internet and databases. -Use concept maps.
Activities	They are specific actions Concatenated in order to achieve the goals.	For each goal, describe one or more activities. -For each activity establish procedures, resources and responsible parties. -Look for each activity in the project to contribute to form the contents of know to be, know to know and know to do.	-Check that for each goal there are the necessary activities to achieve them. -Look for the activities to be feasible to be carried out with the time and resources available.
Timeline	Describes when will be performed each of the activities and its length.	- Make a sequencing of the activities in accordance with the order in which they will be carried out. - Indicate to what date approximately they should be made and how long will they last. - Distribute time based on a measurement unit. If the project lasts several months, the measurement unit can be by weeks; if it lasts one month the unit of measurement may be days, etc.	- Use a Gantt Chart - Address the activities linked to each other, as a system. - Look for information on times in which can require certain institutional and community resources, in order to take this into account in the timeline.

Recipients or beneficiaries	They are all those people whom will benefit of the project directly or indirectly.	Determine direct recipients (students will work directly with them) and indirect (will obtain benefits from the direct recipients).	<ul style="list-style-type: none"> - Quantify the direct and indirect beneficiaries. - Sometimes it is difficult to determine the number of indirect users, therefore must be done an approximation.
Human talent	They are the people required to coordinate or perform all the predicted activities.	Review each activity and determine the necessary people, the role they will play, their competencies and necessary time. The teacher and students should be included here.	Consider what information and training requires each person involved in the project.
Resources	Are the means with which the project will be performed.	Determine for each activity the resources required, differentiating infrastructure (physical space) materials (stationery, implements and supplies), literature and equipment (computers, printers typewriters, telephone, fax, laboratory equipment, etc.)	<ul style="list-style-type: none"> -Check that for each goal there are the necessary activities to achieve them. -Look for the activities to be feasible to be carried out with the time and resources available.
Indicators	Are the parameters for measuring the achievement of the expected goals.	Describe each indicator and how to evaluate it.	<ul style="list-style-type: none"> - Be specific in formulating indicators. - Take into account qualitative and quantitative indicators. - Develop indicators related to the formation of competencies.

Finally, the project prepared by the teacher and students must meet the following quality criteria:

1. The project design is based on a problem relevant to the competence to be formed according with the formative route (RF) and to the disciplinary, social, labor-professional and environmental-ecological context.
2. The goals are consistent with the stated problem.
3. The methodology enables solving the problem and corresponds to the goals.
4. The conceptual framework corresponds to the problem and goals.

5. The conceptual framework is developed based on relevant and updated literature.
6. The activities are feasible to carry out, in accordance with the time, resources and human talent available.
7. The activities have a logical sequence, indicate the procedure by which they will be implemented, describe the responsible individuals and establish potential start and end dates.
8. The proposed activities allow forming the three knowledges that make the competence or competencies set out in the Formative Route.
9. Qualitative or quantitative indicators are described considering the goals.
10. The goals are based on indicators and relate both to problem resolution, as the formation of competencies proposed in the Formative Route.
11. The project integrates the use of information and communication technologies consistent with the proposed activities.

Phase 3. Project performance-implementation

Is the process by which students, with support and mediation from the teacher, implement the project designed in the previous phase, seeking to achieve the agreed goals, both in relation to competencies development as the problem resolution. All this process is guided by the Formative Route (Table 1).

Methodology:

1. To analyze how the project implementation is developing and detect possible contingencies to be addressed strategically in a timely manner.
2. To articulate actions from the formative project with other projects.
3. To assist students in performing activities for these to contribute forming the essential knowledges (know to be, know to know and know to do) of the competencies of the formative project.
4. To determine the need for people to monitor or assist students in the activities defined for the formative project.

5. To coordinate the use of spaces and institutional resources.
6. To present written instructions for carrying out the activities. This is an important aid for students.
7. To verify that students assume the roles established within the planning document/stage, seeking to match their actions to these roles.
8. To guide students in the search, access and management of the different resources: physical space, equipment, materials, books, contents, etc.
9. To provide personalized support for students who have difficulty in the formation of their competencies or the performance of the activities included in the project.
10. To hold meetings with students to determine how are the activities going, the problem resolution and competencies formation.

Phase 4. Project Socialization

Socialization is the final phase of a formative project and is to present within the group of students and in other contexts (family, community, organization, etc.) the process and the results achieved. It is important, as the project is moving along, to socialize the products, which is essential for implementing improvements in the same formative project.

At the end of the Formative Project, the teacher should develop procedures to determine the achievements and areas for improvement. It is recommended that the assessment of the project be based on three criteria: planning, pedagogical mediation and formation of the competencies proposed (see Table 6).

Table 6. Points to consider in evaluating a formative project

Criteria	Essential questions of the criterion
Implementation of the Formative Project	<p>Was the implementation of the Formative Project aligned with the general methodology proposed in the formative route?</p> <p>Was the design and implementation of the project based on an issue relevant to the disciplinary, social, labor contexts and to the formation of the competence proposed in the formative route?</p> <p>Were basic rules of coexistence and academic work established according to the planned activities and the context?</p> <p>Did the agreed standards allow the execution of activities as planned and facilitated the resolution of problems and conflicts?</p> <p>Were the goals of the project with respect to the problem met?</p>
Pedagogical mediation	<p>Was the student work oriented based on the recognition of their prior knowledge?</p> <p>Did students have advice of teachers in conflict resolution and in addressing challenges based on the nature and requirements of the situation?</p> <p>Were students guided in the use of New Information and Communication Technologies, depending on the resources available at the institution, community and the requirements of the planned activities?</p> <p>Did students have guidance in the management of LSM and the different resources according to the requirements of the activities?</p>
Competencies Formation	<p>Did students strengthen their teamwork competence, according to the planned activities?</p> <p>Did the performed activities allow the formation of the competencies proposed in the formative route?</p> <p>Were the goals met in the formation of the competencies set in the formative route?</p> <p>Did students with difficulties or exceptional talents have the expected achievements match their pace?</p>

4. Facilitation of teamwork

All Formative Project is based on teamwork even if in extreme cases there are only two people (a teacher and a student). Facilitate teamwork is to generate the conditions for students to develop and secure their competencies cooperatively (from their zones of proximal development) and thus can perform articulately the planned activities.

Teamwork can take three forms:

1. Custom Projects: Each student takes a different project. Teamwork happens in group meetings in which participatory workshops are held through analysis and solving problems common to all members. This is complemented by the collective assessment of achievements and difficulties. The problem set in the formative route is tailored for each student according to his or her individual interests.

2. Only one team: all students are organized as a single team in the class to implement the Formative Project. In this case, the problem addressed may be the same as the one indicated in the Formative Route or have variations.
3. Several Teams: Students are grouped into several teams, each of which performs a specific project. The problem management can take two situations: one, all groups address the same problem, and two, each group builds their own problem having as base the problem established in the orientation.

Methodology:

1. Determine the work dynamic establishing roles among members, such as: coordinating role (orients basic agreements and decision making), role of information processing (responsible of the minutes of meetings and systematizes the project) and quality management role (evaluates the performance of the team and makes suggestions to achieve higher quality in meeting the goals). In addition to these roles others can be established if deemed essential.
2. Establish responsibilities for each team member.
3. Set a work plan and meetings schedule based on an agenda.
4. Promote within the team building a shared vision versus what is to be achieved. For this it is essential that each member develops their vision first and then from individual visions structures the collective vision.
5. Find, to the extent possible, that in each team students complement their intelligences and skills.
6. Building guidelines for the analysis and resolution of conflicts peacefully.

5. Assessment of the competencies in a formative project

5.1 Assessment of previous knowledges

Any action aimed at competencies formation is based in previous knowledges, as well as the type of competencies possessed by students and the degree to which they have

been built. Such information is useful in the implementation of the project, as it helps guiding activities. In addition, allow identifying students who require personalized support, either because they have difficulties or have great advances in the development of competencies. This information helps guiding the formation of work teams in which it is essential that students complement each other in attitudes, capacities, abilities and dexterities.

Methodology:

1. Determine previous competencies that students possess. For this it is essential to apply some assessment instrument in accordance with the nature of such previous competencies. This can be complemented with the review of the record or portfolio of each student and with reports from other teachers.
2. Motivating students for starting the Formative Project.
3. Help students to identify strengths and areas for improvement in the formative process, looking for them to have awareness of previous knowledges and gaps in different knowledges (know to do, know to know, and know to be). When there are gaps in previous competencies is important to establish measures to strengthen them within the Formative Project and / or manage actions through other FP.
4. If a student already has one, several or all of the competencies expected to form in the Formative Project, these can be accredited. In this case, the student may continue in the FP seeking higher performance levels, or terminate his / her participation in such Formative Project.

5.2 Overview of the evaluation

In Formative Project, competencies are valued in each of the phases, through the following activities:

1. Design and implementation of an assessment plan based on learning maps.
2. Monitoring student performance in working with the activities and solving problems from a qualitative and quantitative perspective (process indication and weighing of results).
3. Coach the student for self-assessment of his / her learning and self-regulation

(self-assessment) on the basis of the components of the competence.

4. Perform co-assessment (with peers) and hetero-assessment (Evaluation of teachers or other bodies).
5. Continuous student feedback on the formation of competencies.

6. Learning guides

Learning guides are a set of systematic indications provided to students in writing in order to guide them in the fulfillment of specific learning activities, referencing criteria of competencies to form. Below is a methodology proposed for its preparation:

1. Understand the component of the competence students will work with, the necessary activities and the time required, in accordance with the plan formulated in the Formative Project.
2. Designing the learning guide describing each of the components shown in Table 7. This helps students to orient themselves in their learning supporting their autonomy.
3. Develop the guide with students so that they feel part of the process. For this their suggestions should be collected and valued, having as a goal the formation of the competence component and not personal interests of teachers.
4. Apply the guide and conduct ongoing monitoring of the work of students, providing specific recommendations on certain issues.
5. Periodically review the learning guide and make the relevant adjustments based on its use and the suggestions from students themselves.

Table 7. Components of a learning guide.

Component	Description
Identification	Indicates the educational institution, the degree, the name of the Formative Project, the name of the author, the name of the teacher who uses it, the date of preparation and the date of last update (when it has been modified).
Competence (ies)	Competence the guide aims to help forming in students.
Criteria	Clearly describe specific achievements or results expected in the learning process.
Justification	Shows the importance of the competence and activities that will be performed.
Activities	The tasks and actions suggested for students to carry out in order to meet the criteria. It is important to note the teaching model that supports the execution of such activities. Precise instructions for each activity are provided in order to carry them out and achieve the purposes. When it comes to perform procedures is recommended to provide graphics to make them easily understandable.
Contents	Essential knowledge that students should learn is described (Know to be, to know, to do and know to live together). Ideally, these contents are readily available for students.
Resources	All the resources that students should have to perform the activities are indicated with reference to: materials, equipment, infrastructure, etc.
Assessment	Presents: (1) the methodology of the assessment, (2) the moments of the assessment, (3) the assessment criteria, (4) learning evidence and (5) the learning map with performance levels.

7. Learning Support Material (LSM)

The Learning Support Material (LSM) is a resource in which the essential knowledges of the Formative Project are systematized, so they are easily accessible for students and can be used interactively and dynamically (see Table 8). The LSM has multiple benefits for educational institutions, teachers and the students themselves, as described in Figure 4. They are the basis for teaching so that competencies can be formed, since they contain essential knowledge contextualized around problems of context. Therefore, if the model of competencies formation is assumed properly, and teacher and students work from the Formative Project methodology, a LSM must be developed for each of the Formative Projects of the institution, in order to support the teaching and learning task.

Table 8. Components of Learning Support Material (LSM)

Contents of know to be	Affective-motivational tools: values, attitudes and norms.
	Affective-motivational and social strategies.
Contents of know to know	Cognitive tools: notions, propositions, concepts and categories.
	Cognitive and metacognitive strategies.
Contents of know to do	Performance instruments: procedures and techniques.
	Performance strategies.
Specific Guides of the activities	Instructions directed to the student to guide him / her in conducting certain activities.
Self-assessment materials	Questionnaires and tests that aim for the student to determine the level of achievement in the formation of knowledges.
Other	Suggested readings, videos and tapes, among other resources.

Once completed the contents of the LSM, it is recommended to save them in a digital-multimedia device that favors its interactive handling by students. The multimedia content in e-book format allow, unlike the content available on paper or in a word processor:

1. Information navigation in an interactive, fast and timely manner.
2. In-depth understanding of the information by articulating words, pictures, videos and sound.
3. Search and find additional information on the web and in the virtual classroom, according to the theme.
4. Get timely advice from the teacher through online communication.

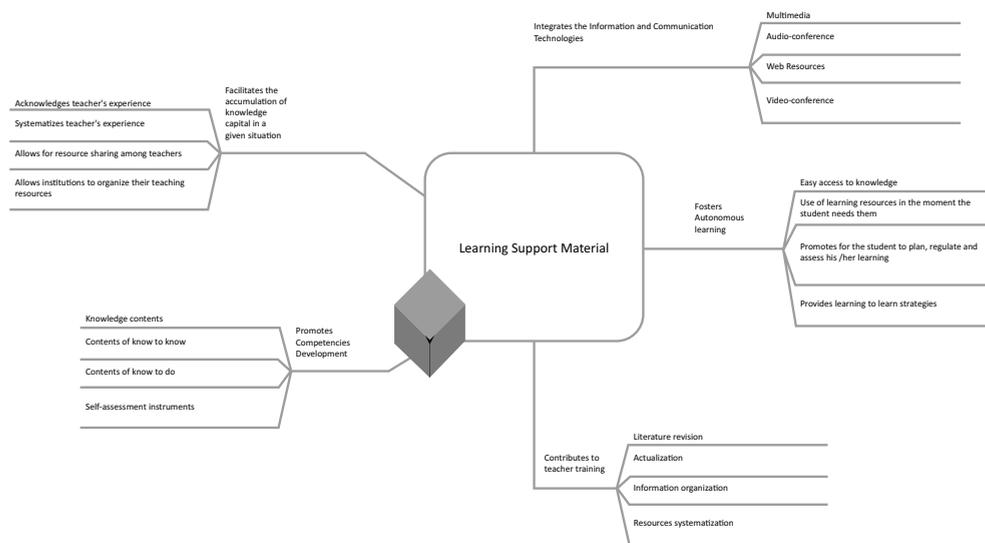


Figure 4. Benefits of Learning Support Material

Table 9. Differences between written information and digital-multimedia information

Written Material	<ul style="list-style-type: none"> - The images are still. - Information is linear. It follows the sequence established by the authors. - No interaction with the information.
Electronic Multimedia material	<ul style="list-style-type: none"> - Uses Information and Communication Technologies (ICTs). - They are not linear. Each person determines how to approach the various contents. - Incorporates multimedia elements: texts, images, sounds, graphics and videos. - Allows for online contact with a virtual classroom or the web. - They enable students to conduct the learning process in a flexible and open manner.

Design methodology of Learning Support Materials

Phase I. Training: is to advise and train teachers in the acquisition and consolidation of the competence of educational materials design by complementing the Information and Communication Technologies (ICTs) and multimedia contents applied to education. This involves specific training in:

1. The process of performance in the competence and the components of their three fundamental knowledges.

2. Production of graphs and maps (conceptual and mental).
3. Understanding and management of ICTs and multimedia materials.

Phase II. Learning Support Materials design: this is carried out through the following steps:

1. Take each competence defined in the Formative Route and proceed to develop in detail each of the knowledges established in the Formative Route.
2. Search current literature on the contents of each knowledge and carry out a systematic process of reading and analysis to determine which are useful for the purposes stated in the Formative Project.
3. Reflect on own teaching experience and take into account the knowledge accumulated in the description of the contents of the three knowledges.
4. Write the contents of the three knowledges (be, do and know) as criteria, establishing assessment matrices (learning maps).
5. Facilitate easy location of content through a detailed index. It is also recommended to use advance organizers (see chapter seven).
6. Report case-based and context problem-based activities for students to learn significantly the contents of the three knowledges.
7. Append questionnaires for students to apply self-assessment of learning.
8. Develop maps and diagrams to facilitate understanding of the information.

Phase III. Design of multimedia material: Once you have the contents of the Learning Support Materials, what follows is to develop them in a multimedia format and establish mechanisms to generate interaction processes with knowledge, linking the textual content with videos, images and sounds, as well as web sites, e-books, other multimedia materials and the virtual classroom (if there is one). This task can be performed by the teacher as an expert in this area or by a professional in programming. Whatever the case, the teacher should play an active role in the process of developing the multimedia material, in order for this to be formative and conducive to meaningful learning.

LSM design and multimedia application for a given Formative Project is not a task that

is done once and for all, but is a process under ongoing reflection and reconstruction. Therefore, when a digital multimedia material is produced, teachers have to have the vision that this material requires constant update on topics and resources.

Phase IV. Using the LSM: is to use the first version of the LSM Digitized (prototype) in actual learning processes in order to assess its contents (knowledges, activities, maps and self-assessment questionnaires) interactivity (links, relationships within the information, and navigation) and formal aspects (color, font, size, links and graphics). It is recommended also that other colleagues and experts review the LSM and give their respective suggestions. Then, the LSM is implemented with a group of students, who are the reason of the LSM existence, and they are asked information about issues such as: clarity of content, how easy was to navigate the information and the design, among other issues deemed relevant. From this information, adjustments to the prototype are done and it is applied massively.

Phase V. Review and update: is the phase of use and provides a set of suggestions for improving the LSM and its multimedia presentation. Suggestions from students and colleagues are taken into account. Suggestions will accumulate and at each term they can be brought up to check the LSM again according to those suggestions and improve this way its quality and relevance.

8. Aspects to consider in the implementation of formative projects

Here are some thoughts that educational action-research has provided around the implementation of formative projects with students.

1. Could training projects be applied in all areas or only in those areas with more focus in practice?

Many counselors, principals and teachers often have the belief or notion that formative projects are primarily beneficial in areas with an important practical component such as values education, communication and technology, but little or nothing in fields such as mathematics, basic sciences and subjects with emphasis on theory (philosophy, sociology, history, etc.) Recently an educational supervisor in Mexico sent a communication to the author in which included the following paragraph: "(...) I have been working with teachers in my area on the implementation of the educational reform in basic education, but math teachers significantly resist to work with projects because they consider this methodology does not apply in this field, they pose the

argument that formative projects could lead to neglecting many contents of the area due to the difficulty to relate them to a context problem (...). Also, they expressed the syllabus is presented by blocks and does not accommodate to projects."

If competencies formation is intended necessarily contextualized problems should be addressed in any area and academic level (even in the case of Master and Doctorate degrees). And once having context problems, one has the key axes of formative projects. To achieve addressing problems critical and proactive reflection is required about the following questions:

- *What competencies forms or contributes to form the area (e.g., mathematics in basic education)?*
- *What context problems require for students to learn to interpret, argue and solve through those competencies?*
- *How the contents relate to these problems?*
- *What specific problems need to be addressed to implement the contents?*

Even in the most abstract contents of mathematics and physics there are contextualized problems. These problems can belong to a field of application in real life or relate solely to the symbolic realm of theory, and in all cases, having problems is the basis for a project. Considering content in themselves, it will always be present the difficulty of addressing projects, but the current challenge is to transcend the contents and see them as a medium in competencies development, not as the goal of learning. It is not enough to say the know to be, know to live together, know to do and know to know are addressed in the classroom, in a subject or module. The real transformation of competencies is aiming for students to take ownership of these knowledges and apply them in an articulated manner in solving meaningful problems. And if the classroom works under a block or topic methodology, formative projects can be addressed within them as the methodology in all sessions or as an application in the end.

2. Are training projects a methodology of micro curricular planning or a teaching strategy?

The formative projects are both a micro curricular planning methodology (in replacement of subjects), as well as a teaching and assessment of competencies strategy. Let's look at this in more detail.

- The formative projects as micro-curricular planning methodology.

The micro-curriculum is the realization of the curriculum and corresponds to what traditionally has been referred to as subjects. In syllabus under competencies different options to the subjects are sought, and some of these options are the modules, learning units and projects, among others, characterized by searching the interface between areas and disciplines considering the graduate profile. The formative projects are a plausible option to organize studies in all academic terms or in part of them, based on the resolution of problems identified in the context's study. So are doing various educational institutions in Latin America, and have also begun to implement some countries in their education reforms, such as Mexico in the area of Spanish for basic education.

- The formative projects as a competencies teaching and assessment methodology.

Regardless of how the micro-curriculum is structured (whether by subjects or more current methodologies such as modules or learning units), formative projects with students can be performed in the class sessions to develop and assess competencies. This can be done in one session, or several sessions or throughout the duration of the formative space.

In any project, other teaching strategies can be articulated, such as problem-based learning, heuristic V, mind maps, conceptual cartography, role-plays, etc. Also, can be implemented different forms of combination of individual and collaborative work, depending on the established goals and previous knowledges of the students. It is not required that projects are always by teams; is perfectly valid that can be done individually and then the collaborative work is done at the time of socialization and / or evaluation of achievements.

Although this chapter presents a methodology of formative projects, teachers and institutions can work with any methodology that addresses the key axes (competencies, context problem, activities, assessment and resources). Nor is it necessary to follow a particular format to plan a formative project; the school or teachers can create their own formats and adapt them to the needs of educational institutions.

9. Suggested Activities

1. Develop a concept map in which are indicated in detail the components of a Formative Project. Add other items that seem important to you according to your educational experience.
2. Based on the material presented in this book and other reference documents you have available, review critically the way you've designed your subjects and courses, and identify specific gaps and weaknesses that you had in the process. Establish possible mindsets that have influenced such gaps.
3. Imagine using the methodology of projects in your courses: What things would you change? What things would you keep from your previous experiences?
4. Take the contents of a particular subject you teach and transform it under the methodology of formative projects. Visualize its impact on students' education.
5. Submit the formative project developed by you to other colleagues to make suggestions of how you can improve its quality. Based on such information, review again your Formative Project and make the changes you consider relevant.
6. Once you've built a Formative Project with a good degree of quality, the next step is putting it into action with students in the next course. As you're implementing the project, ask them to give you suggestions on how to improve it. Based on this and your own reflection, improve the quality of your Formative Project continuously.

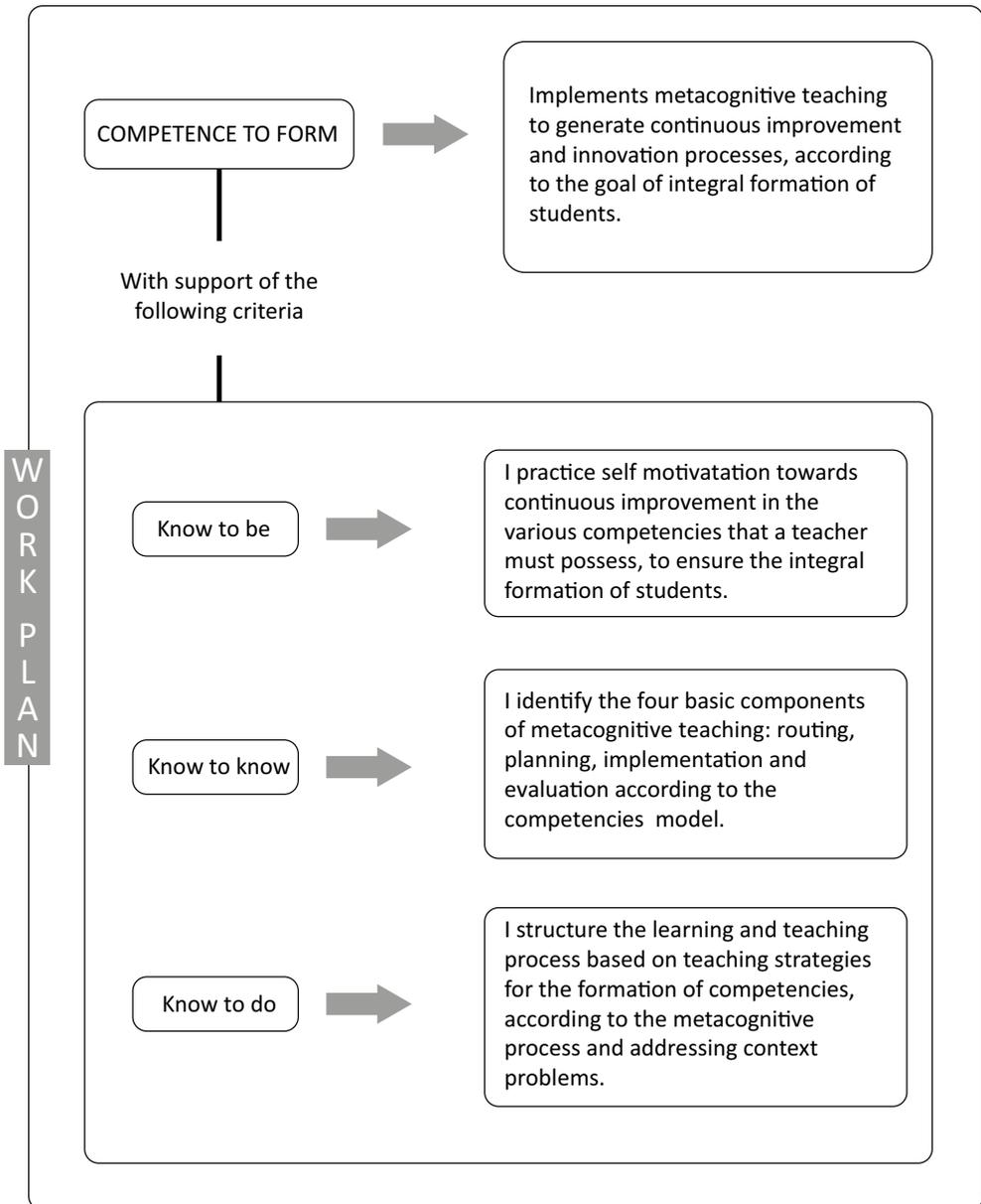
Chapter six

Ten essential actions in competencies articulating metacognition

How can I accept and respect myself
if I'm stuck in my doing (know) because I have not
learned a doing (thinking) that allows me
learning any endeavor to change my
world if my daily life changes?

How can I accept and respect myself if
the value of what I do is measured relative to the other in
continued competition which denies me and denies the
other, not for the seriousness and responsibility with which
I do it?

Maturana (1997, p.33)



1. Metacognitive model of competencies

1.1 Learning and integral performance

In recent years two trends have arisen. The first is the emphasis on learning and the learner (Román, 1998, 1999; Román and Díez, 1994), which is observed in the emergence of a number of concepts such as teaching to think, learning to learn, independent learning, self-directed learning and teaching for understanding. The second trend emphasizes performance and not the knowledge, where the focus is on efficiency and effectiveness regarding goals from the context. In the first trend, the process is the center of learning and performance is neglected; in the second trend, in turn, what matters are the publicly assessable results, but neglects information processing. Against falling into either of the two perspectives separately, and following the dialogic principle of complex thought, it is proposed to articulate learning with the appropriate performance under a systemic context framework. Below a number of approaches and reflections will be formulated from this orientation. We do not intend to exhaust this topic of such broad scope and complexity, full of multiple questions and gaps; we only intend to present a number of insights and approaches, which allow teachers of different educational levels managing the curriculum, and didactic based on competencies.

In what follows we need to understand what a strategy is. This concept was originally a military term referring to the necessary activities to conduct a preliminary plan of military operations, in which tactics were the different stages that made up each of these activities (Genovard and Gotzens, 1990). Then, the concept was adopted in the business field (people started talking about market strategies, competition strategies and sales strategies), in the social sciences and, finally, in education, where it has begun to be widely used, often uncritically and without theoretical contextualization (as happens precisely with competencies).

In order to fulfill the purposes of this chapter we will not address here the serious problems posed by the concept of strategies from the epistemological, theoretical, philosophical, political, economic and ideological. We'll only address this term in relation to performance.

Strategies are plans geared towards achieving learning goals (Schunk, 1991). Also seen as the organized, conscious and controlled whole of the processes performed by the learners so as to achieve a target involved in the realization of a complex and new task (Bernard, 1999). From this, and on the basis of the articulation with the human performance, strategies can be defined as a sequence of steps or stages carried out in

order to achieve certain objectives, by the optimization and regulation of cognitive, affective and psycho-motor processes. A point to note -and that will be essential to understand what follows- is that strategies are conscious, deliberate and planned activities (Beltrán, 1993; Selmes, 1988) (see Figure 1).

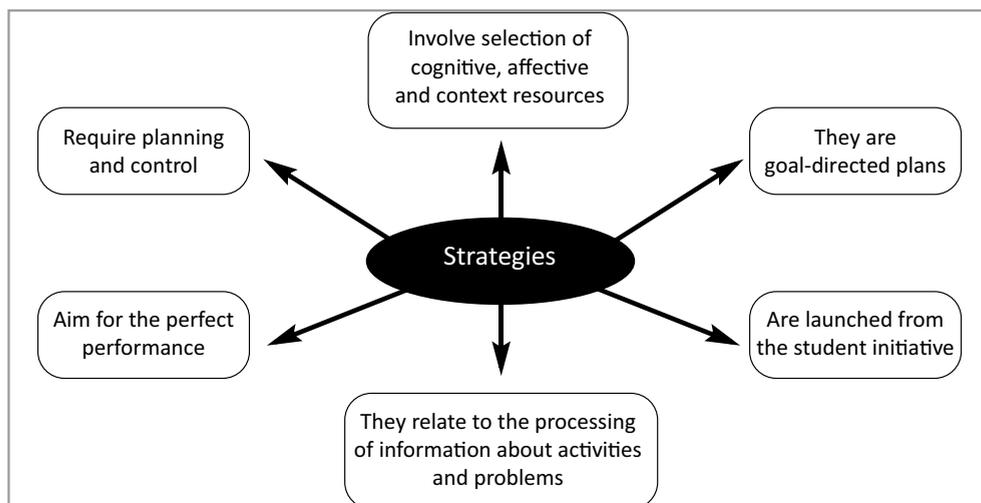


Figure 1. Basic characteristics of strategies

1.2 Processes, strategies and integrated performance to context problems

Each of the three knowledges of competencies consists of processes, tools and strategies. The processes are general mental operations which constitute the essence of the structure and processing of information, which operate automatically and are common to all human beings, although they are developed in different degrees according to the inherited potentials and opportunities of context (e.g., attention, memory, perception and language). The instruments relate to psychological internal tools through which human beings think, feel and act; they are the content based on which processes work (for example, concept of house, theory of learned hope, value of freedom and procedure to design accounting software for airline companies). Finally, the strategies are conscious action plans that people carry out with the goal of optimize processes serving the instruments, under the framework of carrying out activities and problem solving. Examples of strategies are: conceptual cartography (Tobón and Fernández, 2003), Heuristic V, mind maps and concept maps.

1.3 Integrated performance from strategies

How do strategies contribute to integral and appropriate action? This is a question that still keeps many questions. We can, however, aim to respond it by saying that, above all, ideal performance requires the integration of metacognitive strategies with cognitive strategies, affective-motivational strategies and performance strategies. Metacognitive strategies consist of a set of action plans that enable knowledge of mental processes (Monereo, 1994, 1995) as well as planning, monitoring and evaluation of these (Figure 2), in accordance with certain objectives (González and Tourón, 1992). Metacognitive strategies are applied to the different processes related to the competence performance (see Figure 3).

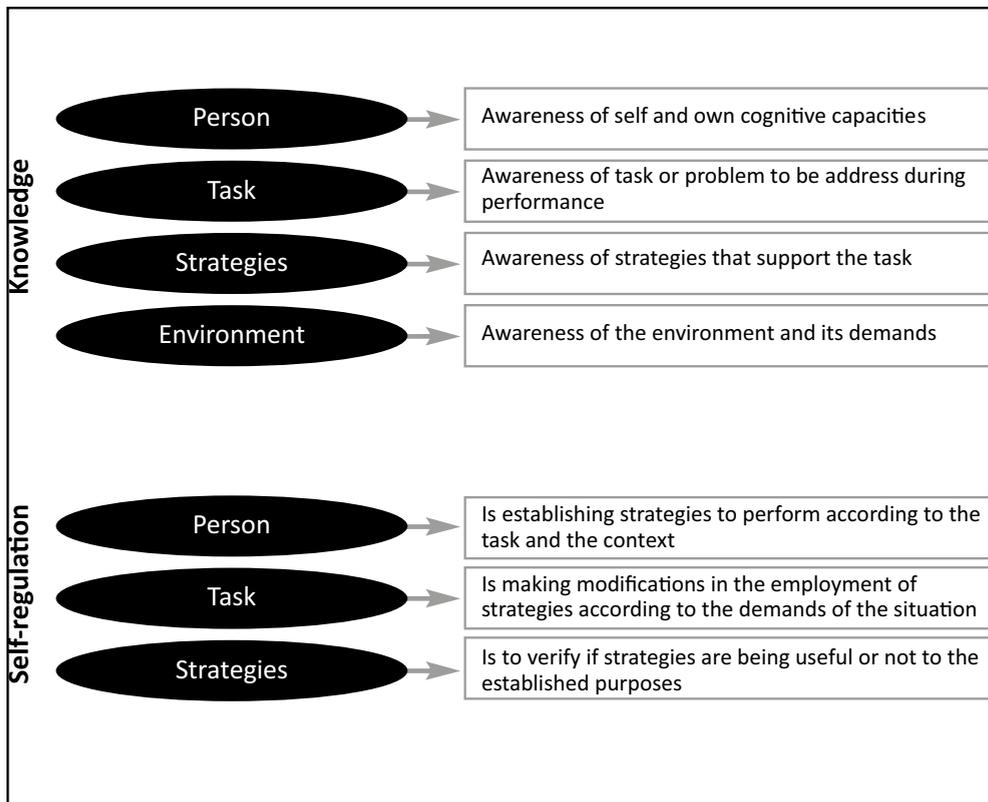


Figure 2. Basic metacognitive processes

In addition, the metacognitive knowledge, as proposed by Flavell (1987) requires an awareness of the variables and factors related to the person executing the performance, the task, available strategies and environment (Figure 2). In this process the critical and reflective thinking is essential, in order to achieve suitability and depth in knowledge

taken over these variables and factors (Ridley, Schutz, Glanz and Weinstein, 1992). Arguably, then, metacognitive strategies are those that coordinate other strategies, therefore commonly referred to as macro-strategies (Kirby, 1984).

Having a competence involves acting based on metacognitive strategies; in this sense, there is an awareness of the process of performance in all its phases and is held constant planning, monitoring and evaluation of this, according to certain goals. This is an essential condition for the ethics of competencies, for how to take responsibility and regulate own actions if one is not aware of them?

1.4 Ten essential actions in competencies articulating metacognition

In Tobón (2004) nine actions are presented to form and implement competencies. These actions have been implemented by CIFE through educational action-research and thus have been improved to arrive to the ten essential actions. It has been shown that teachers who have more impact as mediators and students with higher levels of performance in their competencies, in one way or another, follow these actions, which are concrete facts. In each of the actions is a metacognitive process because they are based on understanding and self-regulation. Hence, we present below the Ten Essential Actions in Competencies Articulating Metacognition (DAEC-M, for its Spanish acronym).

1. Sensitization
2. Conceptualization
3. Problem solving.
4. Values and ethical life project
5. Collaboration
6. Assertive communication
7. Creativity, customization and innovation
8. Transversality and transference
9. Resource management
10. Evaluation (assessment).

These ten essential actions are not the only actions to follow, because at one point others that are necessary can supplement them, depending on the challenges of learning. Neither they follow a certain order nor it is not necessary for them to appear explicitly or for all to be in each formative session (although it is necessary to always have assertive communication and assessment). Furthermore, actions can be integrated together.

Figure 3 shows the metacognitive process followed by each of the ten essential actions. This means they are based on knowledge of the affective, cognitive and performance processes involved, as well as self-regulation (control) to achieve the integral performance. And as metacognitive processes, require that students learn strategies to address them, which are described below. For example, in sensitization, student requires one or more strategies to get motivated and achieve diligence in studying, controlling possible distraction factors.

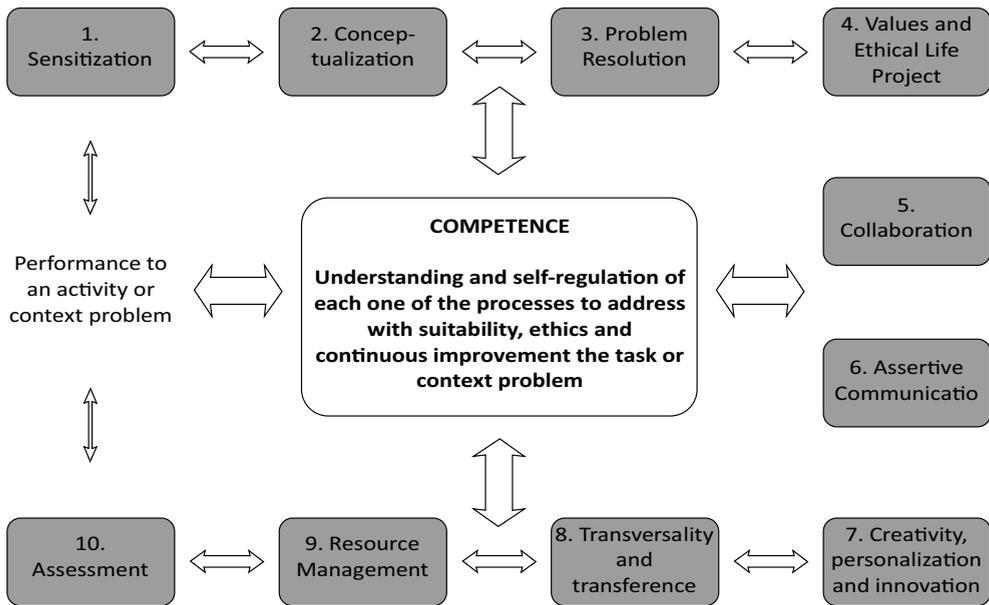


Figure 3. Ten Essential Actions in Competencies Articulating Metacognition (DAEC-M)

In each of the ten actions, the center of the process is the metacognitive routing, from which the person has knowledge of the situation; and makes a conscious and intentional decision to implement certain strategies through the continuous regulation of the events. For this, adjustments are implemented according to the changes during the activity aiming to achieve the goals pursued (Monereo, 1994; Valle, Barca, González and Núñez, 1999).

It's necessary to have three types of knowledges regarding the use of strategies in a situation: (1) conditional knowledge, based on when, where and why a strategy is effective and how to evaluate its effectiveness; (2) declarative knowledge, related to what strategies to apply to a learning or performance in a context situation; and (3) procedural knowledge, related to how to implement the strategies. Ultimately, in order to properly implement strategies, the person needs to know what to do to learn, know how to do it and perform a control while doing so (Beltrán, 1993).

The following describes the Ten Essential Actions.

1. Sensitization. It is the cognitive and emotional process from where learning originates and consists of three comprehensive elements: positive attitudes, attention and concentration. To optimize this process, the person can put into action from metacognitive planning, strategies such as causal attribution, changing attitudes and self-motivation, among others. Here it is important to remember that adequate motivation is fundamental for meaningful learning to occur. (Ainley, 1993; McCombs, 1988).

Once reaching motivation, the proper emotional state and attitude for action, attention turns to play a central role in information processing and involves separating the relevant information material from the irrelevant, looking for the concentration on the task and avoiding distractions (Burón, 1993; Mayor, Suengas and González, 1993). This allows producing in the student a process of industry, meaning, and dedication to an activity with a sense of challenge until reaching the goal.

2. Conceptualization. To meet the challenges of life it is necessary for students to learn to conceptualize, that is, to understand and explain activities and problems through clear concepts, which is different from the traditional approach that aims for students to have a lot of data in their mind about reality, without a connection with problems and without focusing on the essentials. Current education cannot focus on transmitting information because the information is readily available through multiple media; what education must do is to facilitate the construction of concepts.

META-SENSITIZATION

Knowledge of the affective-motivational state is taken and regulates itself through strategies that optimize such state, which are monitored and evaluated according to the achievement of a goal.

It involves understanding how is the attention and concentration with respect to an activity or problem, and implement improvement actions.

META-CONCEPTUALIZATION

Is to determine how we are regarding a particular concept or theory which is key to understand and explain a phenomenon, and then improve on this with specific actions, such as search sources for information, modify the concept, extend it, etc.

3. Problem solving. In addition to positive attitudes, concentration and to possess concepts, in competencies education is required to interpret, argue and resolve situations and problems in different contexts. The interpretation involves understanding an activity or problem; in other words, determine their meaning within a context. Argumentation is to analyze and explain the activity or problem by considering the causal relationships and effects; and the resolution is to run the appropriate procedure in the situation or problem that leads to the achievement of the expected goal.

META-RESOLUTION

Is to know how an activity or problem it being addressed from the interpretation, argument and resolution, to implement improvement actions if necessary.

4. Values and ethical life project. Is to continuously develop and strengthen the universal values such as justice, responsibility, honesty, humility and solidarity, and live by them in various situations. This involves assuming the consequences of our acts and repair potential errors we present in our performance, searching for the minimum negative secondary impact on ourselves, others and the ecological environment.

META-VALUES

Is to understand how are our values and how we are living life to implement improvement actions, which will allow us reaching real happiness.

5. Collaboration. The process of learning and action often requires for cooperative, help and support actions to happen among people to achieve a goal. Social relationships allow collecting and contrasting information; get to know experiences in similar situations and to execute tasks in team for a greater impact on reality.

META-COLLABORATION

Is to know how to work collaboratively with others to implement continuous improvement actions.

6. Assertive communication. Is to express to others with clarity in the message and kindness, respecting their rights, feelings and opinions, giving value to our thinking and acting accordingly.

META-ASSERTIVENESS

Knowledge of how is our assertive communication and implementation of concrete actions to improve it.

7. Creativity, customization and innovation. Is dealing with situations and problems with modifications in the conceptualization, argumentation or procedures regarding what one has done and normally does or what is conventional (creativity), with high personal involvement (customization) and searching to influence the social context for these changes to be followed by others according to environmental challenges (innovation).

META-CREATIVITY

Is the knowledge of how one is creating, customizing and innovating information or knowledge, and how one needs to improve, putting into action strategies for it based on the ethical life project.

8. Transversality and transference. Transversality refers to addressing situations and problems searching the articulated and complementary contribution from other areas or disciplines. The transference, in turn, is applying competencies to complex, unfamiliar problems or problems in new contexts to improve the performance level, and this requires in certain situations transversality processes.

META-TRANSVERSALITY

Implies knowledge of how knowledge linking and transfer is being done to new situations in order to generate continuous improvement based on some goals.

9. Resource management. Is ensuring that students are in circumstances to have the means or resources needed to achieve meaningful learning and solve context problems with the strategies appropriate to this task.

META-RESOURCES

Knowledge of how resources are being determined, sought, adapted and used when addressing situations and context problems, improving this process continuously.

10. Evaluation (assessment). It consists in determining the achievements and areas for improvement in performance, and based on this, implement ongoing improvements that enable the achievement of the expected goals in the formative process. For these purpose, different strategies such as learning maps, portfolios, checklists, etc. are used.

META-EVALUATION

Identification of achievements and issues to improve in performance, and implementation of continuous improvement to achieve the goals.

2. Mobilization of knowledges in integral action

On the basis of the complex conception of competencies, the process of suitable action requires the integration of the know to be with the know to know and the know to do, which is a fundamental activity within curriculum design process (chapter four) and the elaboration of Formative Projects (chapter five). This approach has two important precedents: first is the proposal of UNESCO (1990) to form people with theoretical, practical and evaluative-attitudinal knowledges at all educational levels.

Secondly, there is the Delors report (1996), which goes beyond the knowledges and introduces the field of knowledges in education: know to be, know to know, know to do and know to live together. In this book, know to live together has been integrated into the know to be in order to facilitate its teaching and curriculum management.

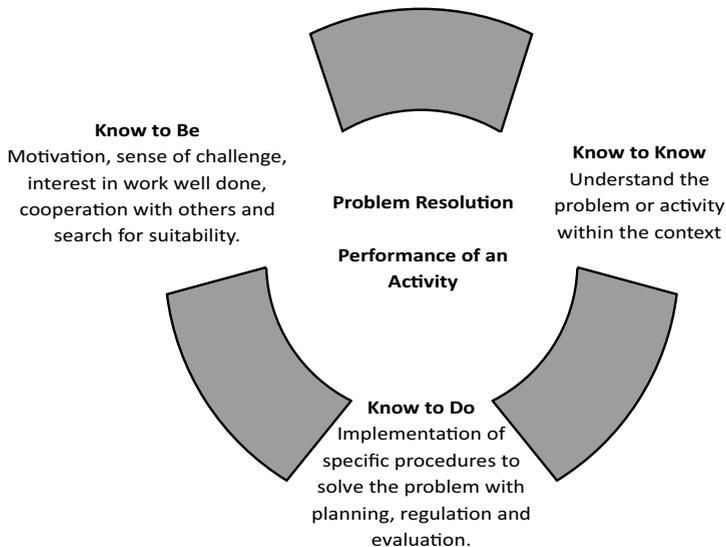


Figure 4. Putting into action the three knowledges in problem solving

For example, solving a problem with suitability originates from the interest to do things right, achieve the proposed goals; obtain valuable products in the cultural context and to work cooperatively with others (know to be).

Requires knowledge of the environment and understanding the problem from concepts and categories previously constructed (know to know) that guide the person in how to address the problem. Based on this, the person puts into action specific procedures to find a solution to the problem, considering the context and possible changes.

Table 1. Example of integration of the three knowledges in integral performance to a problem

Professional: environmental management technologist		
Problem In the department of Antioquia, the Pantanillo river supplies water to La Fe dam, which supplies water to the City of Medellin. A tributary stream of the river has begun to present contamination from organic waste and garbage thrown by people from the locality. How to solve this problem in order to avoid to continue polluting the river and compromising the quality of life of an entire city as soon as possible?		
Competence: promoting community self-management in solving environmental problems having a participatory diagnosis as a reference.		
Type of competence: labor - specific.		
Know to be	Know to know	Know to do
<ul style="list-style-type: none"> - Interest in working with the community. - Sense of challenge in promoting community self-organization. - Sensitization by the high rate of contamination of forests, streams and rivers. - Solidarity with people that are affected by pollution. 	<ul style="list-style-type: none"> - Knowledge of the pollution process from technical reports and site visits. - Knowledge of the degree of community organization. - Management of the concept of community self-management. - Understanding of environmental pollution. 	<ul style="list-style-type: none"> - Management of community awareness techniques when facing environmental problems. - Implementation of brigades to train the community on the management of polluted water and rubbish. - Implementation of procedures for handling polluted water and rubbish.
Explanation	The professional on Environmental Management requires a set of competencies to be suitable in his/her field. The problem described demands putting into action one of such competencies (Community self-management) integrating the know to be, know to know and know to do in the competence.	

Each of the three knowledges (being, knowing and doing) integrates and articulates three components: processes, instruments and strategies; components that must be assumed as a weave, same as knowledges.

2.1 Know to be

Figure 3 depicts the integral performance facing a problem and an activity. It can be observed how in the performance are involved processes such as sensitization, personalization of information and cooperation, which relate to the affective-motivational field. Such processes are essential for a person to be suitable in a particular occupation, since they relate to open mindedness, willingness, interest, wanting to do something, and sense of challenge. Still, this area is significantly absent in the traditional curriculum.

The know to be, according to the mentefacto presented in Figure 5, consists of the articulation of different affective-motivational contents framed in competencies and is characterized by the construction of personal identity and awareness and the emotional-attitude process control, in the performance of an activity or solving a problem.

It requires building collective projects through which people coexist in diversity (Delors, 1996), cooperative work is sought and not individualism nor selfishness, so that competencies are not synonymous of fight and rivalry (López-Herrerías, 1996) and a dialogic process is built so that the fragments do not become differences and differences are not inequality (sexual, economic and educational). Therefore, from the know to be it is promoted the peaceful coexistence for people to assume their rights and duties responsibly and looking to build a civic, democratic and solidary society (Delors, 1996).

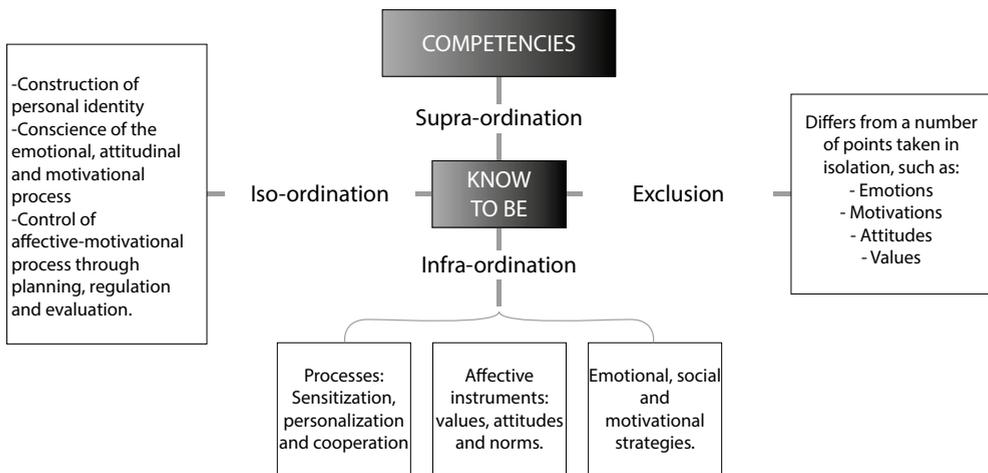


Figure 5. Conceptual Mentefacto of the know to be

2.2 Know to know

While a couple of centuries ago people could handle almost all of the existing knowledge with proper and persevering preparation, today this is impossible because the volume of information produced second to second in a given area, far exceeds the human capabilities to store it in our memory. This implies a significant change in knowledge: more than introjection knowledge, emphasis should be placed on the formation of skills and strategies so that people can learn to process and manage this knowledge without memorizing, through processes of systematic inquiry, critical analysis, sorting, processing, reconstruction and application of information. It is a proven fact that machines can store, retain and recover specific knowledge so much more efficiently than humans (Zubiría, 1998).

The know to know is defined as the setting in motion of a set of tools necessary to process information significantly, according to individual expectations, own abilities and the requirements of a situation in particular. This knowledge is classified within the scope of competencies and is different from the specific knowledge and memorization of information; is characterized by the awareness regarding the process of knowledge according to the demands of a task and putting into action strategies to process knowledge by planning, monitoring and evaluation; finally, this knowledge is divided into three main components: cognitive processes, cognitive instruments and cognitive and metacognitive strategies.

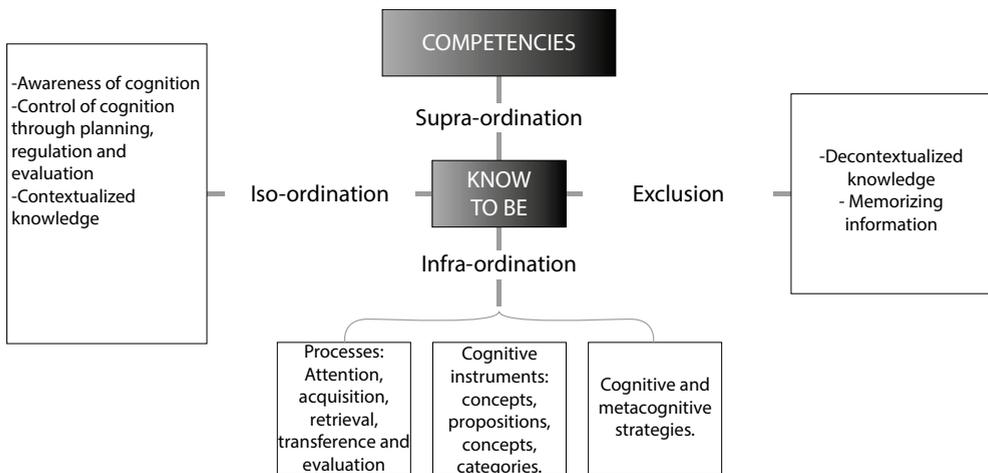


Figure 6. Conceptual Mentefacto of the know to know

Traditional education is based on transmitting knowledge, but it has neglected teaching what is knowledge, as Morin well exposes (2000a): "It is often told that education, which wants to communicate knowledge, remains blind to what the human knowledge, its provisions, its imperfections, its difficulties, trends, both towards error and illusion, and does not worry at all by making known what is to know" (Morin, 2000a, p.13). Based on such complex approach, know to know is oriented to the teaching of the nature of knowledge and its trends both towards illusion as error, in order to prevent blindness, false dichotomies and reductionism.

2.3 Know to do

Dewey said the best way to learn something was by doing it. When doing something, mistakes are made, but awareness of them helps improving the action and, thus moving towards the building of suitability. The know to do is the knowledge of performance in reality, systematically and thoughtfully, looking for the achievement of goals, according to certain criteria. Is not doing for the sake of doing, or remaining in the search of efficient and effective results. It takes this into account, but in coordination with the context, responsibility, integrity and quality of personal and social life.

The know to do is to perform in carrying out an activity or in solving a problem understanding the context and having as a base the planning. According to Figure 7, this knowledge is located as an essential knowledge of competencies and differs -exclusion- from the learning activities teacher implements in the classroom (Losada and Moreno, 2002), capacities, abilities and dexterities (although these components make part of its structure and actions). It is characterized -iso-ordination- by the continuous planning, monitoring and evaluation of what is done. Finally, the know to do is divided into performance processes, performance instruments and performance strategies.

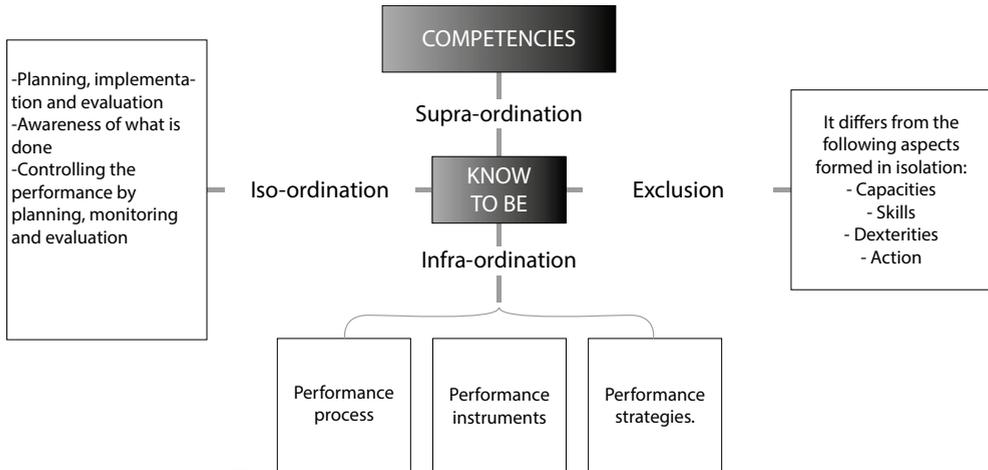


Figure 7. Conceptual mentefacto of the know to do

3. Instruments of the three knowledges

Each knowledge is divided into processes, instruments and strategies. Processes are described in Figure 4. Instruments of each of the three knowledges are shown in Figure 8.

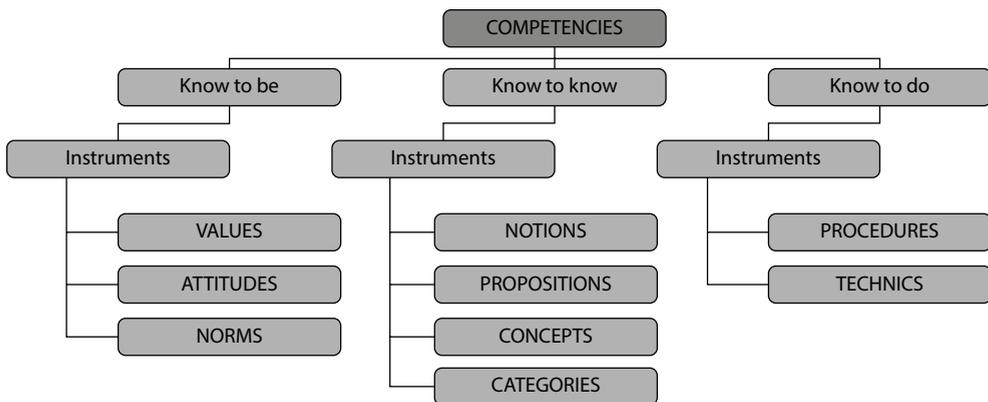


Figure 8. Instruments of the three knowledges

3.1 Instruments of the know to be

Know to be essentially consists of the following affective-motivational instruments: values, attitudes and norms. Through them people process the affective information and is at the service of the ideal performance.

1. Values. Are general cognitive-affective processes, characterized by being deep and lasting, through which the disposition to action occurs. They guide the development of goals and ideals, so they constitute the cornerstone of the ethical life project. They comprise attitudes.
2. Attitudes. They are specific dispositions to action guided by the values and are structured based on three elements: a cognitive component (they have a knowledge of something), an affective component (have an emotional tone associated with wanting something) and a behavioral component (expressed in overt actions). Attitudes involve subjective experiences through which evaluative judgments are made which are expressed in nonverbal and verbal ways; they are relatively stable and learned in social interaction (Díaz and Hernández, 1999). The strength of an attitude is when what we do is consistent with what we like and what we believe.
3. Norms. Constitute rules of conduct essential for living in society, regulating relations between people and things. Provide a guidance in how a person has to behave in a given situation; in turn, they are an essential criteria to assess the performance of others. In the norms attitudes are embodied.

Table 2. Example of the relationship between values, attitudes and norms

Values	Attitudes	Norms
Solidarity	Willingness to share what one has.	"Taking into account the needs and difficulties of others".
		"Providing social, emotional and material support to those who require it".
	Willing to accompany other people in the resolution of their problems.	"Cooperate with others in the search of solutions to their difficulties. "
		"To provide guidance, information and advice for those who require it".

Love for knowledge	Openness to new knowledges	"Having flexibility in learning concepts and categories "
		"Incorporate new knowledge in the specific disciplinary field. "
	Continuous actualization in a given area	"Search advances and innovations in knowledge, within a particular field. "
		"Recognizing the gaps and shortcomings in the realization of a particular activity, in order to search for relevant training. "

Note: It can be seen how attitudes and norms are guided by values.

3.2 Instruments of know to know

The performance with suitability to tasks and problems requires a cognitive mastery (Hernández, Rocha and Verano, 1998), which refers to the knowledge of data, facts, relationships and principles.

Some authors call it declarative knowledge, because it is a knowledge that is declared through language (Díaz and Hernández, 1999). Within such domain, it is essential to distinguish between factual knowledge or knowledge of specific facts and knowledge based on cognitive tools.

Specific knowledge is characterized as being related to concrete situations of reality and therefore is changing (e.g., name brands of vehicles, laws and decrees, curriculum standards, etc.)

The second type of knowledge, however, is enduring and based on general aspects of facts, common characteristics and principles. According to Zubiría (1998), there are four general classes of cognitive instruments to interact with reality: notions, propositions, concepts and categories (See Table 3).

Table 3. Key instruments of know to know

Cognitive Instrument	Definition	Examples	Processes involved
Notions	Representations of reality, which are structured by words and interrelated images.	Big-small Outside-inside White-black Day-night	Project - Introjecting - Comprehend - Nominate
Propositions	They are statements about general classes of reality based in a subject and a predicate, following logical principles.	- "Competencies consist of three essential knowledges: know to do, know to be and know to know." -"Know to know comprises cognitive instruments, cognitive processes and cognitive and metacognitive strategies".	- Propose - Exemplify - Encode - Decode.
Concepts	Represent an organized set of abstractions; a knit of four types of propositions: super-ordinated classes, infra-ordinated classes, excluded classes and iso-ordinated classes.	- Capacity - Thought - Learning - Competence - System - Formation	- Supra-ordinate - Infra-ordinate - Iso-ordinate - Exclude
Categories	Are weaves of concepts being built by argumentation and derivation processes. They are the basis to construct theories.	- Cognitive System - Education System - Teaching - Learning System	- Argue - Derive - Define - Sub-argue.

In the know to know are also critical the thinking skills, which constitute cognitive processes of information processing; are developed from inherited abilities interacting with opportunities from the sociocultural environment and have the property of being employed both consciously or automated (González, Núñez and García, 1999). Strategies, however, are always conscious and are based on sequences of actions, which implement such skills.

There are different proposals to systematize thinking skills. Below we present the PRYCREA project model, from Cuba, which describes four general classes of skills (Giraldo and Mazo, 1996; González, 1994; Lipman, 1992), which indicators are described in Table 4.

Table 4. Indicators of thinking skills

General inquiry skills. Help find general information to address a particular topic or problem.	Makes relevant questions: formulates concerns from detecting discrepancies in the information or in analyzing a problem situation.
	Avoids absolute generalizations. Takes into account that truth is relative. What is true for a phenomenon may not be for another.
	Argues with evidence: explains ideas by referencing facts and evidence.
	Develops explanatory hypothesis: explains a situation with one or more hypotheses.
	Recognizes differences in context: takes into account the contextual differences in argumentation.
	Tends to build his/her ideas from those of others: takes into account the ideas of others with respect to an issue and builds own ideas based on those.
Open-mindedness skills. They enable people to have willingness to accept arguments different from their own and change perspectives according to the evidence.	Accepts reasonable criticisms: acknowledges the criticism provided with argumentation.
	Considers the alternatives of a matter: looking for the different perspectives of an issue and is not carried away by only one.
Reasoning skills. Allow interlacing thoughts that can be assessed with criteria and be taught.	Provides appropriate analogies: compares an affair with other, establishing similarities.
	Seeks to clarify poorly defined concepts: in the analysis of a theme, looks for ill-defined concepts and attempts to clarify them with questions or inquiry
	Makes distinctions and relevant connections: distinguishes aspects that are different or establishes connections between subjects.
	Supports views with convincing reasons: provides opinions supported by arguments that achieve convincing others.
	Provides examples and counterexamples: illustrates with specific cases an approach or contradicts a proposition with examples.
	Seeks to discover what lies beneath a statement: analyzes the assumptions and background ideas to establish whether the statement is sustainable or not.
	Extracts appropriate inferences: analyzes several facts and infers in terms of probability rather than certainty.
	Presents balanced evaluative judgments: takes into account critical thinking guided by open-mindedness and insight guided by context.

Creativity skills. Creativity is a person's transformative potential based on a functionally integrated mode of cognitive and affective resources, characterized by generating, expansion, flexibility and autonomy (González, 1994).	
Change or transformation: the person introduces changes in the thinking thread (divergent thinking).	Makes a creative synthesis by regrouping or connecting elements.
	Proposes a new idea as a different alternative.
	Produces a question that reframes the whole situation.
	Presents a problematization that introduces changes in the situation.
Flexibility: the person assumes different positions and is able to change the approach to a given issue to see it from another angle.	Is open to the dialogue
	Listens attentively
	Notes subtle differences
Generation: the person generates different and own ideas to a topic or problem from his/her autonomous thinking.	Generates own ideas.
	Discovers and spontaneously explores the theme.
Autonomy: the person develops own judgments, not carried away by others in his/her thinking, maintains his/her views through arguments and self-corrects.	Makes judgments from his/her own thinking.
	Defends his/her opinions with arguments.
	Self-corrects.
	Has willingness to take action and make decisions.
	Assumes the consequences of his/her actions.
Extension: the person produces ideas, questions and problems that advance the knowledge to a higher level than where it departs.	Makes general comparisons.
	Makes a creative anticipation.
	Makes synthesis and opinions of the topic.

3.3 Instruments of know to do

The instruments of this knowledge are the procedures and techniques, since the know to do is practical and is based on actions and operations.

(1) **Procedures:** are ordered sets of steps to perform activities and solve problems within a given area of life or the professional-labor performance. A procedure consists of norms that indicate how an action should be carried out to achieve a certain objective (Coll and Valls, 1992). Procedures are classified into four classes: cognitive, cognitive-motor, algorithmic and heuristic.

- *Cognitive.* Those that are carried out solely in the mind: in response to a problem, the person makes a model of the process and structures a sequence of steps to reach a solution to this problem at the cognitive level.
- *Cognitive-motor.* In addition to the mental processes, the person carries out motor actions such as management of technology, equipment and materials that have an impact on the external environment. This involves coordination of mind, perceptual processes and motor system.
- *Algorithmic.* Procedures based on sequential actions following logical and linear processes.
- *Heuristics.* Those procedures that occur intuitively, according to the context, following shortcuts in the performance. Require experience in the field.

Table 5. Examples of procedures and techniques

Competence Area	Procedure	Techniques
Accounting	Financial analysis of an investment project by employing a worksheet.	Construction of formulas for calculations.
		Graphics creation.
Automotive Mechanics	General maintenance of a vehicle.	Oil Change.
		Overhaul of engine, lights and battery.
Human talent management	Performance evaluation of employees in a company.	Interview about successes and difficulties.
		Rating goals according to indicators.
		Application of observational tests about performance.
Clinic psychology	Diagnosis of a psycho-pathological disorder.	General interview of the patient.
		Application of one or more psychological tests.
		Test score.
		Background analysis.
		Determination of a disorder in accordance with conventionally accepted classification.

(2) Techniques: are specific actions by which procedures are conducted and planned goals are achieved. For this dexterities and skills that a person possesses are used, many of which do not need large doses of planning and thinking at the time to put them in operation since, thanks to prior learning, some skills and dexterities are automated.

4. Strategies to form and implement competencies

Below are described examples of teaching and learning strategies to form and apply competencies. They are mediated by teachers within the framework of meaningful learning (Cooper, 1990; Díaz and Hernández, 1999; Kiewra, 1991) and the appropriate action from socioformation. The strategies are applied in each of the ten essential actions:

1. Sensitization
2. Conceptualization
3. Problem solving.
4. Values and ethical life project
5. Collaboration
6. Assertive communication
7. Creativity, customization and innovation
8. Transversality and transference
9. Resource management
10. Assessment

4.1 Strategies to achieve sensitization

In sensitization is intended that students have disposition to construction, consolidation and application of competencies, forming and strengthening motivation and positive attitudes in the context of meta-cognition. This requires teachers to promote the activation of students' previous learnings and help them recognize the value of these.

Table 6. Examples of sensitization strategies

Competence Area	Description	Benefits	Key elements of procedure
Self-Motivation	Is to be aware of our own motivational state respect to an activity and then maximize it through planning, monitoring and evaluation.	Facilitates for the person to be interested in addressing a situation or problem. -Helps concentration on an activity. -Allows control distracting factors and achieving goals.	It involves knowing: -The process of internal motivation. -The challenges of tasks. -The strategies to achieve motivation. -The environmental factors enhancing motivation. Requires self-regulating motivation with the following minimum actions: -To reflect from the dialogue with oneself how is the motivation about a situation or problem. -To dialogue with oneself on the importance of addressing the situation or problem looking for benefits. -Make decisions about the activity or problem and put them into action.
Positive thought	Is to seek any benefit or learning in situations, assuming difficulties as part of life and as challenges to overcome. It is to maintain and strengthen optimism.	- Allows to maintain motivation when difficulties arise. -Strengthens the sense of challenge and favors goal achievement.	-Search positive elements in difficulties. -To assume the difficulties as opportunities to develop strength and growth. -To think positive when it is the tendency to think of the negative.
Stories of life experiences.	It is the description by the teacher of real situations where emotions, motivations, attitudes and values have played a central role in learning. Show, for example, cases of people whom have become successful businessmen, politicians, artists and scientists, thanks to their drive, commitment, dedication, openness to change and flexibility.	- Arouse interest in the students. -Grab students' attention for being situations lived in real life. -Assist students to understand the importance of attitudes in the study and in the process of self-realization.	-Describe experiences briefly. -Relate these experiences with the knowledge to be learned.

Competence Area	Description	Benefits	Key elements of procedure
Visualization	It is a procedure whereby the teacher guides the students to imagine reaching their goals (personal, family, social and labor) through competencies development, together with the process required to be performed.	<ul style="list-style-type: none"> -Helps students to be aware of their goals. -Favors the motivation, implying needs and personal interests. -Enables students to understand better the learning process and possible obstacles to overcome. 	<ul style="list-style-type: none"> -To apply the technique in class and suggest students to practice it often to strengthen their motivation. -Before practicing visualization it is recommended for students to be relaxed. -Suggest students to imagine reaching their goals and enjoying success.
Contextualization in reality	Is showing students the concrete benefits of possessing the competence, taking into account the vital needs related with the ethical life project, the labor requirements and social demands.	<ul style="list-style-type: none"> -Helps students understand formation of competencies. is not a waywardness or imposition of the teacher or educational institution, but a need in order to be functional in society. -It favors motivation towards learning. 	<ul style="list-style-type: none"> -Show specific situations applying competencies in real contexts. -Justify with facts why is it necessary to handle each of the components stipulated in the competence.

Within sensitization is also required on the part of students putting into action selective attention and concentration in a planned and conscious way. The teacher's role is to mediate pedagogical strategies for students to channel their attention and concentration according to the criteria and evidence, considering their needs and interests. Some strategies are: interspersed questions and illustrations.

Table 7. Examples of strategies for attention and concentration

Strategy	Description	Benefits	Key elements of procedure
Meta-attention	It is the knowledge of mental processes to select a set of stimuli and control distractions, seeking concentration for achieving a determined goal.	Enables the person to improve continuously his/her attention and this helps him/ her to achieve goals.	<p>It involves knowing:</p> <ol style="list-style-type: none"> 1. The operation of the attention process and its involvement in learning. 2. The specific requirements of attention and concentration in a task. 3. Strategies to self-regulate attention. 4. Distraction factors in the environment. 5. The resources of the environment to facilitate attention. <p>Requires to self-regulate attention through the following minimum actions:</p> <ol style="list-style-type: none"> 1. Plan, monitor and evaluate continually how is the attention to the task, controlling internal or external disturbing factors. 2. Discriminating relevant stimuli. 3. Controlling the effort according to the task. 4. Focus on main ideas or the data being sought. 5. Apply self-instruction ("dialogue with oneself"). 6. Control environmental distractors.

Interspersed questions (Rickards, 1980)	These are questions that are inserted into certain parts of a presentation or a text with the purpose of attracting attention and facilitate learning.	<ul style="list-style-type: none"> -They keep attention in a topic. -Help showing relevant aspects of the presentation. -Favor reflection and understanding of the information. 	<ul style="list-style-type: none"> -Do not over use the questions. For each question is advisable to provide a nucleus of important content. -At the very least, present questions at the beginning, middle and end of a presentation. -Seek for students to be able to answer the questions or, at least, to problem solve around them. -Provide feedback on the responses to the questions.
Illustrations (Díaz and Hernández, 1999)	Resources that represent the knowledges graphically (photographs, schemes, figures and images)	<ul style="list-style-type: none"> -Arise the student's interest and this favors attention and concentration on a topic. -Help to comprehend a sequence of actions. -Allow to express fragmented information as a whole with meaning. 	<ul style="list-style-type: none"> -Use them when the concepts and approaches have a high degree of abstraction. -Use illustrations in understanding and teaching procedures. -Vary the type of artwork on the presentations and texts.

4.2 Strategies to foster conceptualization

Rather than having data in mind, the goal should be for students to build concepts because these are the basis for processing information, understand, adapt, rebuild it and apply it in different situations and problems. It is also necessary start from previous knowledge so new concepts are constructed from them, with critical analysis, coherence and support (Mayer, 1984).

Table 8. Examples of strategies to foster conceptualization

Strategy	Description	Benefits	Key elements of procedure
Information processing	<p>Is to search, save and retrieve information through procedures relevant to a given purpose.</p> <p>Involves applying critical thinking to separate relevant information of which is not relevant or is not the foundation required.</p>	<p>-Helps avoid overloading the mind with data of facts, which may affect creativity.</p> <p>-Allow students learning to discern what information is relevant and substantiated.</p> <p>- Facilitates students learning to identify sources of information and how to appropriate of such information to achieve a goal.</p>	<p>-Search necessary information to address a situation or problem in reliable sources.</p> <p>-Separate relevant information from irrelevant information. Underlining can be applied here.</p> <p>-Understand information thinking of examples, paraphrasing or presenting an oral summary.</p> <p>-Organize selected information according to explicit purposes. This helps its encoding and retrieval through memory. Several kinds of maps may be employed, such as mental maps.</p> <p>-Relate the new information with information one already has. This increases the likely to recover it. Analogies can be employed, as well as models and examples.</p> <p>-Retrieve information through a procedure or by establishing relationships, analogies or maps.</p>
Previous organizers. (Ausubel, 1976)	<p>It's introductory information that is provided to present a general and inclusive context of new learnings.</p> <p>Previous organizers can be textual or as concept maps (or both).</p>	<p>-Allow to understand new learning from previous knowledge.</p> <p>-Help to understand the general class within which the new knowledges are included.</p> <p>-Allow a global overall vision of a matter in which new learnings will be included.</p>	<p>-Must be introduced before the new knowledges are presented.</p> <p>-Not to be confused with the summary, which describes the main ideas of a text; the previous organizer, in return, indicates the macro context of the new knowledges.</p> <p>-Can be assimilated to an introduction when this does not remains anecdotal or historical data, but formulates general concepts.</p>

Strategy	Description	Benefits	Key elements of procedure
Mind maps. (Buzan, 1996).	Are graphic procedures articulating verbal aspects (keywords and ideas), with nonverbal aspects (images, logos and symbols) and spatial aspects (branches, sub-branches, lines, reliefs, geometrical shapes) in order to facilitate addressing a problem from the search and organization of the information available.	<ul style="list-style-type: none"> -Connect the left hemisphere with the right hemisphere integrating verbal and non-verbal information. -Enable acquiring information in memory for a long term due to associating key words with images. -Promote understanding of the information 	<ul style="list-style-type: none"> -Put the main theme on the center associated with an image and from it branches set off in which sub-topics that make the whole topic are placed. Such sub-topics are associated, in turn, to images and symbols. The sub-topics are subdivided into other sub-topics and so on. -Relate sub-topics among themselves. - Software for designing mind maps can be used with students. This favors its use.
Semantic networks (Dansereau, 1985).	They are graphic resources where relationships between concepts are set up. Differ from concept maps in that information is not organized by hierarchical levels from the more abstract to the most concrete. Another difference is the link between concepts is given by three basic processes: relations of hierarchy, concatenation and clusters.	<ul style="list-style-type: none"> -Allow to retrieve information about a subject in an organized manner setting semantic relations between different data. -Facilitate reorganization of information already possessed. 	<ul style="list-style-type: none"> -Start up from a topic and develop it by formulating question to students about the type of relationship between propositions and concepts. Then proceed to develop graphically the type of relationships. -Search that all students participate orderly.

Strategy	Description	Benefits	Key elements of procedure
<p>Conceptual cartography (Tobón and Fernández, 2003; Tobón, 2011)</p>	<p>Is an analytical-graphic procedure based on mind maps and conceptual mentefactos which have as a goal understanding and appropriating academic concepts and theories by the following eight basic themes:</p> <ul style="list-style-type: none"> -Axis of exemplification -Notional Axis -Categorial Axis -Characterization Axis -Differentiation Axis -Subdivision Axis -Link up Axis -Methodological Axis <p>Furthermore, other axes can be added such as:</p> <ul style="list-style-type: none"> -Foundation Axis -Innovation Axis 	<ul style="list-style-type: none"> -Orients the construction of academic concepts in a given area. -Allows for students to build concepts actively and participatory. -Facilitates understanding all key elements of any concept or theory. -Guides teachers on how to address the most relevant academic concepts in an area with their students. 	<p>Analyze an example of the concept or theory to understand its importance and structure.</p> <ul style="list-style-type: none"> -Carry out an initial exploration of the knowledges students possess regarding the concept to be learned or analyzed. -Carry out the exploration based on leading questions from each axis and organize the information. -Orient students in the search for new information regarding the concept and organize it according to the axes.

Strategy	Description	Benefits	Key elements of procedure
Meta-memory	It is the knowledge and self-regulation of long-term memory processes.	All human beings need to memorize certain data, concepts and theories. Meta-memory helps us boost this process with understanding and in meaningful situations.	<p>It involves knowing:</p> <ul style="list-style-type: none"> -The process of forgetting. -The information storage capacities. -The storage limitations and information recovery. -The methods to store and retrieve information. -The task's characteristics. -The distinction between relevant and not relevant information. -The environment factors favoring memory. -The environment factors limiting memory. <p>Requires self-regulate memorizing through the following minimum actions:</p> <ul style="list-style-type: none"> -Planning, monitoring and assessment of the information storage and retrieval processes. -Categorization and rearrangement of the information. -Description with own words. -Use of graphs to establish the structure of concepts and propositions (conceptual maps and mentefactos). -Development of models. -Association of key words and images on mind maps.

Strategy	Description	Benefits	Key elements of procedure
Metacompre-hension	It is the knowledge and self-regulation of factors related to meaningful understanding, contained within the performance of a certain competence.	<p>Allows for the person to achieve deepen appropriation of the concepts and interpreting and argument situations and problems of the context based on these concepts.</p> <p>This metacognitive strategy empowers or facilitates the process of concept building.</p>	<p>It involves knowing:</p> <ul style="list-style-type: none"> -What is and is not understanding. -The level up to which a particular matter can be understood. -What is what will be understood? -The complexity of the task and the effort required for understanding it. -Related factors to the understanding of various situations. -How to assess comprehension. -The environmental factors that make understanding possible and how they can be modified. <p>Requires self-regulate understanding with the following minimum actions:</p> <ul style="list-style-type: none"> -Planning, monitoring and assessment of the comprehension process. -Development of abstracts. -Creating schemes with the main ideas. -Exemplification -Search opposite arguments. -Explanation of ideas with own words. -Dramatization. -Design of mental maps to systematize information.

4.3 Strategies to promote problem resolution

It is not enough to have concepts; they must be applied in situations and meaningful problems, based on the interpretation and argumentation. This implies to propose and implement solutions with relevant and sufficient strategies for this.

Table 9. Examples of strategies to facilitate problem solving

Strategy	Description	Benefits	Key elements of procedure
Case Studies	Is the analysis of an actual or hypothetical situation of the context described in detail, presenting a problem with its causes and effects, as well as the necessary elements from the context to achieve understanding.	<ul style="list-style-type: none"> -Allows to understand an area of application of competencies. -Facilitates development of argumentative, communicative and purposeful competencies. -Helps to learn to detect problems and to address them. 	<ul style="list-style-type: none"> -Describe in detail the case. -Search for the case to address a problem. -Guide the discussion around how the problem is addressed within the case. -Allow for students to discuss how they would approach the problem if they'd find it in their everyday life or their work life.
Problem Based Learning (Restrepo, 2000b)	Is to analyze and solve context problems through collaborative work, according to one or more competencies. The solution is generally hypothetical and not taken to the real context. The latter actually is done in formative projects.	<ul style="list-style-type: none"> -Helps contextualize competencies. -Contributes to form argumentative and purposeful competencies as well as teamwork competence. -Allows to build skills of relationship, planning, information search and anticipation of the future. 	<ul style="list-style-type: none"> -The teacher needs to know the environment in depth. -The problems require having challenging aspects and should arouse interest in students. -In certain cases, students themselves must find the problems they will analyze and solve.

Strategy	Description	Benefits	Key elements of procedure
Heuristic V	It is a graphic procedure using the shape of letter V, oriented around approaching a problem through a central question that is answered with reference to a context, articulating the know to be, know to know, and know to do, within a metacognitive framework.	It's a simple way (heuristic) to analyze and solve problems in the context, and also to show the process of resolution finally implemented. -Facilitates resolution of problems with specific questions. -Helps students realize the relevance of the different knowledges in addressing a particular problem (attitudes, concepts and procedural skills)	<ul style="list-style-type: none"> -Understand the problem in its context. -Determine the relevance of the problem. -Present the problem with one or more questions to solve. -To determine clearly the context in which the problem it's to be solved. -Analyze the problem with relevant concepts. -Proposing a solution to the problem with context data. -Secure positive attitudes during the addressing of the problem. -Argue through a text the process carried out from start to finish. The text can be communicated orally or in writing.
Sociodramas	There are theater representations that are simple and experiential carried out in the education context to form certain attitudes, knowledges and procedural skills. They address a problem or situation of the context.	<ul style="list-style-type: none"> -Allow learning by doing through simulated situations. -Allow to form the know to be, know to know and know to do in situations similar to real. -Students learn and reinforce competencies experiencing the situations. 	<ul style="list-style-type: none"> -Identify a problem required to be addressed by the students. -To present an example of a Sociodramas if possible. -Identify the minimum elements to be addressed within the sociodrama and maximum time available. -Rehearse the sociodrama by the students. -Present the sociodrama to peers, face-to-face or through a video. -Perform a self-assessment, co-assessment and hetero-assessment of achievements and areas for improvement at the end. -It is not required to rehearse many times for the sociodrama, and sometimes is necessary to repeat the sociodrama until students learn how to perform a procedure appropriately.

Strategy	Description	Benefits	Key elements of procedure
Trial and error	It is a complementary strategy to the previous and is to perform several times a procedure identifying and overcoming errors, until attain perfection, based on certain criteria.	This strategy allows the person to improve continuously.	<ul style="list-style-type: none"> -Identify and understand the procedure to be done. -Perform the procedure. -Reflect around achievements and areas to improve. -Improve during the procedure. -Perform the procedure again many times as necessary, seeking to overcome errors or difficulties.
Modeling	Is to identify people performing a given activity with a high level of suitability, in order to learn from them watching their performance (what they do, what they say, what they express).	Observing and analyzing examples of people whom act with suitability achieve relevant learning.	<ul style="list-style-type: none"> -Understand the procedure and goals to achieve. -Search people performing the procedure with high level of suitability. -Analyze what they do, what they say and their recommendations. -See their finished work. -Reflect on what elements to replicate from other people to improve their own performance.

4.4 Strategies to promote the values and ethical project of life

As already explained above, values are key in competencies to act with suitability, continuous improvement and ethics in various situations and problems of context. To form values, there are various strategies, which focus on students to develop continuously the compliance of commitments and obligations, and implement concrete actions to reinforce this.

Table 10. Examples of strategies to promote values and ethical project of life

Strategy	Description	Benefits	Key elements of procedure
Personal Journal	It is the description in a notebook of personal experiences of daily life around how students put into action responsibility in the activities and problems, both at the school environment, and in their family and community. Experiences are accompanied of reflections on areas for improvement and actions that must be implemented to achieve improvement. In some cases, these experiences and reflections are shared with peers and teachers, as a mechanism for social recognition and reinforcement of achievements in this field.	<ul style="list-style-type: none"> -Allows students to be aware of the responsibility in various situations of life. -Helps to implement actions to correct errors based on real situations. -Enables to keep a historical record of improvements in responsible performance. 	<ul style="list-style-type: none"> -Search for students to have examples about the importance of the strategy to strengthen their responsibility. -It's important that students share regularly their annotations around their responsible performance. -The teacher should suggest in certain moments that the students reflect on their actions and record them to be aware of them and this will make possible a continuous improvement.
Challenge Games	They are experiential situations in which students must achieve a certain purpose through collaborative work. Allow to recognize in practice how students put some key values into action.	<ul style="list-style-type: none"> -Allow the formation of values based on experiential situations. -Students get continuous feedback from their peers around their performance. 	<ul style="list-style-type: none"> -Select those challenge games that address in more depth the values. -Determine an appropriate location where people can concentrate in challenge games. -Search that through the games students reinforce the values.

4.5 Strategies to promote collaboration

Collaboration with others is key in any competence because it enables learning based in the zone of proximal development. From the sociocultural viewpoint, that socioformation picks up; it shows how learning occurs first on an inter-psychological plane (mediated by the influence of the others) and then in the background at an intra-psychological level, when knowledge is internalized (individual level), with the support of experts (Vygotsky, 1979) or with a larger cluster of instruments and strategies. At the inter-psychological plane the zone of proximal development is given, which consists of learning a person can obtain with the support of others.

Collaboration is also essential in competencies because facilitates the achievement of goals that would otherwise be difficult to reach. This implies that people coordinate with each other and complement their knowledge, skills, attitudes and strategies.

Teaching strategies in this process are designed to promote collaborative learning, looking for the following goals: (1) trust among students, (2) direct and unambiguous communication, (3) mutual respect and tolerance, (4) mutual appreciation of the work and achievements in forming the competence (5) complementarity between the competencies of the different members, (6) friendship and good treatment, and (7) shared leadership.

Table 11. Examples of strategies to promote collaboration

Strategy	Description	Benefits	Key elements of procedure
Team learning	Aims to generate learning through group interaction based on: (1) selection of an activity or problem; (2) organization of the students in small groups, according to the task and planning of the work to be performed; (3) implementation of the actions; and (4) overseeing the work of each of the groups with timely advice.	-Support among students themselves on the formation of competencies -Allows learning to learn by addressing problems in teams.	-Teach students teamwork. -Promote development of social skills. -Guide group work according with the competencies that are intended to be formed.

<p>Team research</p>	<p>Is the formation of competencies through research activities performed in teams (of 3-6 people). General steps are: (1) selection of a problem by the group; (2) construction of the conceptual framework to understand the problem; (3) planning a set of activities to solve the problem; (4) definition of goals; (5) implementation of activities coordinated and with monitoring by the teacher; (6) systematization of results and presentation of the final report, and (7) assessment of results and competencies formation.</p>	<p>-Allows learning to investigate in teams. -Competencies are formed by mutual support of students themselves. -Develops motivation and challenge spirit facing the solution of a given problem.</p>	<p>-Helps to organize groups so that there is complementarity. -To advise the groups so that all members are responsible both of cognitive and inquiry activities, as well as manual activities and enforceable. -Orient planning of the activities for its implementation and systematization are within course time and are feasible.</p>
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4.6 Strategies to foster assertive communication

Students show assertive communication when express with warmth, respecting the rights, feelings and opinions of others, acting consequently, communicating their feelings and ideas without attacking or offend and assuming self-respect and respect for others.

Table 12. Examples of strategies to promote assertive communication

Strategy	Description	Benefits	Key elements of procedure
<p>Model observation</p>	<p>Is to observe people who have a high level of assertive communication, and analyze how they act and benefits obtained in their interaction with others.</p>	<p>Allows to learn taking concrete examples of the reality.</p>	<p>-Identify at least one person that is an example of assertive communication. -Observe what the person does in a challenging situation. -Record his/her performance. -Reflect on the elements to be taken into account.</p>

Role play	Is to rehearse assertive communication in a real way in different situations and through different roles. Thus, attitudes, knowledge and skills of this kind of communication are learned.	It is based on learning by doing and ensures the development of a minimum level of assertiveness in communication.	<ul style="list-style-type: none"> -Identify a situation that is difficult for the person to take with assertiveness. -Rehearse assertive communication with a peer (another person). -Rehearse different roles: communicate with assertiveness, passivity and aggressiveness. -Fix errors in the process to achieve the performance with assertiveness.
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4.7 Strategies to foster creativity, personalization and innovation

Consist on planned and systematic procedures so that students form engaging in activities and problems, with critical, proactive, creative and innovative thinking from within their ethical life project.

Table 13. Examples of strategies to promote creativity, personalization and innovation

Strategy	Description	Benefits	Key elements of procedure
Brainstorming	With respect to a given issue or problem, the teacher looks for students to contribute ideas to understand the problem, without considering if they are viable, good or relevant. All contributions are recorded. It is not allowed any form of criticism. Then, organize all contributions and evaluate them. Finally conclusions are drawn.	<ul style="list-style-type: none"> -Facilitates the recovery of stored information. -Allows creating and innovating knowledge and procedures. -Allows applying knowledge that exists in the resolution of a problem with creativity. 	<ul style="list-style-type: none"> -Have clarity in the approach to the topic or problem, as this is the guide for brainstorming. -Coordinate participation of the students, looking that all of them can provide their input.

<p>Facilitation of initiative and critique</p>	<p>Is to facilitate the space, pedagogical intentions and resources necessary for students to take the initiative in the formation of their competencies, providing their management in the search for suitability.</p>	<p>-Allows students to assume the formation of competencies from their own personal management. -It favors the motivation, creativity and spirit of challenge.</p>	<p>-Provide examples of people who have taken formation of competences from their own initiative and achievements they have had. -Orient students in the management of projects to solving needs of the context.</p>
<p>Construction of dreams</p>	<p>It is to guide students to have clarity of their ethical life project and build dreams towards the future being aware of their vital needs for growth. This leads to assume challenges and do their maximum effort to reach them, developing fully their potential with perseverance.</p>	<p>-Build dreams is a powerful engine to strengthen creativity, personalization and innovation. -Dreams feed perseverance and this is key to innovation, because it enables overcoming continuous obstacles.</p>	<p>-To reflect on people who have achieved their dreams despite difficulties. -Orient students to have dreams and imagine that they have achieved them, starting from their vital needs. -To advise students about strategies to achieve their dreams, being creative and innovative.</p>

4.8 Strategies to promote transversality and transference.

In transversality, students address problems or situations articulating knowledge from other areas and disciplines.

Here is also considered the transference, which is that students can tackle more complex problems in other less familiar contexts. This facilitates deeper learning and achieving high levels of suitability. The transference of knowledge can be within the same context (for example, go from a local to a global context) or to a different context (learning happens in the context of friendships and passed to the family, or from the family is passed to the workplace).

Table 14. Examples of strategies to promote transversality and transference

Strategy	Description	Benefits	Key elements of procedure
<p>Solution of complex problems. A problem is highly complex when:</p> <ul style="list-style-type: none"> -Has more than three variables influencing. -Requires of two or more disciplines to be analyzed and solved. 	<p>Is to analyze and solve problems that require various disciplines to be dealt with success.</p>	<ul style="list-style-type: none"> -Helps for students to learn solving problems relating and integrating different areas, approaches and / or disciplines. -Allows for students to learn to supplement actions of different nature in addressing problems. 	<ul style="list-style-type: none"> -Determine the problem in which are involved different variables and requiring at least of two disciplines to be solved. -Inquiry specific knowledge of the different disciplines needed to analyze and solve the problem. -Analyze the problem with knowledge from different disciplines, looking for the disciplines to complement each other. -Solve the problem by applying actions of the disciplines established, looking for such actions to be also articulated among themselves. -To reflect on learning achieved and what should be done in the future facing a similar problem.
<p>Formative Internships (Tobón, 2001)</p>	<p>Consist on visiting companies, social organizations, official entities and different community spaces with the purpose of understanding the real environments in which people employ the competencies a certain course aims to form.</p>	<ul style="list-style-type: none"> -Allow students to understand the social demands and problems that are required to address in a given area. -Linkage with reality through observation and interviews with people who possess the competencies of reference. -Deep understanding of the daily or professional context where competencies are required. 	<ul style="list-style-type: none"> -To prepare ahead the visit to organizations or companies selected. -Develop a guide with some basic aspects to be considered in the observation and interviews. -After the visit perform a reflection within the group on the contributions of the activity for each student.
<p>Business or social practice</p>	<p>Is to apply competencies in real and varied situations for these to generalize. This can be in a company or a social organization.</p>	<ul style="list-style-type: none"> -Increases the broadness of application of the competence. -There is a transference of learning from a situation to another. 	<ul style="list-style-type: none"> -Guide the students in their adaptation to the company or social organization. -Provide transference guidelines of the competence to the realization of activities and solution of problems of increasing level of complexity.

4.9 Strategies to promote resource management

Are procedures designed to teach students to have the necessary resources for both learning and the application of competencies. More specifically, is for students to achieve identifying the means to address situations and be able to find, adapt and apply them with relevance, so that the goals are achieved. In certain cases, resources must be created or find alternative resources.

Table 15. Examples of strategies to manage resources

Strategy	Description	Benefits	Key elements of procedure
Resources diagnosis	Is the procedure by which students determine the resources necessary to perform a given activity and achieve the goal.	Allows students to learn to diagnose accurately the resources necessary to perform successfully the various activities.	<ul style="list-style-type: none"> -Identify the goals to achieve. -Set the activity or activities to be performed. -Identify resources required to perform the activity or activities. -Establish at what times they must have the resources to look for them well in advance.
To search for alternative resources	It is the process by which students seek for alternative resources to those required. This occurs when such resources are not available or it is seek to have better resources, consistent with a determined situation.	<ul style="list-style-type: none"> -This strategy helps develop recursion in students. -Besides, it prepares students for life in the sense that many times the necessary resources are not available, or the resources available are not the most relevant. 	<ul style="list-style-type: none"> -Identify the goals to achieve. -Establish the activity or activities to be performed. -Identify resources required to perform the activity or activities. -Search for alternative resources when the ones available are not the most relevant or effective to achieve the goals.
Improvement of resources available	Is to improve the existing resources to obtain better results in achieving the goals, or make the process more efficient.	It enables for students to learn to have initiative and creativity in improving the resources. This is a success factor in addressing the problems.	<ul style="list-style-type: none"> -Identify the goals to achieve. -Establish the activity or activities to be performed. -Identify resources required to perform the activity or activities. -Search for the necessary resources. -Make improvements in the resources to perform as best as possible the activities.

4.10 Strategies to promote assessment

They are a set of action plans for students to provide feedback about achievements and areas for improvement in their performance, and to implement specific actions for improvement. Some assessment strategies are: portfolio, learning maps, interviews, sociodramas, etc. (Tobón, 2011a). Given the importance of the subject, a separate chapter is presented addressing these strategies (Chapter 8).

5. Putting strategies into action

The implementation of metacognitive-cognitive and affective-motivational and performance strategies follows the procedure outlined in Figure 9. The person, to an activity or problem in which has the task to learn or act in an ideal way, becomes aware of the situation and analyzes what are the goals to achieve. From this, the person plans how to implement the strategy; then, puts the strategy into action (implements), exercises control over its implementation and modifies it, if necessary. For this, the person requires knowing he / she can apply certain strategies, which can follow the described steps and can be clear about how and when to implement them.

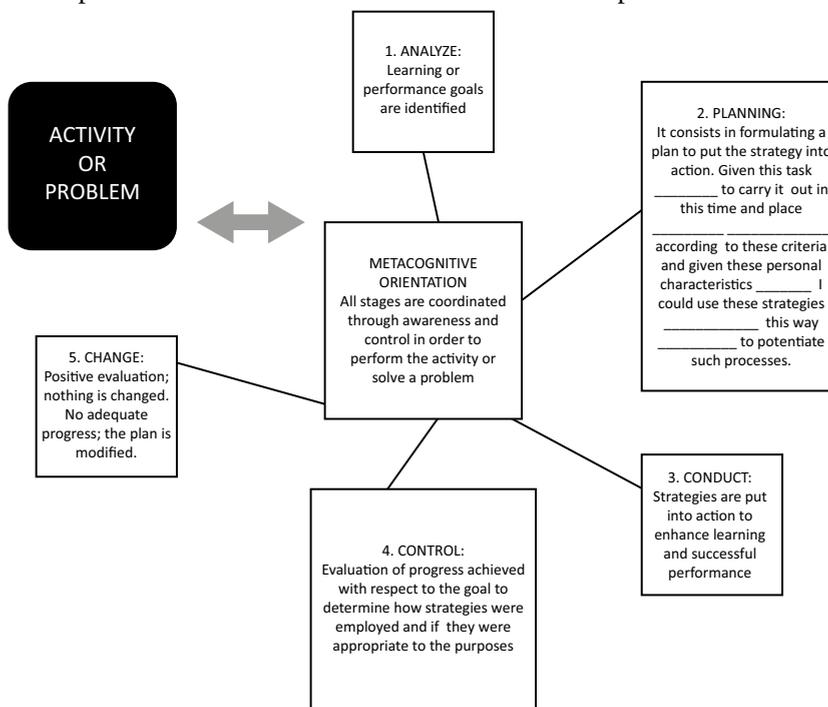


Figure 9. Steps in putting into action strategies to learning activities or performance in the context

6. Suggested activities

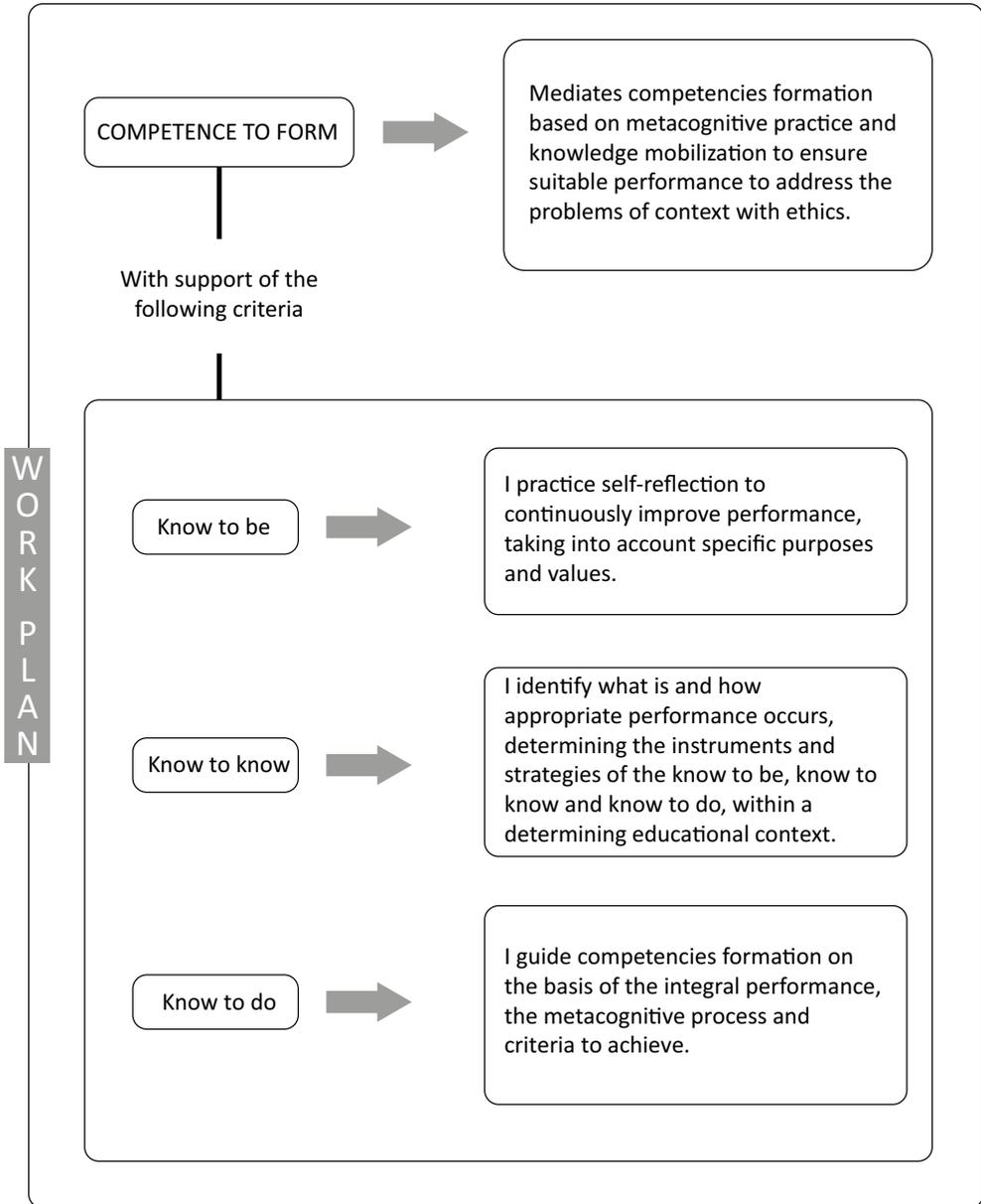
- 1) Make a mental or conceptual map that includes all contents of this chapter and its relation to the topic of competencies. It is important that you add your input and thoughts on the subject.
- 2) Perform an analysis of your performance to an activity or recent problem, determining how was the implementation of strategies to potentiate the ten essential actions proposed by socioformation. Determine how much you employed metacognitive orientation at each stage. Conclude by describing the achievements and areas for improvement in this regard.
- 3) As a teacher, think about the following questions: Have I oriented learning considering integrally the know to be, know to know and know to do? Have I addressed within each knowledge both their basic instruments and teaching strategies?
- 4) Make a sketch of how would your subjects or modules be from the perspective of working competencies formation by integrating each one of the three knowledges exposed.
- 5) Determine what gaps you present at managing the pedagogical work based on what is proposed in each of the three mentioned knowledges.
- 6) Finally, we invite you to share with others the products of the various activities proposed, in order for you to know the point of view of your colleagues and also receive feedback from them on your contributions.

Chapter seven

Essential competencies of teachers and principals

Imagine a garden with a hundred kinds of trees, thousand varieties of flowers, a hundred species of fruit and as many kinds of herbs. Well, if the gardener of this garden knows no botany differentiation of "edible" and "weed" then will not know what to do with nine tenths of the garden, will pull out the most lovely flowers, will cut off the noblest trees, or will hate them and look askance at them.

Hesse (1985, p. XXXIX)



1. The metacognitive teaching in pedagogical practice

From the socio-formative approach to competencies, the emphasis is not on the students, nor on the teachers, but on the inter-systemic relationship among both. Accordingly, metacognitive teaching involves the understanding and regulation that teachers carry out of the learning-teaching process, in order to form certain competencies in their students at the same time they build and strengthen their own competencies as professionals of pedagogy, guided by integral human formation (ethical project of life), trans-disciplinarity, open-mindedness, flexibility, social and economic demands, and the interweaving of knowledge through continuous reflection about their practice (Schon, 1992, 1998).

In this regard there are two concepts that reflect the essential steps through which metacognitive teaching occurs: knowledge and self-regulation. Knowing means for teachers to be part of student's learning, engaging in their goals and put themselves on the student's place, without losing their own role as teachers. This is embodied in a permanent diagnosis of how competencies are forming, guiding each student so that, in turn, practice self-diagnose.

Meanwhile, self-regulation has three actions: plan, monitor and evaluate. The planning parts of understanding the purposes of formation, and determines how, where, when and by what means are competencies to be formed. At this stage the teaching of learning strategies is planned according to each of the three knowledges: know to know (cognitive and metacognitive strategies), know to do (implementation strategies) and know to be (emotional and social strategies). Then what was planned is performed and monitored, which means to monitor how the process of learning-teaching is being executed, in order to make changes if necessary. Finally, continuously assesses the process of competencies formation in students and the teaching strategies put into action, taking into account the results, which are compared with the initial purposes.

Unlike traditional teaching, metacognitive teaching involves continuous construction, deconstruction and reconstruction of the teaching practice, from the reflection that the teacher himself / herself performs about his / her action. Therefore, change is not imposed from above but arises from every teacher at the school. At the same time, it is intended that every student learn from reflection at school and everyday experiences.

From the socio-formative perspective, metacognitive teaching is based on the cycle of academic quality management from the GesFOC model, addressed in Chapter Three, which consists of four circular steps: orientation, planning, implementation and

evaluation (see Figure 1). In other words, the same way quality is managed in a macro-curricular level in regard to the educational model and at a meso-curricular level on curricula and formative projects, also managing the quality of learning is proposed in a micro-curricular level, regarding the teaching mediation with students.

In each of the four stages in Figure 1, the teacher continuously monitors how is him / her mediating learning and implements improvement actions to ensure effective formation of competencies in the framework of the ethical life project.

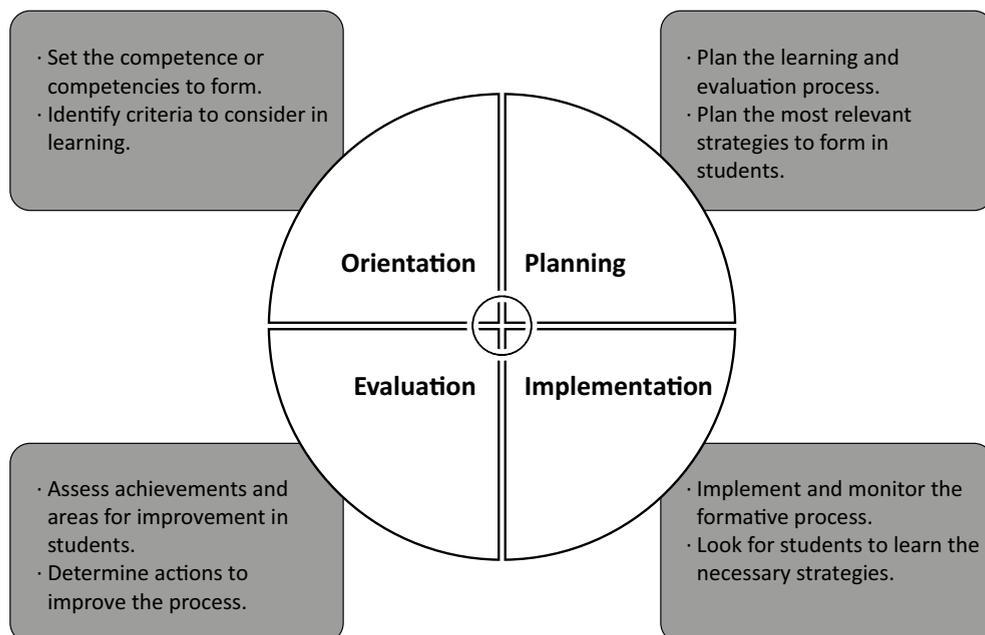


Figure 1. Key steps in metacognitive teaching

2. Are competencies formed, developed, learned or built?

The integral formation and learning of competencies have as a central problem the confusion that exists about whether these are formed, developed, learned or built. To better understand this situation, is important to review what is meant by each of these terms (see Table 1).

Table 1. Usual definitions of formation, development, learning and building

To form	"Make something with a material or elements: form a snowball" (Moliner, 1999, p. 1327). "Compose different things together " (Moliner, 1999, p. 1328). "Compose one thing by joining other" (Moliner, 1999, p. 1328). Other meanings are: educate, train.
To develop	"Extend one thing that was rolled up. To roll out. Grow an organism to reach its final adult size or maturity status" (Moliner, 1999, p. 911). "Give greater amplitude or importance to something, or boost the activity of something: exercises to develop memory" (Moliner, 1999, p. 911). Other meanings are: to mature, to unfold, to take off, stretch, germinate.
To learn	"Generate new behaviors, attitudes and knowledge to concrete situations of the personal, social and environmental life."
To build	Do one thing gathering the necessary elements, for example, build a boat (Moliner, 1999). Other meanings: ideate, elevate, rise, and do.

None of the four perspectives taken individually gives full account of the process of structuring competencies on human beings. Each has advantages and disadvantages; therefore, how to solve this matter so that the education system is enriched in clarity and understanding? There are many alternatives, but the stronger comes from the application of the dialogic principle of complex thought, which refers to the complementarity of opposing ideas in an articulated weave. Therefore, it suggests to take competencies-based teaching from the union of the four concepts listed (formation, development, learning and construction).

1. **Formation:** on competencies, the formation process is expressed as the reunion, integration and interweaving of various knowledges to enable the emergence of a new human being able to think for him / herself, critical and self-critical of the socio-economic conditions, taking into account his / her potential; which is contrary to the traditional claim of molding a specific type of person according to unclear interests or not focused on human development. The formation has an integral character, oriented from the ethical life project.
2. **Development:** On competencies, there are processes ranging from a state of relative wholeness to states of greater regulated differentiation, coherent articulation, hierarchical integration and ordered growth (Montenegro, 2003). Cognitive development is marked by the maturation of biological structures, specifically neural structures, in which genetic influences. Such cognitive development is the process by which cognitive phenomena pass through a series of stages, each of which has certain characteristics in the information processing. This occurs, for example, in the development of intelligence, in which cognitive

structures evolve from the sensorimotor stage to the stage of formal operations, in order to enable the adaptation to the environment. Teaching has the task, then, of implementing strategies to favor the development of cognitive and affective structures, since these are the basis for structuring the various affective-motivational, cognitive and performance instruments.

3. **Learning:** competencies have components that are learned through interactive, contextualized practice; not a priori or which are in the nature of the person. Teaching must implement relevant and suitable processes for people to incorporate new structures of action that will enable them to solve increasingly complex context problems; thus they have new tools to perform and act in life.
4. **Construction:** on competencies there are processes that are built (Gallego, 1999) based on basic sub-processes possessed previously. For example, in middle-high school students develop and reinforce abstract cognitive processes and categories based on the notional and conceptual structures addressed in elementary education. Teaching, as such, must build learning maps to articulate the different educational levels and to enable building new competencies based on previous knowledges.

3. Concept of teaching strategies

The concept of strategy refers to a set of actions that are projected and implemented in an orderly manner to achieve a given purpose. Thus, everything done has a meaning given by general thrust of the strategy. In the field of education, didactic refers to plans of action a teacher implements systematically to achieve certain learning objectives in students (Pérez, 1995).

From strategic teaching, strategies are planned and implemented in a flexible manner continuously reflecting on the formative process to adjust them to it and facing the uncertainties that may arise along the way, considering the complexity of any education act (Tobón and Agudelo, 2000). Strategies are composed of three elements (Avanzini, 1998): (1) Purposes (here are the social, institutional and personal purposes to be reached); (2) contents to be formed (are given by the areas and courses), and (3) conception we have of students.

Teaching strategies are developed according to a given teaching method, which is a general method to address learning. In turn, teaching strategies guide the establishment of technics and activities (see Figure 2 and Figure 3).

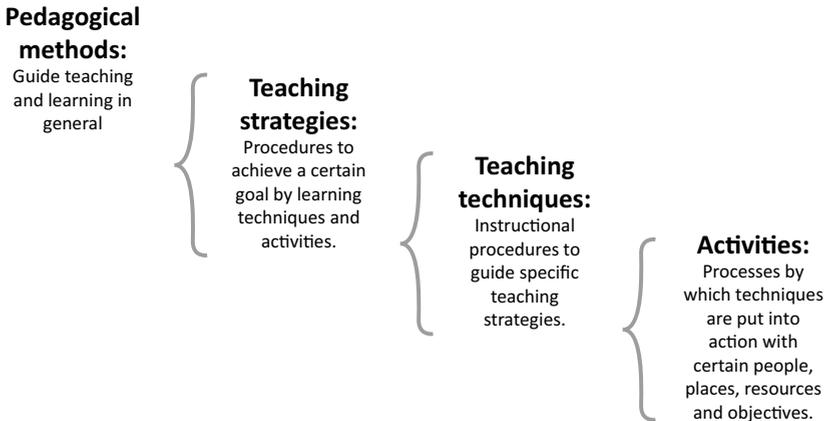
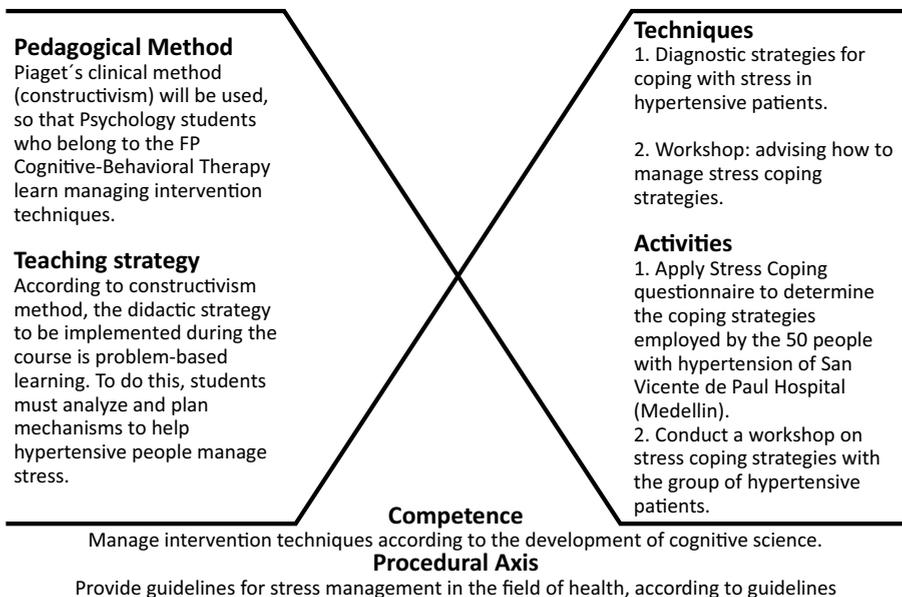


Figure 2. Relationship between methods, strategies, techniques and activities

Despite this classification, it should be noted that strategies in a given moment could become techniques, just like techniques can be converted into strategies. Therefore, one must always take a flexible attitude in the learning process and transcend all systematization that hinders formation itself, since "any attempt to educational assistance, from educational efforts, is a risk, a challenge and a constant and potential desire for improvement" (López-Herrerías, 2002, p. 16).



Note. Planning was aimed at the formation of the procedural axis of the competence.

Figure 3. Example of articulating a teaching strategy with a pedagogical method, techniques and activities with Psychology students within the framework of the formative project "Cognitive Behavioral Therapy"

4. Teaching, reflection and complexity

4.1 Reflection and self-reflection

Teaching oriented to the formation of competencies requires putting into action reflection and self-reflection of teachers through analysis, deliberation, discussion and interpretation around teaching strategies that are implemented to guide students' learning. This implies continually reviewing the work plan, actions, needs of students, orientation provided and mediation of resources. Thus, each teacher stops being a technician and implementer to become an autonomous professional who daily builds his / her suitability by seeking excellence and developing his / her own competencies (see García, 2000).

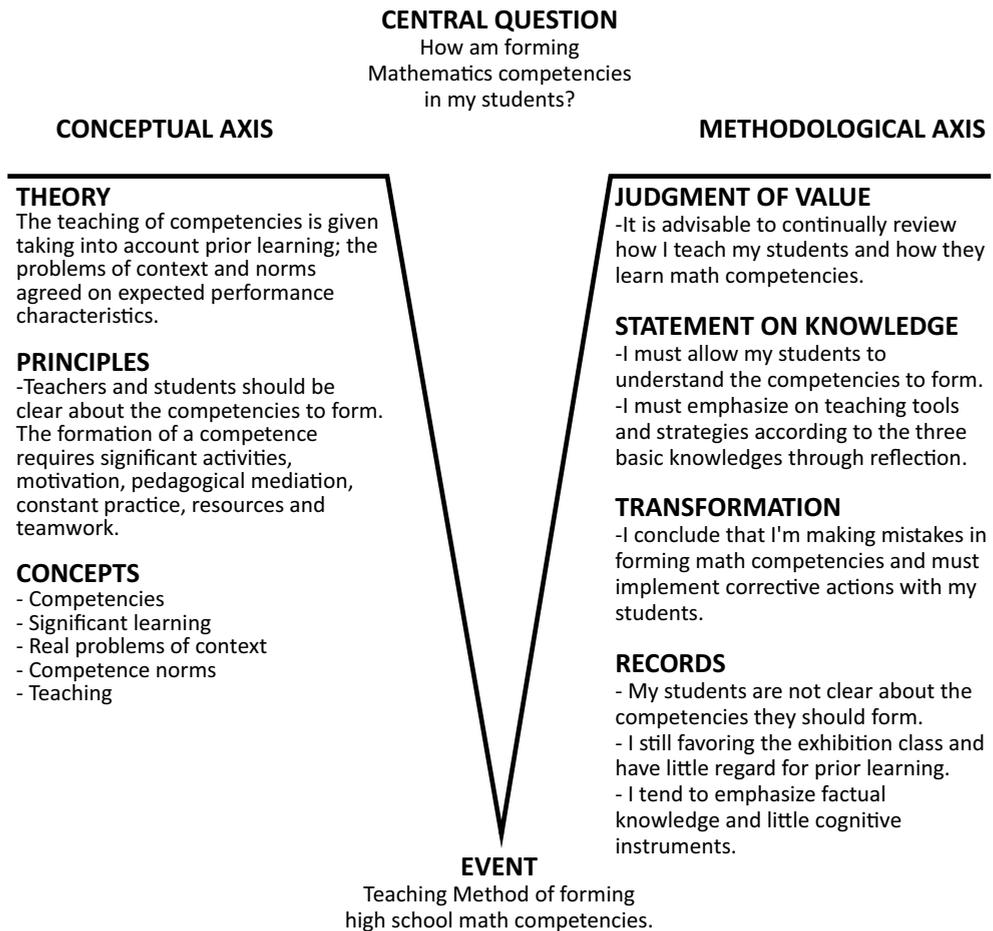
The art of forming competencies requires not only training, but also a continuous reflective learning by doing, in which teachers are aware of the achievements and mistakes to implement remedial actions in the teaching practice. This model departs from the technical rationality that has prevailed in teaching (e.g. instructional teaching based on behaviorism) and enters the assumption of the practical rationality based on thinking and learning from -and within- the experiences lived in everyday teaching (Schon, 1992).

The reflective teaching example shown in Figure 4 shows the most important guidelines to consider in this methodology: (1) guide reflection based on the question of how we are teaching and how our students are learning; (2) contextualize the questions on specific competencies formation events; (3) From the above, we must build a solid conceptual knowledge, in which we have clarity in concepts, principles and theories immersed in the events related to the central question guiding reflection, as shown in the example (conceptual axis); (4) the next step is to perform a systematic recording of the delimited events and then compare and analyze the information (transformation), to draw conclusions and make supported judgments about our teaching practice (methodological axis). From here new learning and purposes arise to be implemented with students.

4.2 Teaching from complexity

A competence is a complex performance process. Its formation, learning, development and construction requires a teacher to risk out of the paradigm of certainty, the known and the controllable, assuming surprise and what is to be known as a determinant part of vital processes as well as the authentic possibility of creation; the teacher's vision should be broad in order to make room for different knowledges, allowing these to

articulate and integrate systematically from the same problems they arise from; the look at the action cannot be missing, but must also be a builder of conceptual and values knowledge, that protects him / her from falling into the purely instrumental rationality; must be a person related to the culture and concerns of society, bringing the rudder to them and channeling them into learning-teaching processes regenerating human tissue.



Note: This example was created by a teacher on the implementation of competencies model. We recommend reading the graph from bottom to top in each axis.

Figure 4. Example of reflection on an educational activity using the V heuristic

Competencies-based formation needs to deliver strategies to individuals in order to be able to build and defend their civil and democratic rights, as well as to participate in a labor world where knowledge increasingly reigns. (Torrado, 2000). "We talk of competencies in terms of those individual capacities that are necessary condition to promote social development in terms of equity and exercise of citizenship" (Torrado, 2000, p. 32).

Education still gives great emphasis to the lecture, which looks for knowledge transfer from a vertical relationship, patriarchal and of subjugation. In this educational sense, the world is shown as deterministic and given, refusing the possibility of diversion, curiosity, error and question (Rozo, 2004). The strategic teaching, based on complex thought, considers lecture or expository class, but the emphasis is not on this, but takes it only as a support tool that complements other didactic strategies. This is done in an atmosphere of participation, establishment of agreements, teamwork, learning from the mistakes and coping with uncertainty. Table 2 shows a series of teaching suggestions to guide the process of learning-teaching from complexity.

Table 2. Knowledge of complex thought and its application in the learning-teaching process, based on Morin (2000a)

Knowledge	Teaching guidelines
1. Teaching the knowledge process and its tendency to illusion and error	<ul style="list-style-type: none"> -Enable spaces for people to make contact with themselves, others and the environment in which they live, favoring awareness and regulation of cognitive and affective processes involved in knowledge. -Encourage self-observation and self-reflection individually and in groups to identify and manage formatively potential errors, blindness, illusions, passions, totalitarianism and false dichotomies.
2. Teaching relevant knowledge	<ul style="list-style-type: none"> -Orient the different activities and sessions around real issues that make sense to people. - Continuously relate the parts to the whole and the whole to the parts. - Integrate knowledges from different areas through problems and projects. -Articulate education with the social, cultural and labor needs.
3. Teaching of the human condition.	<ul style="list-style-type: none"> -Develop formative projects on the human condition linking different areas. -Guide students in building their ethical life project. -Enable through different activities that people can reflect on transcendental questions for life: Who are we? Where are we? Where do we come from? Where are we going? What is our mission?
4 Teaching of earthly identity.	<ul style="list-style-type: none"> -Provide spaces for students to relate the local problems to national and global issues, in order to establish multiple interdependencies. -Promote respect for cultural diversity, seeking continuous dialogue of knowledges based on mutual enrichment, as members of a global village and a homeland.
5. Teaching the uncertainty process.	<ul style="list-style-type: none"> - Encourage in the different areas the understanding of the organization of systems and processes of order and disorder. -Guide students in analyzing potential risks in a given project and coping through the development of strategies contextualized to the environment.
6. Teaching of the comprehension process.	<ul style="list-style-type: none"> - To promote cognitive and affective contact with the situation in formative activities. - Analyze the problems in the context where they occur, weaving relations between the factors involved. -Guide students to be linked to community and labor projects to be part of them and understand the problems related.
7. Teaching anthro-poetic ethics	<ul style="list-style-type: none"> -Generate attitudes of solidarity between students, teachers, parents and the community. - Create spaces for reflection for students to assume their responsibilities towards themselves and others.

4.3 Forming complex thought in students.

The world becomes complexity: from a culture based on tradition and durability of values and ideas has passed to the emergence of multiple lifestyles, the continuous change in values and a weakening of the ideological concepts with pretensions to universality (Santos, 2001). We are witnessing a period of profound transformations unprecedented in the history of mankind. Thus, there are new problems and challenges: coexistence in difference, the search for identity with the continuous change, building solidarity with the increasing social and economic exclusion, establishing agreements with cultural and economic conflicts of great magnitude, sensitivity to the planet as a whole, basis for constructing a culture of respect and care for the environment.

Finding complexity in social processes, as well as in biological process- requires educational institutions to transform in order to form human beings who practice complex thinking, from their very own condition of complexity (Santos, 2001), enabling them to construct reality as a multidimensional fabric, with clarity and judgment of ideas, with distinction and synthesis of elements, articulating one and the many, unity in diversity, the regular and the changing, the local and the global. This means transcending the curriculum approaches in which reality is assumed to be predictable, futuristic, local and unchanging. Therefore, complex thought must be a crucial issue to work within the curriculum and the various subjects of a formative program (Tobón and Agudelo, 2000).

5. Planning and employment of didactic strategies

Here are some general recommendations in order to plan and implement didactic strategies into concrete learning activities:

- 1) Often teachers have resistances to employ different teaching strategies to those they have traditionally followed in pedagogy, as is the case of the lecture or expository class. In Table 3 some common strengths in this area are described and provide suggestions for improvement.

Table 3. Most common resistances in the use of teaching strategies

Resistance	Demonstration	Recommended
Do not provide anything new	When didactic strategies are exposed, sometimes teachers say they have always worked, but using other words. This keeps them from embrace them or be motivated to study them.	<ul style="list-style-type: none"> - Recognize there have been innovations in the teaching strategies as a result of pedagogical, psychological, sociological and anthropological research, reason by which the strategies bring new meanings, visions and significance. - Understand that traditional teaching strategies (e.g., expository class, lecture, review the material, etc.) are insufficient to form competencies.
Are complicated	Teachers often express that new teaching strategies are difficult to implement because they are complicated or very "technical".	<ul style="list-style-type: none"> - Further training in depth, since human beings tend to take what is not known as hard to do, because it is not familiar. - Having contact with other teachers who apply the strategies in their pedagogical practice and ask advice on this field. - Use videos and teaching materials to better understand the implementation of the strategies.

2) Once recognized and learned to manage resistances -if there are any- the next step is to select the teaching strategy or strategies more consistent with the formation of the competence the teacher has projected to form in a given formative project. This selection is made taking into account the criteria and required evidence, as well as institutional policies and the availability of resources.

3) Besides the structure of competencies, institutional guidelines and resources available, we recommend selecting teaching strategies for a particular formative project considering whether they are aligned to the formation of appropriate and responsible action. It is important taking into account the principles described in Table 4.

Table 4. Principles to be considered when selecting a teaching strategy

Activity	It is necessary every teaching strategy allow students to take active and not passive roles to learning.
Reflexivity	Reflection is an essential component that must be present in the formation of competencies, considering the what, what for, why, how, when and with what.
Inclusion	Teaching strategies should enable students to work with their varying degrees of competence.
Adequacy	All teaching strategies should be adequate to the conditions of students on cultural aspects and formation of the selected competencies.
Pertinence	The strategy must address real-world processes.
Congruence	The steps of the strategy, techniques and activities should be consistent with the competencies to be formed in a course or formative project.
Motivation	The strategy must possess curiosity, challenging, creative and innovative aspects.

- 4) Once you have selected the didactic strategies to employ, the next step is planning activities through which they will be executed taking into account aspects such as date, duration, methodology, resources and evaluation.
- 5) In formative projects, planning complementary teaching strategies should be articulated to activities, scenarios and planned resources.
- 6) It also recommended incorporating into the learning sessions activities to form the competencies of information and knowledge management, as proposed in Table 5.
- 7) It is important to consider when implementing teaching strategies how the teacher will guide the learning sessions coordinated directly by him / her, either within the actual class or virtual education. Generally, a learning session (known traditionally as a class session) is structured by a beginning, development, synthesis, reinforcing and assessment. Table 5 shows examples of common activities, which are used in each of these moments.

Table 5. Examples of learning activities to form competencies of information and knowledge management

Competence	Didactic activities
Interpretative	<ul style="list-style-type: none"> - Paraphrase: exposing the approach of an author's using own words. - Modeling: construct examples of how a given topic applies. - Analogies: establish similarities of an issue with others. - Conceptual Network: develop graphically the relationships between main and supporting ideas of a subject according to certain purposes. - Reading. Read a document, determine its structure and understand its meaning. - Analysis of art masterpieces: observe, analyze and raise comments on its meaning.
Argumentative	<ul style="list-style-type: none"> - Justification: give reasons for using a particular procedure in performing an activity. - Causality: analyzing the causes and consequences in a given phenomenon. - Debate: conduct a group discussion in which students analyze an issue exposing different positions and arguments.
Propositive	<ul style="list-style-type: none"> - Build problems: identify and describe drawbacks in the analysis of a problem. - Solve problems: finding solutions to problems in a way that is creative and innovative. - Hypothesizing: formulate and sustain hypotheses to explain certain issues. - Literary elaboration: describe situations and imagine possible worlds.

Table 6. Types of activities for a learning session with direct support from the teacher.

Type of activity	Didactic activities	
Opening activities	They are held at the beginning of the class or learning session to detect previous knowledge and motivate students to learning.	<ul style="list-style-type: none"> - Develop the agenda of the session. - Game of questions. - Observation sheets. - Group integration dynamic. - Listen to songs. - Read stories.
Development and learning activities	Seek to form the components of each of the three knowledges of competencies. Should emphasize the functionality of learning.	<ul style="list-style-type: none"> - Systematize and organize information. -Write essays. - Present a topic. - Present situations that generate an imbalance between previous and new knowledge. -Lab practice. - Executing a procedure following a video. - To visit a company to know how to carry out a professional process.
Summary and Synthesis activities	Look to synthesize central aspects addressed during the learning session. They help reinforce learning.	<ul style="list-style-type: none"> - Reading a report. -Graphical summary of the key aspects worked during the session using a mind map.
Reinforcement activities	They are complementary activities to those activities of development and learning, or summary and synthesis, and are carried out with students who have a slower pace of learning or have difficulty learning.	<ul style="list-style-type: none"> - Analysis of further reading. - Bibliographic consultation on conceptual gaps. - Written workshop to solve the difficulties of the student.
Assessment activities	Seek to determine achievements in learning from the initial objectives. It also determines the impact of the activities carried out.	<ul style="list-style-type: none"> - Satisfaction with the facilitator and realization of the activities. -Student performance and achievements obtained.

8) Finally, it is recommended facilitating learning considering the following:

- Agree with students the formation of competencies taking into account their expectations and socio-environmental and labor challenges.
- Focus on student learning, considering the process of teaching and teacher mediation.
- Establish didactic strategies involving students.
- Guide students to self-motivation and awareness of their plan of life and self-realization.
- Assign activities that are meaningful for students.
- Lead in obtaining resources to conduct activities suggested.
- Integrate in the formative activities processes for the assessment of competencies.
- Guide students to build strategies in each of the knowledges of competencies.

6. Teaching of affective, cognitive and performance instruments.

6.1 Values, attitudes and norms

The learning of values, attitudes and norms is a slow and gradual process, given by the influence of personal experiences sustained along life, the social group within which one lives, family, peer and mass media. Hence every teaching process that intends to form affective-motivational instruments must consider these factors and articulate them in a particular direction. In educational institutions, progress has been made in incorporating affective-motivational instruments within the curriculum, but most of the time this stays only as good wishes, because teaching strategies are not implemented systematically to teach them.

Guidelines for teachers:

- The teacher should seek mechanisms to ensure students can observe people putting into action the attitudes intended to form; this implies the need for the

same teacher to be a model of these attitudes.

- The formation of a new attitude implies, generally, a change in a previous attitude. For example, from the openness to new knowledge requires guiding students in modifying the attitude to stay in the familiar and safe. To do this, it takes a persuasive teacher who attempts this by presenting examples and situations of everyday life.
- Implement participatory techniques such as role play, sociodramas, skits, case analysis, visualization of movies and study of life experiences.
- Guide students to become aware of their attitudes and reflect on these. This can be done by formulating questions around performance, readiness for learning and responsibility in the study.

6.2 Notions, propositions, concepts and categories

Teaching this type of content requires tools such as the conceptual mentefactos (Zubiría, 1998), concept maps (Novak and Gowin, 1988) Heuristics V (Novak and Gowin, 1988), the conceptual cartography (Tobón and Fernández, 2003) and semantic networks (Dansereau, 1985). These teaching strategies are very different from those used to form specific or factual knowledge: reading, re-reading, exercises for checking and review of a topic.

Guidelines for teachers:

- Teach students cognitive strategies such as conceptual mentefactos and concept maps to be themselves, with support from the teacher, those who build the cognitive tools.
- Introduce the notions, propositions, concepts and categories in the learning situations and in school textbooks and guides with support of graphic maps.
- Take into account the previous knowledge of students to promote understanding of new knowledge.
- Provide sufficient opportunities for students to explore, understand and analyze the concepts and categories as well as other cognitive tools.

6.3 Procedures and techniques

Teaching these instruments happens gradually based on contextualized learning activities and close to the real environments where the competence will be put into action.

Guidelines for teachers:

- Guide students to understand the context in which they will be required to put into action these procedures.
- Teach procedures and techniques from real activities or simulated near to the context of performance.
- Promote in students a progressive control and accountability in handling procedures with the teacher's guidance, which must be decreasing as students learn these procedures.
- Facilitate for students to move progressively from an execution of procedures with effort, disruption, uncertainty and continuous trial and error to a more automatic, ordered execution with less effort, that is systematic and rule-governed.

7. Methodology of creating learning and research communities

Forming affective-motivational, cognitive-metacognitive and performance instruments and strategies, requires structural changes in the pedagogical practices of educational institutions, in order to form authentic communities of competencies development where everyone learns from all through self-reflection and social interaction. This is the spirit and philosophy of learning and research-communities, which are based on pioneering contributions from Lipman (1993) and Brown and Campione (1996). Technically, are organizations made up of students, teachers and members of the educational community and society, in which are held activities for the identification and solving of problems, learning of knowledge and project implementation (applied and research) to develop and strengthen thinking skills.

Form competent cooperative people (López-Herrerías, 2002) is not possible from isolated teaching actions. It requires communities where people share their life

experiences (in the classroom, in institutions and in society), where the difference in the rhythms of learning and potential is recognized, so that there is complementarity in competencies, based on respect, solidarity, responsibility and commitment.

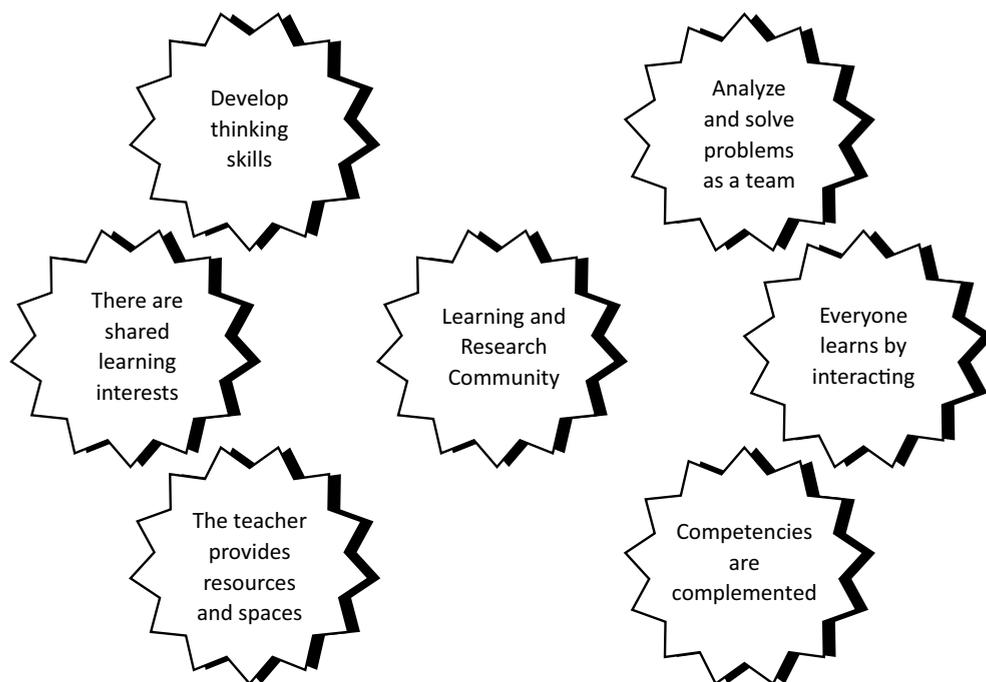


Figure 5. Characteristics of learning and research communities

8. Teaching strategies of know to be, know to know and know to do

As in teaching the affective-motivational, cognitive and performance instruments, teaching referred to strategies in each of the knowledges involves having clarity about the competence that wants to be formed in a given formative project, taking criteria into account.

Teaching useful and meaningful strategies for students is a major challenge for education (Beltrán, 1993, 1995, 1998) and, therefore, for competencies formation, as the ideal performance is based on intentional action plans, self-paced and focused on goals.

Setting goals and purposes, knowledge of psychological processes, performance assessment, environmental control, management of motivation confidence in one, among other things, contribute to successful learning (González et al., 1999; Nisbet and Shucksmith, 1987; Valle et al., 1999). Also the use of strategies by students corresponds with better performance in the study, comprehension and success (Bernard, 1993, 1999).

At this point, two general recommendations are essential. First, it is essential to form strategies within the formative projects, to the extent that it has been proposed that effective teaching of strategies cannot be outside the relevant curriculum (Pozo, 1989). This enables linking strategies with the right action, something that is lost when such strategies are taught outside the curriculum, as has been the case with many traditional cognitive training programs (E.g., Feuerstein's program for instrumental enrichment and the applied intelligence program of Sternberg).

Secondly, keep in mind that significance and functionality are issues of great importance in teaching strategies, implying to be based on activities and problems that are meaningful to students, whether real or simulated. This requires continuous practical work so that people can develop a comprehensive knowledge about how, when, where, why and what for use them.

Here are discussed seven key dimensions in teaching strategies, based on Beltrán (1995), González et al. (1999) and Valle et al. (1999):

- 1) Teaching strategies through specific activities, as this favors the information processing, facilitates learning and improves the effectiveness and efficiency of performance. This allows students to be convinced that the strategies are useful and necessary for success and suitability. From this motivation, the following step is to raise awareness about the fact that learning and putting into action strategies require time and effort, but with practice can be automated, becoming a valuable resource for solving problems of diverse nature (Valle et al., 1999).
- 2) Teach students all conditional knowledge needed to implement a particular strategy such as why, where and when put it into action (Paris, Lipson and Wixson, 1983). This involves being clear about the goals, tasks (problems or activities), scope, benefits of implementation, effort needed and value of the results (Valle et al., 1999).
- 3) Instruct students in a direct, sequential and planned manner, which means: (a) presenting material in small steps; (b) focus on one aspect at a time; (c) organize the material sequentially; (d) model how the strategy is applied; (e)

give examples of application of the strategy; (f) explain difficult processes and issues; (g) control student's progress (Rosenshine, 1983).

4) Guide students to learn to use the strategies based on the daily reflection on their study practices, to make them aware of their shortcomings and how can overcome them.

5) Search for a transfer of strategies from the teacher to the students and then among students themselves. This is as follows: students act first as students in the incorporation of strategies and then as teachers of their own peers (Palincsar and Brown, 1984). Teach others favors consolidation of the strategies in own action and, in turn, facilitates learning in other peers (cooperative learning).

6) Use instructional materials in writing or electronic-multimedia formats looking for: (a) integration of learning support materials (LSM) of formative projects; (b) clarity and ease to be understood; (c) simple explanations with examples; (d) concrete guidelines on how to apply strategies; (e) motivation to follow these strategies describing its benefits, and (f) show how can be implemented from cognitive capacities (Monereo and Clariana, 1993).

7) Current research shows how the largest deficit in students with learning disabilities is not a lack of skills, but lack of strategies for information processing, especially those of metacognitive type. Therefore, the work of teachers should seek for these students to be aware of the processes involved in learning and learn to plan, direct and control them, by the practice of reflection, as an activity is performed (meta-learning) which is related to an improvement in the academic performance (Bernard, 1999).

Metacognitive strategy example: self-statements

This strategy consists of a set of instructions that the person gives him / herself to self-regulate attention and performance around a problem, which can be done mentally or aloud. This helps to overcome problems such as inattention, lack of concentration, hyperactivity, impulsiveness and aggressiveness, problems in which there is difficulty in regulating the action through language. Below the teaching process is described.

Teaching the strategy begins with an introductory session in which the teacher explains to the student or students the importance of tackling a task reflectively through mental self-instructions. Then they choose a specific activity and the teacher is a model to the student performing the activity and giving self-instructions aloud.

Example:

Do you know what self-instructions are? They are instructions that a person gives him or herself to perform an activity in a planned and efficient way. These allow keeping the attention, concentration, and go step by step, being aware of mistakes and correct them immediately. Now I'll guide you to learn this technique from the resolution of a problem. You'll love it!

After the teacher models the technique, the student imitates doing the same activity guided by his / her own instructions. Then, the student performs again the same activity, but he himself provides the instructions given aloud. The teacher provides continuous feedback on their performance and, in turn, seeks for the student to self-assess how they are learning the strategy. The next step is to look for the student to internalize the self-instructions. In this regard, the teacher asks them to pronounce the instructions each time with a lower pitch until they provide the guidance to themselves mentally while doing the task.

Then, the student is prompted to apply such self-instruction in daily activities and self-reinforce each time they get it right. When there are several students in formation, the methodology of reciprocal teaching (Palincsar and Brown, 1984) can be applied, through this one the students model, as does the teacher, the application of the strategy with respect to performing a task and then choose another student to apply it.

Step 1. Analysis of the situation through self-questioning

As a first step it is intended that the student, before undertaking any activity, questions her / himself about what she / he must do. Thus, it enables them to learn to observe him / herself in the way he / she behaves.

Examples of self-instructions:

What do I have to do?

How have I handled the situation before?

How I shouldn't handle it?

What is happening?

How I can better handle this situation?

Step 2. Planification

In this step the person is taught to conduct an analysis of how to better plan the way to approach the task.

Examples of self-instructions:

What are my options?

What are the steps of the task?

What comes first?

What is next?

What is last?

What problems can arise and how can I address them?

Step 3. Self-testing

Guide the students to practice self-instructions to become aware of how they are performing the activity and correct their mistakes.

Examples of self-instructions:

Am I following the steps?

Am I doing it right?

What achievements I'm having?

What difficulties are presenting to me?

What changes can I do to improve my performance?

Step 4. Performance assessment

Upon completion of addressing the task students are taught to assess their implementation through self-instructions. Also, they are taught how to self-assess their

efforts and achievements.

Examples of self-instructions:

How did I perform the activity?

What achievements did I obtain compared with the objectives?

How were my dedication, effort and commitment?

Am I satisfied?

How I can do the activity better some other time?

Step 5. Self-reinforcement

Is to guide the student to praise him / herself for the achievements obtained and intends to continue to improve his / her performance with optimism and self-confidence.

Examples of self-instructions:

Great! I did a good job!

I worked well, but next time I will consider other alternatives.

I paid attention and I could understand the subject!

I deserve a break for the work done!

Next time I will do better!

9. Pedagogical mediation based on multiple intelligences

Multiple intelligences enable to design and articulate teaching activities considering the student's pace of learning and their different potential. They also promote the development of various capacities. In Table 7 we describe some suggestions for pedagogical mediation based on multiple intelligences, within a formative project.

Table 7. Pedagogical mediation based on multiple intelligences

Type of intelligence	Tips for students during a formative project
Logical-mathematical: sensitivity and capacity for abstract reasoning and numerical computation.	<ul style="list-style-type: none"> - Include statistical reasoning in diagnosis and formulation of a problem. - Construct an algorithm or flowchart to solve a problem. - Conduct a financial analysis of a project. - Apply mathematical reasoning to solve problems in the project as well as mathematical formulas.
Linguistic: sensitivity and capacity for literacy and verbal communication with others.	<ul style="list-style-type: none"> - Keep a journal where student describes and analyzes important events. - Expose orally the built solution to the problems of projects. - Develop a conceptual framework based on monitoring specific methodologies for constructing notions, concepts and categories (for example, by conceptual mentefactos, which consist in graphic procedures describing a concept based on four kinds of propositions: supra-ordination, exclusion, infra-ordination and iso-ordination).
Musical: ability to appreciate and produce musical rhythms, along with their tunes, melodies and sounds in different spaces.	<ul style="list-style-type: none"> - Include music in a particular activity. - Compose a rhythm for a stage performance related to an activity. - Analyze messages in a set of songs.
Visual-spatial: ability to perceive the visual-spatial world and perform transformations in own initial perceptions. Comprises thinking in three dimensions and orientation in space.	<ul style="list-style-type: none"> - Watching the space where the projects will be held. - Plot the activities to be undertaken. - Develop maps to understand the context of a curriculum.
Body-Kinetics: capacity for controlling body movements and handle objects skillfully.	<ul style="list-style-type: none"> - Perform manual activities such as drawings and models. - Perform a gymnastic performance. - Articulate verbal communication with proper management of gestures, hands and body posture. - Conduct choreography.
Interpersonal: ability to discern and respond appropriately to moods, temperaments and motivations of others, through understanding.	<ul style="list-style-type: none"> - Interact friendly and not aggressively with others. - Teamwork in the design, implementation and evaluation of the activities - Peacefully resolve conflicts through dialogue.
Intrapersonal: capacity for introspection and self-knowledge . Access own feelings and ability to take them into account in guiding behavior.	<ul style="list-style-type: none"> - Build and reinforce the ethical life project. - Link the formative project with the ethical life project. - Promote self-reflection to recognize achievements, difficulties and errors. - Manage the positive and negative emotions taking into account others, within the framework of a project and teamwork. - Understanding own strengths and weaknesses, assuming the attitude of continuous self-improvement.

10. Teacher's core competencies

To guide integral human formation and mediate the development, learning and competencies formation in students, teachers must possess the necessary competencies. From the socio-formative perspective, teaching competencies are those effectively put into action in daily educational practices, not those described in the profile of teachers in educational programs. To this we must be in a continuous improvement from metacognition.

The CIFE corporation has developed a proposal of competencies teachers should possess, based on experiences of formation and assessment of more than 5,000 teachers in Latin America, from different education levels (see Table 8).

Table 8. Essential competencies teachers must possess according to CIFE institute's studies in Latin America

Minimum teacher's competencies	Minimum criteria	Minimum evidence
1. Collaborative work Carries out collaborative projects and activities to achieve certain goals, according with the educational model and action plans of academic programs.	1. Has cordial and respectful relations with others, which enables him / her to face challenges and difficulties that arise. 2. Supports the different methodologies for collaborative work, according to the objectives established. 3. Conforms teaching, research and extension teams, in accordance with the institutional policies. 4. Makes action plans within teams according to the challenges and requirements of the context. 5. Promotes activities of collaborative work in students considering certain lines of action and goals. 6. Participates in collaborative processes with colleagues, administrators and students, according to certain pre-established goals.	1. Report of the achievements of at least three teams of students on one or more goals and the action policies set. Discusses how teamwork helped the achievement of the goals. 2. Record on the approach of a conflict in a team of students and how was solved. 3. Report of collaborative work with other colleagues respect to several goals and an action plan established during an academic period. Discuss how teamwork helped achieving the goals.

<p>2. Communication Communicates orally, written and assertively with the community, colleagues and students, to significantly mediate integral human formation and promote cooperation, in accordance with the requirements of educational situations and institutional performance.</p>	<ol style="list-style-type: none"> 1. Interprets written texts according to the challenges and requirements of a situation. 2. Produces written texts to communicate certain messages, with relevance, cohesion and according to the rules of grammar. 3. Communicates orally with others, promoting understanding, comprehension and the effective realization of the activities. 4. Expresses clearly and friendly, respecting the rights, emotions and opinions of others, according to the challenges of each communicative situation. 5. Performs self-reflection on own communication and corrects errors, considering the communicative situation. 	<ol style="list-style-type: none"> 1. Audio or video of a class or conference. Must be accompanied by an assessment report of the dissertation by attendees. 2. A relevant publication around the area of expertise during the two most recent years. It can be: an article, manual, book or paper. Must follow the rules of style in writing. 3. Assessment report about assertive communication developed by two different groups of students, and by at least two colleagues. This report should indicate at least: degree of listening, message clarity, management of norms, friendliness in communication and respect for the rights and views of other's when talking. 4. Report on how has him / her contributed to improve communication of at least two students or other people, showing their learning evidence.
<p>3. Mediation Mediates formative, teaching and Assessment processes for students to develop the competencies of the graduate profile, according to criteria and evidence established.</p>	<ol style="list-style-type: none"> 1. Plans formative processes on the basis of diversity in the rhythms and learning styles, as well as different socio-cultural contexts. 2. Establishes an empathetic relationship and of collaborative work with students, strengthening the working environment in the classroom. 3. Carries out formative sessions with teaching strategies relevant to the competence to be formed, the criteria established, the evidence to be presented and the performance level expected. 4. It gives special support to students who have a slower learning rhythm or learning disabilities, considering the educational model of the institution and the expected goals. 5. Applies didactic and evaluation strategies considering the diversity in learning and in socio-cultural contexts. 6. Implements actions for continuous improvement in his / her teaching practices based on assessments carried out and the innovations in pedagogy or in educational policies. 	<ol style="list-style-type: none"> 1. Report of the planning and execution of a course, module or formative project based on competencies. Must contain the addressed competencies, the problem or problems of the context that were tackled, activities undertaken, the evaluation evidence delivered by students and resources effectively employed. 2. Video of at least one complete class session working with competencies. Must be attached: evidence of the impact of the class session, report of students' evaluation, report of the evaluation of two colleagues and the report of the principal of the school or organization. 3. Complete report of the achievement of competencies by two different groups of students for at least one academic period and the impact of the teacher's mediation on them. 4. Report of supporting a student with learning difficulties and the impact reached.

<p>4. Learning Evaluation Assesses the competencies of the students to implement continuous improvement, according to the expected profile and certain pedagogical and methodological referents.</p>	<ol style="list-style-type: none"> 1. Plans evaluation according to the expected competencies. 2. Develops and / or adapts assessment instruments based on the evidence student's must present and certain pedagogical and methodological references. 3. Determines the achievements, areas for improvement and performance level of competencies in students, depending on the application of certain assessment instruments. 4. Provides feedback in a cordial and purposeful manner to students, considering the competencies to form. 5. Ensures continuous improvement by students according to the competencies to form. 6. Applies competencies assessment considering the diversity in learning and in socio-cultural contexts. 	<ol style="list-style-type: none"> 1. Document with the evaluation plan in a subject, module or a formative project. 2. Evaluation instruments applied to two different groups of students, with evaluation of their relevance by the students and two colleagues. 3. At least five reports of competencies evaluation in students demonstrating the improvements made by them in the process.
<p>5. Resources management and ICT Manages educational resources and information and communication technologies to mediate students' formation, according to the expected goals and action plans.</p>	<ol style="list-style-type: none"> 1. Ensures that formation spaces are comfortable, organized and have the necessary materials and equipment, according to the learning goals and considering the institutional possibilities and the context. 2. Develops and / or adapts educational materials according to the competencies to form and taking as a base collaborative work with colleagues and students. 3. Delivers educational materials in a timely manner, based on an agreed schedule and certain quality criteria. 4. Assumes the use of information and communication technologies with a critical sense, considering the purpose of integral formation. 5. Develops learning plans articulating information and communication technologies, in correspondence with the curriculum goals and competencies to be formed. 6. Search, designs and / or adapts the information and communication technologies required in teaching, according to institutional possibilities, competencies aiming to form on students and ethical commitment. 7. Mediated the learning activities in students with the use of information and communication technologies, according to the competencies that are to be formed and ethical commitment. 	<ol style="list-style-type: none"> 1. Audio or video of a class or conference. Must be accompanied by an assessment report of the dissertation by attendees. 2. A relevant publication around the area of expertise during the two most recent years. It can be: an article, manual, book or paper. Must follow the rules of style in writing. 3. Assessment report about assertive communication developed by two different groups of students, and by at least two colleagues. This report should indicate at least: degree of listening, message clarity, management of norms, friendliness in communication and respect for the rights and views of other's when talking. 4. Report on how has him / her contributed to improve communication of at least two students or other people, showing their learning evidence.

11. Core Competencies of the Principal in an educational institution

The formation of students integrally and with competencies is not only a responsibility of teachers; also depends on the competencies of the directors of educational institutions, as well as on those of parents, politicians and leaders of social and business organizations. It is necessary, therefore, that all actors in society assume their responsibility to achieve quality education.

Regarding the directors, they must seize new roles, looking for the institutions they direct to offer quality education for all students, based on current educational policies and challenges of formation's future demands, given current trends. To do so, directors should be leaders in the planning, implementation and continuous evaluation of formation plans; coordinate quality assurance in learning; manage human talent in their charge; and seek for them to possess the resources needed to meet the expected goals.

This implies the need to grant educational institutions sufficient autonomy to respond to the diverse formation needs of their students and to the socio-economic range, with the necessary and sufficient resources to comply fully with their work, along with suitable human talent. It also requires the implementation of processes of continuous formation for directors, to develop and / or strengthen their competencies, of which depends to some degree, the school's performance.

Table 9 describes the essential competencies all director of an educational institution must possess. These competencies take into account recent studies, which show the work of the director is key to achieving students' competencies. Therefore, they must seek the curriculum meets the educational policies and the needs of the context, and that is implemented in the framework of continuous improvement.

In the analysis of successful experiences by the Wallace Foundation (2011) respect to directors of educational institutions it was determined that the directors with greater positive impact on the achievement of learning goals are characterized by:

- They create a friendly climate to educate.
- Cultivate leadership in others.
- Improve teaching and learning.
- Manage people, data and processes.

These aspects were integrated into the competencies of directors that are described in Table 9. There are other competencies also relevant, but these have been prioritized to have a narrower list.

Table 9. Core competencies of directors

Core competencies of an educational director	Some key criteria	Some key evidence
<p>Curriculum management Directs curriculum management to comply with the vision and mission of the institution as well as with current educational policies, according with defined roles, current regulations and needs of the socio-economic and ecological environment.</p>	<ol style="list-style-type: none"> 1. Achieves the participation of all curriculum management actors (teachers, students, alumni, parents, experts, etc.), according with the type of institution and identified challenges. 2. Leads the study of the internal and external context, both at present and ahead, using a methodology relevant to the formation of competencies. 3. Directs the construction and / or improvement of the institution's educational model, according to current educational policies and developments in pedagogy. 4. Directs the construction, contextualization and / or improvement of curricula based on the institutional educational model and current educational policies or trends in the area. 5. Directs the ongoing assessment of the curriculum to introduce improvements and innovations considering the results of the evaluation process. 6. Assumes educational change flexibly and openly, according to challenges from the disciplinary, social, economic and political context. 7. Has an ethical commitment for the institutional education project to respond to the social, educational, academics, and politic and environmental challenges. 	<ol style="list-style-type: none"> 1. Report of the curricular management process implemented, with the corresponding planning, execution and assessment of results. 2. Report of the evaluations of plans and programs that integrate the curriculum, with the respective deployment of improvements.

<p>Leadership of the formative process Leads the educational process to achieve the goals established in the curriculum on the basis of the management indicators, the competencies assigned and current normativity.</p>	<ol style="list-style-type: none"> 1. Directs the planning and put into action of the learning and evaluation activities, according to the teaching action plans. 2. Directs educational processes based on management indicators. 3. Partners with different stakeholders according to the institutional strategy. 4. Advises members of the educational institution in the application and evaluation of formative plans according to the established goals. 5. Achieve that formative plans translate into concrete actions with students, considering the learning goals. 6. Has perseverance in dealing with the academic processes and partnerships until achieving the established goals. 	<ol style="list-style-type: none"> 1. Report around the achievement of educational goals in the institution. 2. Report of the educational projects planned, executed and evaluated with corresponding impact and relation with curriculum management. 3. Report with at least two established partnerships. 4. Record of advisory sessions with teachers and classroom visits. 5. Monitoring report of academic performance of the students. 6. Report of results of a survey applied to members of the institution around the role of the director.
<p>Resource Management Manages the procurement of resources to ensure academic and administrative processes based on the requirements of the educational project.</p>	<ol style="list-style-type: none"> 1. Plans budget and investments' management according to institutional policy and current regulations. 2. Controls the budget execution in accordance with current legal criteria and institutional policy. 3. Obtains resources through the presentation of projects to different institutions and organizations in accordance with the needs and opportunities of the educational institution. 4. Manages contracts in accordance with institutional policies and current regulations. 5. Evaluates the status, occupation, optimization and maintenance of resources of the institution, according to the needs of the educational activities. 6. Demonstrates honesty in managing the resources of the educational institution and ensures its custody and care. 	<ol style="list-style-type: none"> 1. Report of financial management performed in the organization. 2. Report of the resources raised and its impact on academic and research processes. 3. Report of the status and management of the resources of the institution, with its corresponding optimization process.

<p>Certification Process Direction Directs the certification or accreditation of educational service process to ensure integral formation and development of competencies in students, teachers and administrative and support staff, with transparency, accountability and following the guidelines established in the institution.</p>	<ol style="list-style-type: none"> 1. Coordinates the quality assurance system of educational services based on the philosophy and guidelines adopted by the institution. 2. Orients the documentation of processes to certify or accredit according to parameters received by the institution. 3. Evaluates the quality assurance system of the educational service based on the established criteria. 4. Has spirit of challenge to ensure the quality of academic and administration processes of the institution. 	<ol style="list-style-type: none"> 1. Report of the quality Assurance process in the institution with the corresponding documents. 2. Report of the impact of the quality Assurance process in the institution.
<p>Human talent management Manages talent of the personnel in charge in order to meet the formation purposes and the development of competences in the students, according with current regulations, strategic planning in the institution and transparency in actions.</p>	<ol style="list-style-type: none"> 1. Determines competencies profiles of jobs according to the educational project at the institutional level. 2. Manages the recruitment, selection and hiring processes according with established competencies profiles and current regulations. 3. Manages the formation and assessment of human talent in accordance with the job profiles by competencies and goals of the organization. 4. Rates the performance of teachers in their classes or sessions and ensures improvement according to the established goals. 5. Creates conditions that favor the organizational climate based on the requirements of established projects. 6. Manages the promotion and remuneration (or incentives) of the members of the institution according to their performance. 7. Manages human talent with ethical commitment. 	<ol style="list-style-type: none"> 1. Report with the human talent managing planning in all its processes. 2. Report of the execution of the different processes of human talent management for one year, with evaluation of its impact.
<p>Marketing Directs the offer of services and educational products to the community to enroll in the institution interested persons that comply with the entry profile expected, according to the educational offer, the requirements of users and legal standards.</p>	<ol style="list-style-type: none"> 1. Defines niche market, based on the characteristics and needs of users. 2. Formulates promotion and marketing strategies of educational services depending on the target population. 3. Coordinates the marketing processing the educational institution with honesty and social responsibility, respecting ethical standards that exist for the effect. 	<ol style="list-style-type: none"> 1. Report of the marketing process for one year with demonstration of its impact.

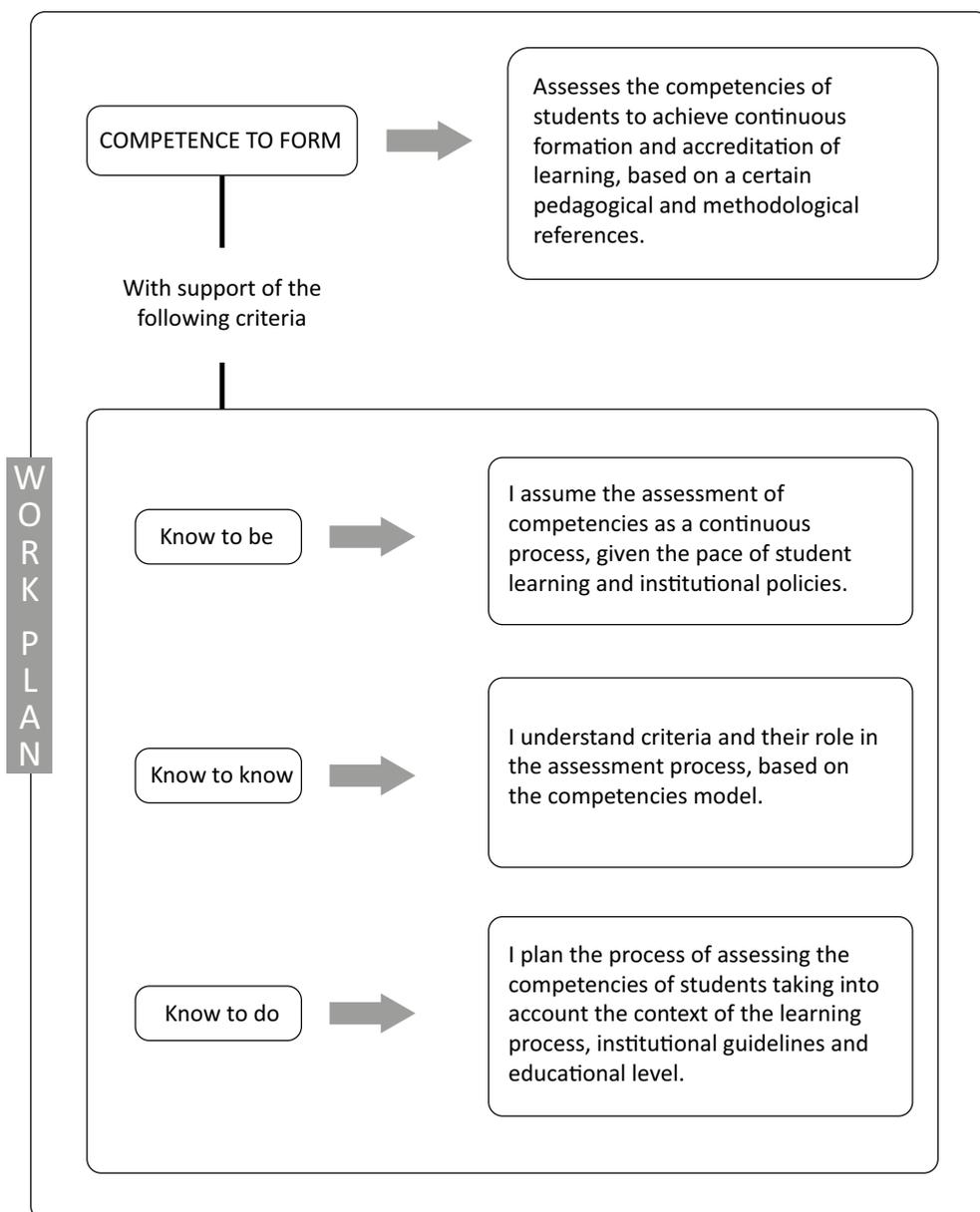
12. Suggested activities

- 1) Draft a mental or conceptual map of the essential components of metacognitive teaching, integrating into it other elements that you consider relevant.
- 2) From the competence identified and described in the session of activities in chapter three, determine the most relevant didactic strategy. Describe how to apply this didactic strategy taking into account the particularities of the competence. Indicate the guidelines by which the components of the know to be, know to know and know to do, will be formed.
- 3) Considering the model of metacognitive teaching, draft a self-reflection about what elements of this you are currently following in the pedagogical process and which ones you don't follow. Analyze how you could improve your teaching in the immediate future having as a guide this methodology.
- 4) Check again Table 11 on recommendations to overcome resistance against the use of teaching strategies and analyze which of the resistances mentioned therein you've had in your teaching. Establishes guidelines to overcome them in the near future.
- 5) Establish the general method for forming a strategy, either of the know to be, know to know or know to do, related to a certain competence.
- 6) Review the teaching competencies shown in Table 8 and make a self-assessment of each, identifying your accomplishments and areas to improve.
- 7) Finally, we invite you to share with others the products of the various activities proposed, in order for you to know the point of view of your colleagues and also receive feedback from them on your contributions.

Chapter eight

From evaluation to assessment of competencies

Existence is a knot of complexity in which one must decide, accept, propose, impose. From these realities, everyone learns to be, live, being, in a certain way. Some are more positive, other heartbreaking, other acceptable, other functional. The approach of the pedagogical role is sensed: act for people, wrapped in that unavoidable complexity, go afloat in the deciding and make their own existence, not staying deteriorated in some corner of complexity, while producing and living together, as we produce and perfect us.
López-Herrerías (1996, p. 340).



1. Assessment concept

With the entry of competencies into education, traditional evaluation is moving from the emphasis in specific and factual knowledge (based on facts) to the emphasis on integrated performance to context problems, in an effort to overcome various problems in traditional evaluation, such as the lack of relevance respect to the challenges of personal and contextual development (community, social, labor and professional, environmental-ecological, artistic and research) and the absence of methodologies that enable a continuous analysis of learning based on criteria, evidence and proficiency levels.

Considering the above, socioformation proposes the concept of assessment to highlight the appreciative nature of evaluation and emphasize it primarily as a process of recognition of what people learn and put into action –performance- in a social context, assuming errors as an opportunity for improvement and personal growth. This involves determining continuously the progress of students with respect to certain competencies based on agreed and supported criteria (which are not imposed by the teacher), and support them in their difficulties so they overcome them.

Below are described the central axes of the concept of evaluation as assessment having as a reference the conceptual cartography strategy (See Figure 1):

Exemplification axis. Examples of the assessment can be: (1) the use of portfolio to support the assessment of the competence of project design, for which students organize evidence of competence learning, along with self-assessments performed, and the record of continuous improvement throughout the process; (2) using the technique of Heuristic V to determine if students manage the cognitive tools and the basic procedures to solve problems related to the maintenance and repair of computers.

Notional axis. Evaluation as assessment is a feedback and reflection process for the development and improvement of competencies, taking into account the diagnosis, continuous monitoring and considering agreed criteria, from which decisions are taken on teaching strategies, learning strategies, resources, institutional policies and social policies.

Categorical axis. Assessment belongs within the general category of competencies-based formation, since it is the basis for the student to be continuously informed about his / her learning process in order to understand it and regulate it (Alonso, 1991). Therefore, the first task of the teacher is teaching students to self-assess (Díaz and Hernández, 1999). At the same time, assessment allows teachers to have information

about the process and results in competencies learning to provide advice and support to students, tailored to their formation needs. Moreover, assessment provides feedback to teachers about their decisions and their actions as a person, which promotes their own personal and professional formation.

Characterization axis. The evaluation as assessment is characterized by: (1) is a dynamic and multidimensional process performed by teachers, students, the school and society; (2) takes into account both, the process and learning outcomes; (3) provides feedback qualitatively and quantitatively; (4) is guided by the ethical life project (personal needs, goals and paths); (5) recognizes the potential, multiple intelligences and the zone of proximal development of each student; (6) is based on agreed criteria, recognizing, in turn, the subjective dimension that is in all evaluative process; and (7) is carried out through matrices that result in learning maps, in which there are successive formation challenges.

Differentiation axis. The evaluation as assessment differs from the traditional evaluation. The latter has the following characteristics: (1) is a control and promotion instrument from one level to another; (2) is assumed to be an end in itself; (3) focuses on the student and takes little account of the teaching process, curriculum and institutional-social management; (4) tends to focus on determining specific knowledge, with a weak look at the instruments and affective-motivational, cognitive and performance strategies; and (5) is an activity performed basically by the teacher, because students are taught poorly how to perform self-assessments. Traditional evaluation is heir of the empirical-positivist tradition stemming from the industrial revolution in the late nineteenth century, as it has privileged measurement and experimentation without taking into account the multi-dimensionality of human formation in context. Therefore, it has emerged as a rigid, mechanical and closed system based on the quantification of introjected content.

Division axis. There are two procedures to classify assessment: (1) the moment at which is performed (initial, procedural and final) and (2) according with the practitioner (self-assessment, co-assessment -or peer-assessment-, and hetero-assessment). Regarding the first classification, the initial assessment is carried out at the beginning of the educational process and is diagnostic; procedural evaluation is continuous and involves determining progress, achievements and areas for improvement; final assessment is that done once concluded a specific course or formative project and involves determining the achievements that were finally obtained, considering the initial purposes. The second classification is described in the following section.

Linkage axis. Assessment is linked to quality improvement on education, as it is a mechanism that informs about how is the formation of competencies and the necessary

actions to overcome deficiencies. Assessing the quality of education was officially introduced in all Latin American countries in 1995 from the Fifth Ibero-American Summit of Heads of State and Government (Bustamante, 2003). Furthermore, assessment is linked to knowledge society, in which the focus is learning how to search, process, organize and evaluate information to apply it in a contextualized manner.

Methodology axis. Competencies assessment is carried out through the following methodological elements:

1. Solving Context Problems
2. Determining the performance level based on criteria, evidence and assessment tools.
3. Establishment of achievements and actions for improvement.

2. Assessment application

The assessment of competencies requires four interdependent processes: self-assessment, co-assessment, hetero-assessment and meta-assessment.

2.1 Self-Assessment

It is the process by which the person assesses his / her own competencies formation with reference to certain criteria and evidence, based on a learning map. Thus, the person builds his / her autonomy assuming him / herself as manager of their own education; also contributes valuable information for the educational institution to recognize his / her achievements. Self-assessment has two main components: self-knowledge and self-regulation. Self-knowledge is a continuous reflective dialogue of each human being with him / herself which enables to be aware of those competencies necessary to build and how such construction develops. Self-regulation is the systematic and deliberate intervention to guide the formation of competences according to an established plan.

Here are some specific guidelines recommended for a successful self-assessment:

- Create a space of trust and acceptance within the educational institution, so that students can express themselves freely and spontaneously around their formation.
- Create the habit in students to compare their achievements with the proposed criteria.

- Facilitate for students themselves to correct errors introducing the necessary changes.
- Build on students the attitude of assuming self-assessment with responsibility and sincerity, from the framework of the ethical life project.
- Guide students in writing their self-assessments.
- Develop learning maps for students to perform self-assessment and improve their performance before the processes of co-assessment and hetero-assessment. In many cases, these self-assessment maps are useful for co-assessment and hetero-assessment.

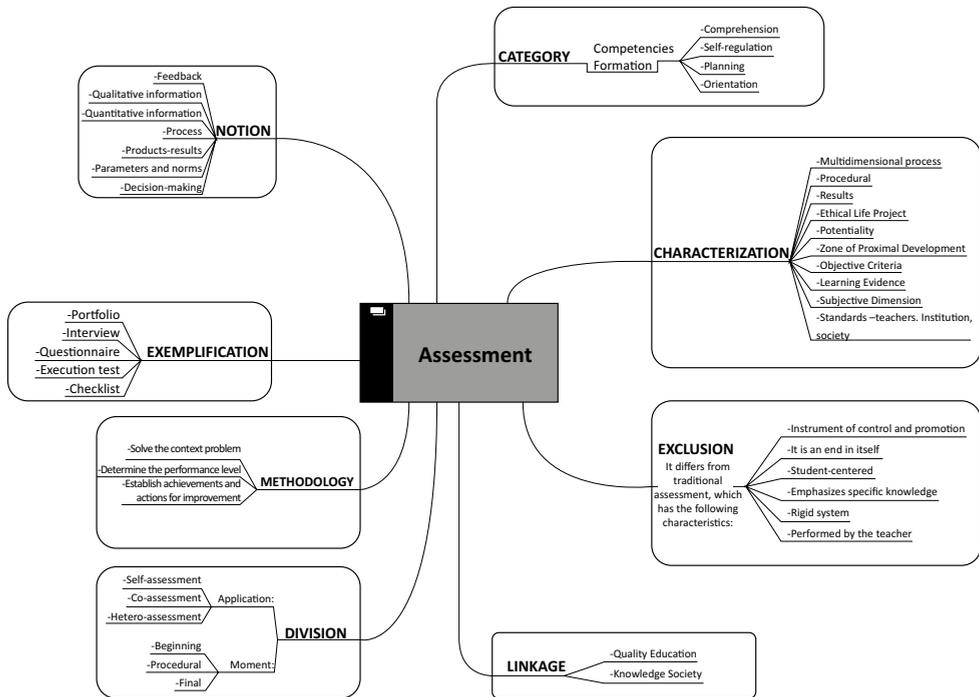


Figure 1. Structural axes of the concept of assessment having as a guide the conceptual cartography.

2.2 Co-assessment

Is a strategy through which students assess each other's competencies according to previously defined criteria. Thus, a student receives feedback from their peers regarding his / her learning and performance. Co-assessment requires the implementation of the following guidelines:

- Educate students about the importance of comments from colleagues to improve their performance and build suitability.
- Build on the group a climate of trust and acceptance that allows free expression.
- Motivate towards taking comments from peers from a constructive perspective, generating a mutual recognition of achievements and aspects for further improvement, avoiding non-constructive criticism, punishment and guilt.
- Advise students on how to assess the achievements and difficulties in their peers, along with the language that should be used.
- Develop learning maps to support co-assessment and advise their peers in their employment. These maps in many cases may be the same used for self-assessment and hetero-assessment.

2.3 Hetero-assessment

It consists in assessing the competencies of students by people other than their peers, such as the teacher or teachers of the subject or formative project, the state, a social organization or a company. The act of competencies assessment is primarily a process of understanding, which, from its complexity, implies for teachers to be part of it, get involved, place themselves in the student's place, without losing their own place as professionals.

Hence assessment is an act of love, as it consists in recognizing the student learning regardless how small or how large it is, taking into consideration the multidimensionality of their performance and intelligence. Therefore, assessing implies respect for difference, discretion and confidentiality in the information. The following guidelines are suggested:

- Prepare students to have willingness to submit to the assessment of their competencies by the teacher, the institution, companies, or the state.
- Assess the formation of competencies in students taking as a reference their performance on activities and problems similar to the ones in the work context.
- Take into account the results of the self and co-assessment.
- Listen to students and address their concerns about the assessment, avoiding verticality and impositions.

- Provide sufficient opportunities for students to achieve the expected accomplishments considering their potential and possibilities of the teacher and the institution.
- Develop learning maps, assessment techniques and instruments.
- Periodically review the learning maps, techniques and assessment tools in order to improve the quality of the process.

2.4 Meta-assessment

Is to analyze the relevance, usefulness, clarity and simplicity of the strategies and tools for competencies assessment, in order to implement continuous improvement. It implies also considering the process of evaluation, with self-assessment, co-assessment and hetero-assessment to be in continuous improvement. This should be an ongoing task of principals and teachers, with support of students. Meta-evaluation beyond the institution is also required, seeking to be part of the education system in order to ensure relevance. Some guidelines for carrying out this process is below:

- Introduce strategies and competencies assessment tools to colleagues for them to provide suggestions for improvement.
- Enable students to provide suggestions on the improvement of assessment strategies, such as the portfolio, maps, sociodramas, etc. This can be verbally or in writing, and thus the teacher gets feedback about the need for possible improvements.
- Include in the assessment instruments a section to invite students to provide suggestions for improvement, such as: What aspects should be removed or added to the instrument to assess more clearly and more comprehensively your learning? Explain your suggestions.

The instruments could also be accompanied by checklists, questionnaires, etc. to more accurately assess its quality.

3. Some general criteria for assessing competencies

The assessment of competencies requires building a pedagogical model to guide this process in its purposes and methodologies. After the analysis of different projects and

experiences on implementing competencies assessment processes, a series of criteria is presented next, as well as general assumptions to take into account in this area.

3.1 Purposes of the assessment

Overall assessment of competencies in the educational framework has four very clear purposes: formation, promotion, certification and teaching improvement. In the formation area, assessment has as an essential goal: provide feedback to students and teachers about how the established competencies for a particular course or program are developing, what are the achievements in this area and what aspects are necessary to improve. It is also essential in this type of assessment to analyze the progress of students in the formation of competencies taking as a base the starting point. In light of all these, adjustments can be introduced in the mode and willingness to learn by the student, and the pedagogical mediation of the teacher, from certain teaching strategies.

Regarding promotion, the purpose of assessment is to determine the degree of development of competencies within a given module or formative project, to determine whether students can be promoted or not to another level. Certification, in turn, consists of a series of tests that are applied to students or graduates in order to determine whether they possess the competencies of a specific area according to public criteria of high suitability. There are three types of certificates: 1) of the educational institution, which must determine whether students have the competencies at the expected level upon completion of a program or cycle; 2) the state, by applying massive testing to determine the degree of development of cognitive competencies (in Colombia, for example, three types of tests are done in this area: SABER tests in basic education, State Examination for Admission to Higher Education upon completion of middle education and the ECAES testing at the end of a given university program; and 3) of professional organizations, seeking certification of competencies as such, through independent analysis.

Assessment cannot be performed to differentiate competent students from the non-competent or not yet competent, as this helps creating an educational culture focused on competition between students and hinders cooperation. Assessment should recognize that students have different potentials (see, for example, the theory of multiple intelligences of Gardner, 1988, 1993) and its development depends as much of the ethical life project and the resources, opportunities and characteristics of the environments in which students live. Education has the challenge that each student achieves full self-realization, seeking the optimum use of resources from the environment, promoting their desire to know and the enjoyment of learning, and not the simple study to pass or to have the best notes.

Behavioral and functionalist approaches tend to evaluate students in two categories: competent and not yet competent. This form of evaluation is based on simple and reductionist thinking because it assumes there are only two results, when the reality shows that all competence has different levels of complexity and this needs to be addressed in the evaluation. That is why in the socio-formative approach students are not evaluated in terms of competent or not yet competent, but are established matrices with learning maps describing different performance levels that can be achieved in a subject, module or formative project, as well as in an entire curriculum.

Finally, assessment of competencies should serve teachers to improve the quality of the teaching process, because this is the way per excellence to get feedback on how they are conducting pedagogical mediation, allowing detecting difficulties. Overall, students' assessment should serve to improve the quality of courses, the assessment methodology itself and formative programs (Zabalza, 2003).

3.2 Teach and assess students for co-assessment and hetero-assessment processes

For humans it is difficult to accept being evaluated and assessed by others on their strengths and areas for improvement, to the extent that traditionally a culture of evaluation in which the objective is to distinguish those who know of those who do not know has been really strong, stressing difficulties and issues not achieved, and associating not knowing with failure. Furthermore, for students, and the same happens to many people, it is difficult to subject their being and their actions to public scrutiny because it implies accepting other views, opinions and ways of seeing. For the competencies formation, as these have as one of its essential axes what is public (the other axis is the plane of the private), students need to be prepared to assume as part of their development and self-realization to be subject of assessment by their peers and teachers, to receive feedback, thus having enough information for their own self-formation.

This is especially relevant in the case of promotion and certification processes, in which the teacher has to make decisions regarding the degree of development of competencies in students. These two types of assessment should be carried out taking into account the agreed criteria, for that assessment is not merely a subjective act of the teacher. Also is necessary to orient and sensitize students about the importance of reaching minimum competencies to move to another level (case of promotion) and demonstrate they possess the competencies in the degree of suitability required to be linked to some labor and professional activity (certification). In both cases, the process must be addressed not only from the institutional and social requirements, but

also from the being of the students themselves, aiming they see the promotion and certification as acts of individual responsibility, in which they must show the degree of formation achieved.

3.3 Moments of assessment

The assessment of competencies should be carried out in three stages: the beginning, during the formative process and at the end of this. Initially, a diagnosis must be carried out of how students are forming their competencies and what are their interests and expectations, to articulate the teaching strategies and activities according to these aspects. During the process, assessment seeks to reveal how learning is taking place and the relevance of teacher mediation. Finally, assessments aims to determine how was the formation of competencies and establish promotion (by teachers) as well as the certification (by independent bodies).

This is not the same as applying midterms and finals in which there is a count of student's notes. Rather, the three stages indicated above form a continuum along a course and a formative program. Every moment provides information to the subsequent moment, producing an adjustment (Zabalza, 2003), and the final assessment is carried out on the basis of the diagnosis and the process. Therefore, each moment makes a specific contribution to the assessment of competencies.

3.4 Participation of students in the establishment of assessment strategies

The success of competencies assessment processes is related to the extent to which these are taken as valid by the students. To achieve this success, is very important to create spaces to discuss with students the importance of assessment, its types and strategies, seeking for them to present suggestions and comments to implement or improve such process within a module or formative project and taking as a reference the competencies to develop with their respective criteria and evidence. This helps assessment to be seen as closer to them, and less like an instrument to judge their learning unilaterally.

3.5 Key issues in the assessment process

Assessment of competencies goes beyond the mere issuance of a judgment. Involves articulating four aspects: inquiry, analysis, decisions and feedback.

Inquiry	Is to collect information systematically about how competencies are developing, using various strategies for such effect and considering its components.
Analysis	The information obtained in the previous step is analyzed based on the criteria and evidence required, in order to draw conclusions.
Decision	From the findings of the previous step, decisions are taken, which can be related to learning, teaching strategies, promotion or certification.
Feedback	Is to share the results of the assessment as following: self-assessment, with peers and teachers; co-assessment, from peers with each other; and hetero-assessment, from the teacher with each student.

4. Performance levels in competencies based education

When assessing competencies is essential to have as a base performance levels to guide the teacher and students themselves about how competencies are developing and learned. Performance levels are areas, phases, stages or axes that represent how competencies form, develop, learn and build from the simplest to the most complex, either in short forming processes (for example, a subject) or in long processes (e.g. stages of the life cycle, educational cycles or a full undergraduate or graduate program).

Regarding the performance levels, there are different proposals, such as Bogoya's (2000), Gomez's (2001) and the Tobón's (2009b). It is important to have a certain model of performance levels to be able to structure learning maps. Below is exposed a summary of these proposals.

4.1 Bogoya's proposal

Bogoya (2000) proposes a series of competencies levels, which pose an "increasingly elaborated appropriation of principles and rules in a disciplinary field" (Gómez, 2001, p. 112). The specific analysis of Bogoya's levels (2000) (see Table 1) provides the following results. In the first level recognition and distinction is taken as a criterion. This level is essential to identify the concepts and the problematic reality on which they apply. However, contrary to some reviews that state this level corresponds to a simple macro-operation that cannot be in the range of competencies (see, for example, Zubiría, 2002), it is worth noting that recognizing an object involves the complex interaction of a set of thinking skills, without which problem resolution can not be performed.

This corresponds to a legitimate level of structuring competencies. The second level of complexity that Boyoga (2000) proposes shows the involvement of new cognitive skills, because understanding requires contextualizing an object and establishing relationships. Finally, the third level shows the greater complexity, since aside of recognizing and understanding, requires production and taking a critical approach to a problem or matter.

Therefore, in face of the criticism formulated to Bogoya's model (2000) by authors like Gómez (2001) and Zubiría (2002) our opinion is that this approach on levels of complexity of competencies is a very important tool to guide teaching strategies towards the progressive construction of knowledge and its application in problem solving. It also facilitates the implementation of assessment processes adjusted to the mechanisms by which the progressive appropriation of the instruments of thought to interact with reality are given, such as evidenced by the experience carried out in Bogota around the massive assessment of competencies in primary and secondary education (Mayor of Bogota, 2000). Like all models, this is also likely to be improved and, as such, should incorporate new contributions from education, cognitive psychology, sociology, anthropology and other related disciplines. In this vein, could be considered the possibility of incorporating intuitive performance, which departs from the formal and abstract system of rules, because performance goes beyond preset systems and is characterized by being highly flexible, intuitive and meaningful.

Table 1. Bogoya's complexity levels (2000)

Recognition and distinction	Is the recognition and identification of elements and structures that are at the base of sciences and disciplines.
Interpretation and comprehension	-Establish common properties to objects. -Use of codes of disciplines and sciences. -Interpret and apply knowledge to facts. -Problem solving.
Production	Making guesses, deductions, explanations and predictions of facts of nature.

Source: Adapted from Bogoya (2000, p. 28).

4.2 Gómez's proposal (2001)

A complementary approach is to understand the variation of competencies not by their structural complexity (as Bogoya, (2000) does), but by the progressive amplification, redefinition and re-ranking of representational contents (Gómez, 2001), which would be carried out by intentional and meaningful actions mediated by tools. Thus, four areas are proposed to understand the complexity in the formation of a certain competence:

routine performance, autonomous performance, transference performance and intuitive performance. Such levels stress the progressive personal involvement and automation of strategies. (See Table 2).

Table 2. Levels of complexity based on personal and intuitive mastery

<p>LEVEL I. Routine performance</p>	<p>The competence is applied in solving specific types of problems and activities following technical procedures carried out routinely, although the action is not mechanical. There is continuous review of the application of the procedure to the problems and errors are corrected.</p>
<p>LEVEL II. Autonomous performance</p>	<p>The competence is applied in solving problems and conducting activities from own engagement, making decisions without relying rigidly on others. Thus, the problems are addressed as challenges where the person is involved with his / her whole being to achieve excellence. Explicit procedures are followed to solve problems.</p>
<p>LEVEL III. Transference Performance</p>	<p>The competence is applied across multiple types of related problems and in different contexts, with error correction, personal involvement and autonomy. Likewise, more specific problems are solved considering the management of uncertainty.</p>
<p>LEVEL IV. Intuitive performance</p>	<p>The competence is put into action in a personalized way, in multiple problems related and a variety of contexts, but not based on specific procedures guided explicitly, since the person performs according to their experience and a wealth of accumulated knowledge. It is said to be an intuitive performance because the information processing is not conscious and is based on the setting in motion of multiple data, both from personal experience and the context.</p>

At Level IV there is a mastery of dexterities and abilities in an automated manner, which frees in a person’s mental mechanisms, facilitating paying more attention to the activity being performed (Prieto and Pérez, 1993). In fact, experts dominate a lot of automated dexterities; i.e. they group their knowledge into sequences of automatic actions that make the execution of tasks (Chi, Glaser and Farr, 1988) quicker and more efficient.

4.3 Proposed performance levels from the socio-formative perspective

The evaluation methodology from the socio-formative approach is based on performance levels. In this regard, we have established five performance levels, which range from the pre-formal level to the strategic level (see Table 3).

Table 3. Performance levels of a competence from the socio-formative approach

Performance levels.	Features (one or more)
Preformal	There are some elements that fail to define a receptive level. It is preformal because the competence still has no form, i.e. structure.
Receptive	-The student has received the information. -The performance is very functional. -There is low autonomy. -She/He has notions about reality and the scope of the competence.
Resolutive (or basic)	-The student solves simple context problems. -There are some activities to assist others. -The student has technical elements of the processes involved in the competence. - Possess some basic concepts.
Autonomous	-There is autonomy in the performance (not ongoing advice from other people required). -The student manages resources. -There's solid and deep scientific argumentation. -The student solves various problems with the necessary elements.
Strategic	-The student possesses strategies to change reality. -There is creativity and innovation. -There's high impact on reality. -The student makes evolutionary and prospective analysis to better address the problems. -Considers the consequences of different options for the resolution of problems in the context.

The methodology of performance levels may be applied to:

- A criterion
- Several criteria
- A full competence.

5. Competencies assessment with learning maps.

Although there are different methodologies to assess competencies, in recent years assessment through learning maps (rubrics) has been showing results of high impact. The learning maps are tables of double entry in which the criteria of competencies is related to performance levels (preformal, receptive, resolutive, autonomous and strategic), and the evidence to be provided by students during the process are integrated.

A learning map indicates the progressive challenges that must be met by students in a course, module or formative project. It also shows the relevant achievements and aspects to improve during the process.

Some steps in the assessment methodology through learning maps are the following:

- Step 1.** Determine the competence or competencies to be assessed, indicating the criterion or criteria to be taken into account.
- Step 2.** Establish evidence, single or multiple, to be considered in the assessment, from the learning activities of reference.
- Step 3.** Determine the indicators considered in assessing performance levels of the competencies.
- Step 4.** Set the weighting of criteria and indicators of performance levels, according to the educational policy of the country and the educational institution.
- Step 5.** Establish what criteria and indicators should necessarily be verified in students to demonstrate academic competence. A student can get a high score, but if he / she doesn't show the indicators that have been established as essential, then he / she cannot approve the module or formative project.
- Step 6.** Establish the assessment process with self-assessment, co-assessment and hetero-assessment.
- Step 7.** Determine when students will be evaluated. This can be at the beginning (diagnostic evaluation), during the process (continuous-formative evaluation), at the end of the process (academic-promotion evaluation) and certification (evaluation for occupational or professional certification).
- Step 8.** Plan the way feedback will be provided to students. We suggest, overall, that feedback reports on the competence approached, reached proficiency, achievements, areas for improvement and scores. In addition, indicate if it has been approved or not, or what should be done so that the competence is approved. It is necessary to put great care in statements included in the hetero-assessment of competencies to show a deep respect to the dignity of students as individuals, seeking to prevent distress and despair towards learning. To do this, reports that are presented to students should always be written in a positive and hopeful language, starting with the achievements and strengths, and then considering the difficulties and areas for improvement.

What is not evaluated is not likely to improve. In every formative project must be carried out continuous assessment in order to become aware of the difficulties, recognize achievements and redirect processes. This is done based on learning maps.

6. Design and validation of assessment instruments

Following are some suggestions for making instruments for the assessment of competencies.

- Determine criteria of the competence to be assessed.
- Based on the criteria, learning maps are developed considering different performance levels.
- From those learning maps, instruments are designed to assess evidence, seeking for the instruments to allow analyzing different performance levels of the criteria. For example, if a written test will be designed, it is necessary to develop a matrix first and seek that the written test assesses the learning map described in such matrix.
- Then the assessment tools are validated before being used in teaching. Validation is to test the benefits of the instrument and its relevance to the purposes sought. For this the instrument is applied to a group of students to assess its properties. At the same time, it is intended that experts, taking into account the criteria agreed in the competencies, evaluate the instrument in question. In this process suggestions are also collected for improving the quality of the instrument.
- Based on the results of the validation, we proceed to make relevant adjustments to the instrument, taking into account the knowledges that will be assessed.
- Finally, systematize and archive assessment instruments so teachers can apply that when they deem it necessary taking as a reference the institutional policies.

Table 4. Example of a learning map

<p>Competence for evaluation: teamwork and leadership Description: Performs collaborative activities and leads projects to achieve a specific goal, with planning and well-defined objectives, in different contexts and with ethical commitment.</p>									
<p>Evaluation process: - Each student and each team must carry out the self-assessment based on this learning map. - The teacher will assess the competence also using this learning map. - The final assessment will be a process according to this learning map. Weighting: quantitative assessment of competence will be on a scale of 100 points.</p>		<p>Moments of evaluation: - Diagnostic - Summative (accreditation)</p>							
Criterion	Evidence	Preformal domain	Receptive domain	Resolutive domain	Autonomous domain	Strategic domain	Assessment		
							Self-assessment	Co-assessment	Hetero-assessment
<p>1.) Conceptualize what is teamwork, its features and responsibilities, having into account challenges of the context.</p>	<p>Conceptual map with support.</p>	<p>I identify teamwork.</p>	<p>I have general notions about what is teamwork. I understand how a group work looks like.</p>	<p>I define teamwork with my own words.</p>	<p>I discuss the key features of teamwork. I determine the types of teamwork.</p>	<p>I determine the process of linking the teamwork and support it. I make contributions for a better understanding of teamwork. I make critical and purposeful reflections around teamwork.</p>	<p>Achievements: Aspects to improve:</p>	<p>Achievements: Aspects to improve:</p>	<p>Achievements: Aspects to improve:</p>
<p>Weighting: 10 points</p>	<p>0 points</p>	<p>2 points</p>	<p>8 points</p>	<p>9 points</p>	<p>10 points</p>	<p>Points:</p>	<p>Points:</p>	<p>Points:</p>	<p>Points:</p>

<p>2. I participate in carrying out joint activities in a given team, according to certain objectives.</p>	<p>-Minutes of teamwork -Record of the activities performed within a team.</p>	<p>I participate in a group or massive activity.</p>	<p>I participate in 20-60% of team's activities.</p> <p>I assume the agreements established.</p>	<p>I participate in more than 80% of the team's activities. I participate in activities of the team and this allows me to contribute to the achievement of the objectives sought after.</p> <p>ESSENTIAL</p>	<p>I apply improvements when carrying out activities in a continuous manner. I face difficulties proactively, seeking to strengthen the team.</p>	<p>Aspects to improve:</p>	<p>Aspects to improve:</p>
<p>Weighting: 10 points</p> <p>3. I contribute to the team to have a shared vision and a clear work program, participating in the analysis and creative resolution of conflicts.</p>	<p>-Minutes of team work -Record of the activities performed in the team. -Interview.</p>	<p>0 points</p> <p>I identify the importance of contributing to the shared vision within a team.</p>	<p>10 points</p> <p>I offer suggestions around the vision and / or the work program, but without relevance.</p>	<p>15 points</p> <p>I some times make contributions to the vision and / or work program with relevance.</p> <p>ESSENTIAL</p>	<p>27 points</p> <p>Often make relevant contributions to the shared vision and work program. Present evidence of own judgment in the contributions I make.</p>	<p>30 points</p> <p>I contribute to difficulties and conflicts that might present within the team are an opportunity for the team to be strengthened and generate new work actions that allow better achievement of its shared vision.</p> <p>I propose strategies for innovation in the program of teamwork, looking for concrete actions to become real.</p>	<p>Points:</p> <p>Aspects to improve:</p>
<p>Weighting: 10 points</p>		<p>0 points</p>	<p>6 points</p>	<p>8 points</p>	<p>9 points</p>	<p>10 points</p>	<p>Points:</p>

<p>4. I coordinate processes of planning the activities and projects, according to the challenges of the context and my ethical life project.</p>	<p>-Minutes of teamwork -Records of the activities within the team. - Interview</p>	<p>I identify the importance of coordinating an activity in the team.</p>	<p>I demonstrate at least one process of coordination, but without relevance.</p>	<p>I demonstrate at least one process of coordination from relationships with other individuals, with relevance and the process enabled achievements regarding the objectives of the team.</p>	<p>I demonstrate at least one process of coordination of activities from the relationships with others, with relevance, wide argumentation of the actions and generation of agreements.</p>	<p>I demonstrate at least a coordination process in which we managed to unite further the team, from synergic processes, and progress was made in the commitment of all participants.</p>	<p>Achievements: Aspects to improve:</p>	<p>Achievements: Aspects to improve:</p>
<p>Weighting: 20 points</p>	<p>0 points</p>	<p>10 points</p>	<p>17 points</p>	<p>18 points</p>	<p>20 points</p>	<p>Points: Achievements: Aspects to improve:</p>	<p>Points: Achievements: Aspects to improve:</p>	<p>Points: Achievements: Aspects to improve:</p>
<p>5. I respect differences between team members as well as opinions that are posed, with tolerance and proactivity.</p>	<p>-Minutes of teamwork -Record of the activities performed by the team. - Interview.</p>	<p>I show respect to the opinions of others once.</p>	<p>Sometimes I respect differences in opinion of other team members.</p>	<p>In general, I respect the differences in opinion from others opinions with warmth and kindness.</p>	<p>I make contributions so that there is better acceptance among team members, so they can express their opinions freely and be respected.</p>	<p>Points: Achievements: Aspects to improve:</p>	<p>Points: Achievements: Aspects to improve:</p>	<p>Points: Achievements: Aspects to improve:</p>
<p>Weighting: 20points</p>	<p>0 points</p>	<p>0 points</p>	<p>15 points</p>	<p>19 points</p>	<p>20 points</p>	<p>Points: Achievements: Aspects to improve:</p>	<p>Points: Achievements: Aspects to improve:</p>	<p>Points: Achievements: Aspects to improve:</p>

<p>6. I identify difficulties in teamwork and propose solutions that are clear and feasible, assuming my responsibility in overcoming such difficulties.</p>	<p>Weighting: 10 points</p>						
<p>-Minutes of teamwork sessions. -Record of teamwork activities. - Interview</p>							
<p>I identify the importance of contributing to solve difficulties that arise in teamwork.</p>	<p>0 points</p>						
<p>Sometimes I present a suggestion to improve teamwork.</p>	<p>1 points</p>						
<p>I show interest in difficulties of the teamwork and propose solutions assuming my responsibility.</p>	<p>8 points</p>						
<p>I identify difficulties that arise in teamwork and propose solutions that are clear and feasible, assuming my responsibility and committing myself to help solving them.</p>	<p>9 points</p>						
<p>I implement collaborative actions to overcome difficulties of teamwork, and prevent difficulties in the future.</p>	<p>10 points</p>						
<p>Achievements:</p> <p>Aspects to improve:</p>	<p>Points:</p>						
<p>Achievements:</p> <p>Aspects to improve:</p>	<p>Points:</p>						

Table 5. Characteristics of a good instrument for assessing competencies

1. It is based on performance levels. Feedback is by performance levels.
2. Addresses situations and context problems according to the competence being evaluated.
3. It is suited to the content of specific knowledges of the competence evaluated.
4. Describes statements clearly and accurately.
5. It can be applied by different teachers that guide the same course.
6. The statements are interrelated.
7. The statements are neutral and do not determine the answer.
8. The questions address different levels of cognitive processing. For example, there are questions of interpretation, argumentation, proposition, etc.

7. Assessment of learning

In the class sessions with students is important to look that competencies assessment considers the following suggestions:

- Conduct an introduction for students on the assessment of competencies (concept, nature, importance, benefits and methodology), with the institutional guidelines as a base. Also, present the competencies to them and explain each of their contents.
- Plan the assessment of competencies with the participation of students.
- Guide students to practice self-diagnose about how are they with respect to the competence of reference, taking into account the criteria and required evidence.
- As teaching strategies for the formation of competencies are put into action, it is intended that students provide evidence about their construction.
- This is accompanied by the application of tools to assess competencies, referencing institutional procedures and the criteria included in the assessment plan.
- An alternative to present evidence is the portfolio, which allows students to organize the evidence and perform a metacognitive job to ensure continuous improvement.
- The assessment of the criteria and evidence can be performed by learning maps.

8. Using the portfolio in assessment

8.1 Description

The portfolio consists of organizing evidence of students' learning for a certain educational cycle (Valencia, 1993), which give account of the competencies formation process and achievements. In this regard, contains evidence of learning (essays, articles, queries, laboratory reports, workshops and products) and reports of self-assessment, co-assessment, and hetero-assessment collected during the course. Through portfolios, both facilitators and students themselves may be monitoring the evolution of the process of construction and reconstruction of competencies.

8.2 Types of portfolios

- Showcase portfolios. Contain limited information about a set of activities. A choice of the best job, the worst job, the most significant achievement, the developing of a competence that the student didn't have, as well as an annotation of any significant difficulty.
- Comparison portfolios. They are made from a predetermined number of statements, which are presented to students at the beginning of a course. Sometimes, teachers allow students to choose certain activities from a predefined list. For example, in a formative project in organic chemistry, in the chemistry major, teachers may request students to submit a portfolio with a lab report on a chemical analysis, the resolution of five problems related to the subject and a novel application of organic chemistry in an activity of daily living.
- Open format portfolios. Enable students to append the evidence deemed necessary to account for the learning of certain competencies. May contain, for example, reports of library visits, laboratory experiments, analysis of daily situations, reading reports, etc.

8.3 Importance of portfolios

- Allows students to recognize how the process of formation of competencies is progressing and make changes to maximize it.
- Facilitates the construction and strengthening of self-criticism, and the recognition of difficulties and mistakes, constituting a contribution to the

improvement of performance.

- Allows understanding of the development and consolidation of cognitive instruments (concepts, propositions, concepts and categories), affective-motivational (values, attitudes and norms) and performance (procedures and techniques).
- Provides information on the formation and implementation of strategies for learning to learn by students (affective-motivational, metacognitive-cognitive and performance strategies).
- Enables students to show different evidence of the development of their competencies.
- It is a means through which students can plan, monitor and evaluate their own learning.
- Promotes independent learning to the extent that implies for students the responsibility to monitor their performance and collecting evidence of it.
- It takes into account the pace of learning and work of each student.
- Enables the development and strengthening of self-esteem since it focuses more on the achievements than failures. Its emphasis is given in what students can do rather than what they cannot do.

8.4 Portfolio's design

- Step 1. Explaining the technique of portfolio. The facilitator explains students what the technique is, its importance and purposes for its use in the formative project or module.
- Step 2. Agreement on the assessment activities. Before starting using portfolios is necessary to agree with the students the competencies that will be assessed, along with their criteria and evidence. It is also necessary to establish how the self-assessment, co-assessment, and hetero-assessment will be performed.
- Step 3. Evidence. Students receive orientation about the kinds of evidence the portfolio must have, which can be:

- Documents: essays, articles and systematized literature reviews.
- Reproductions: video recording, photography and audio.
- Testimonials: notes and annotations that other people make on the work done by the student.
- Productions: Evidence of the products obtained in carrying out the activities. For example, in an accounting formative project, it could be established with students carrying out a project in which they develop an accounting book of a real business. The competence could be assessed in this case considering the product (the accounting book).

Step 4. Organization. It consists in providing guidance to students so they structure and present the evidence, taking into account issues such as title page, introduction, chapters, bibliography and appendices. Each evidence must contain the following information: what they are, why were they added and what do they provide evidence of. In addition, evidence can be organized chronologically or by type of activity.

Step 5. Materials. Characteristics of the material in which should be presented the portfolio.

Step 6. Assessment and continuous improvement. Students get advice so they can perform self-assessment in each piece of evidence and record their achievements and areas for improvement. They are also asked to record the assessments done by teachers and peers, and how these assessments were taken into account in the improvement process. To demonstrate the latter, must be added the improved evidence.

9. Techniques for assessing competencies

In addition to the portfolio, it is advisable to use other techniques in order to conduct a comprehensive assessment of competencies, taking into account the hetero-assessment, self-assessment and co-assessment. Unlike the traditional emphasis of written examinations, assessment prioritizes on performance in systemic contexts (although traditional techniques still apply). Below is a description of the most important aspects of some fundamental techniques in competencies.

9.1 Assessment techniques

Table 6. Assessment techniques

Name	Description	Methodology	Recommendations for its use
Observation	<p>Is to tend and analyze student's performance in activities and problems, in order to detect achievements and areas for improvement, according to their potential and external events (opportunities and threats).</p> <p>It is essential to record systematically the observations and compare these with performance criteria in order to determine the progress of students.</p>	<p>There are two basic types of observation: spontaneous and planned. The first arises anytime during the educational practice without having in advance a plan and the results are scored by the teachers in their teaching journal. Planned observation is one structured before the facts, based on objectives and formats previously determined.</p> <p>Observation can be supplemented with direct questions to determine the degree of understanding about a topic or the management of a process.</p>	<ul style="list-style-type: none"> - Consider spontaneous conversations from students with respect to their class participation, communication within work teams, formulation of questions, interaction with others, etc. - Observe, also, the non-verbal behavior: gestures, postures, the way they walk, etc.; since this informs the attitudes and degree of motivation. - Teachers should be trained on how to observe behavior considering all elements of the situation, taking into account the context and flexibility.
Focalized interviews	<p>Focalized interviews constitute a variant of critical incident interviews and consist of a planned dialogue performed with students in order to collect information about the formation of attitudes, notions, concepts, categories, specific knowledge, thinking skills and the use of strategies in problem solving.</p>	<ul style="list-style-type: none"> - Establish previously the questions according to student characteristics, components of the assessed knowledge, assessment criteria and evidence of learning. - Write the questions openly, seeking to invite students to reflect on their formation. - Systematize the results of the interview and take them into account in the assessment of competencies. 	<p>Avoid for questions to directly inquire if the student possesses or no such ability. Rather ask him / her to describe recent situations, related to the aspect of the knowledge to be assessed and how he / she faced them. E.g., the student is not directly questioned whether he / she resolves conflicts via the dialogue, but is asked to describe situations where she / he had conflicts recently and how he / she handled them.</p>

<p>Field diary</p>	<p>Is the record and analysis of events that were carried out in the framework of an activity, on the basis of certain previously agreed criteria between teacher and students, according to institutional guidelines. This technique provides evidence on the construction of competencies, mainly on points such as modifications of beliefs, thinking skills development, demonstration of attitudes, interpretation of reality and problem resolution.</p> <p>The field diary is also of great value for teachers because it allows them to assess their professional work, determining the impact of teaching strategies and identify areas to improve.</p>	<ul style="list-style-type: none"> - Agree with students the activities to register, along with the minimum frequency of the entries. - Suggest a methodology to register activities based on at least the following: (a) brief description of the activity delving into a certain aspect of it, (b) conceptual analysis of some observations, (c) annotation of doubts and concerns, (d) self-reflection on own performance and experiences and (e) description of learning. 	<ul style="list-style-type: none"> - Encourage students about the importance of the technique. - Teach examples of some diaries. - Note the occasions in which the technique can be used. - Use a notebook or notepad that does not involve a high cost to the student. - Instruct students the type of evidence that will be collected from the field diary.
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Execution testing	Consist on real or simulated activities near to the context where the competence should be put into action, which do the students perform with monitoring from the teacher. They enable to assess the degree of suitability with which a procedure or technique is implemented when performing a certain task (for example, ask students to perform in a class session maintenance of a computer following a standard procedure in the area).	<ul style="list-style-type: none"> - Identify the components of the knowledge requiring assessment through this type of technique. - Determine the activity or context problem enabling to assess these components. - Indicate the procedure or technique that should be executed. - Establish indicators to be considered in order to assess the degree of suitability in execution. 	<ul style="list-style-type: none"> - Ask other students for feedback about the performance. - Provide an assessment report taking into account the strengths and areas for improvement. - Indicate the degree of suitability and also if the person is competent or is not yet competent.
Essays	They are written works where students analyze a problem, understand it and formulate guidelines to solve it, stating their personal perspective based on bibliographic inquiry, analysis of the approaches, support of ideas and hypotheses, and presentation of feasible proposals.	<ul style="list-style-type: none"> - Propose a general topic according with the competences that will be assessed. - From this topic, invite students to choose a problem to be analyzed. - Enable the different criteria that should be considered in developing the essay. - Articulate the technique with the formative purposes. 	<ul style="list-style-type: none"> -Motivate students to have a clear position before the problem chosen and support it. -Search that the essay is based on understanding the problem and propose solutions, not so much on making a theoretical analysis of a topic.

9.2 Instruments

Table 7. Assessment tools

Name	Description	Methodology	Recommendations for its use
Open questions questionnaires	<p>They are instruments that aim to determine the degree of knowledge through open questions, which require the person assessed to write the answer, describe facts and explain them. This type of questionnaires favors the expression of ideas, the development of arguments, creativity and conceptual analysis.</p>	<ul style="list-style-type: none"> - Determine the element of the competence that will be assessed and the type of knowledge. - Locate a topic to be assessed taking into account the criteria and learning evidence. - Define the questions. - Include questions that inquire about content and processes (information retrieval, transference, application, analysis, argumentation, etc.). - Include questions that inquire about how is the student learning: practice of self-regulation, strategies put into action and potential difficulties. 	<ul style="list-style-type: none"> - Administering questionnaires to assess the contents of the three types of knowledge (know to be, know to know and know to do). - Seek for the questionnaires to assess holistically each knowledge: processes, instruments and strategies.
Knowledge Test	<p>They are objective tests seeking to quantify certain components of knowledges belonging to a specific competence. They are generally lists of statements where the person is presented with several response options and must choose only one. This category includes knowledge questionnaires (factual and conceptual), the attitude scales and personality testing.</p>	<ul style="list-style-type: none"> - In its preparation it is sought that they have an adequate degree of validity (that assess that for which they have been designed) and reliability (that its application in similar conditions allows to obtain similar results). - Tests may be of two types: standardized (compare a person with norms taken from a reference group) and criteria (compare a person with certain criteria defined previously). - The development of questionnaires must be done taking into account the essential knowledge required in each element of the competence, and the performance criteria. 	<ul style="list-style-type: none"> - In competences tests based on criteria are preferable because they do not compare students with other students but with certain ideal parameters, defined by the same components of the competencies.

<p>Cognitive competencies testing</p>	<p>They are objective tests seeking to determine quantitatively how is a person in the formation of a particular cognitive competence. Present the student a problem situation and from this is described a set of closed questions. They are ideal for assessing the interpretative, argumentative, and propositive competence.</p>	<ul style="list-style-type: none"> - The cognitive capabilities to be assessed are determined according with a particular element of the competence. - From this, context problems are selected which require putting into action these cognitive skills. - Once having the above, the questions are designed concerning the problem, which involve putting into action the cognitive skills. 	<ul style="list-style-type: none"> - Search problems that capture the interest of the students. - Provide all data necessary to solve the problem
<p>Checklists</p>	<p>They are assessment instruments that aim to estimate the presence or absence of a number of aspects or attributes of a particular element of the competence.</p>	<ul style="list-style-type: none"> - Prepare the list of dimensions or attributes to observe in performance (e.g., attitudes, concepts and procedures). - Sort logically the characteristics according with the reference activity. - Organize the characteristics in a format that facilitates its use, by placing a column to note whether the person possesses or not the characteristic in question and then a second column to describe punctual observations. 	<ul style="list-style-type: none"> - The list of attributes should not be too extensive in order to ease its use. - Attributes to observe must be relevant and have as a basis the assessment criteria and essential knowledge. - The checklist must be linked with the type of evidence requested in the element of the competence.
<p>Assessment scales</p>	<p>They are instruments that enable teachers making qualitative estimates within a continuum (Díaz and Hernández, 1999) taking into account processes and products related to the assessment criteria and learning evidence. There are several types of scales: Formal attitudes scales (E.g. Likert type) semantic differential scales type, estimation scales and academic performance scales.</p>	<ul style="list-style-type: none"> - Choose the characteristics to assess according with the assessment criteria and required evidence. - Assess each attribute based on a continuous scale, which may be qualitative (qualifiers are indicated for relevant dimensions) or quantitative (numbers are assigned to the scale). - Assess the extent to which each attribute is present in the person, according to their performance. 	<ul style="list-style-type: none"> - The scale for each attribute must consider more than two segments. - The assessment of each scale should be an easy activity to perform.

10. Assessment of specific knowledges

10.1 Assessment of know to be: values, attitudes, and norms

Suggestions

- Guide students to perform self-assessment about how they are with respect to the values, attitudes, and norms defined for a certain competence. Questionnaires may be used with open questions, as well as quantitative standardized tests created for this purpose. A challenge faced is to sensitize students to be sincere in their responses in order to be able to provide relevant support.
- Complementary to the above, assess the tools and affective-motivational strategies of students observing their behaviors in specific activities and taking notes about them. Tools such as checklists and assessment scales, which enable a more reliable record and objective information, can support this.
- It is recommended to perform activities that foster in students the emergence of emotions and attitudes, in order to determine how are these, and also, how they are handled. In this regard, teaching strategies such as role-play are useful.

10.2 Assessment of know to know: factual knowledges, notions, propositions, concepts, and categories

Suggestions:

- For the assessment of specific or factual knowledge it is recommended the use of knowledge tests such as true-false, multiple choice, etc.), because they will verify whether the person has the minimum knowledge required.
- With respect to cognitive instruments, assessment procedures are different. In this area should be sought that students construct the concepts in their mind and not stay simply in understanding definitions. For example, if it is intended to assess the concept of free fall in physics, the ideal is that students expose the central structure of this concept and their differences relative to other concepts of the same area.
- It is important to suggest to students not to repeat word by word the definition of concepts, but invite them to paraphrase (to account for something in their own words).

- It is also critical that students have cognitive strategies to account for the organization and structure of cognitive instruments, a feature in which mentefactos are useful (Zubiría, 1998), concept maps (Novak and Gowin, 1988) and conceptual cartography (Tobón and Fernández, 2003; García Fraile and Tobón, 2009).
- It cannot be ignored assessing cognitive abilities within this knowledge (e.g., interpretation, argument and proposition). For this, is recommended the application of tests, which examine the use of thinking skills in solving context problems. This can be complemented with the observation in the classroom of verbal and non-verbal behavior taking as a guide thinking skills indicators presented in chapter six.
- Finally, the cognitive tools and thinking skills can be assessed through essays, articles, monographs, reports and brief summaries, which determine how students use these tools and skills, and interrelate them.

10.3 Assessment of know to do: procedures and techniques

Suggestions:

- Procedures should be assessed taking into account the way whereby run and put into action in certain activities (Coll and Valls, 1992). In this regard, the essential technique that should be used is the execution test, complemented with other strategies such as observation, checklists and scales.
- Assessing the procedures should be based on clear and agreed criteria, in which it is recommended to consider: (1) understanding the type of activities and problems in which applies the procedure; (2) understanding and awareness of the steps involved in running the procedure; (3) performing the steps according to conventional parameters of the area; (4) functional and flexible use of the procedure; (5) correction of errors during the performance of the procedure; and (6) the efficiency and effectiveness in the use of the procedure.

11. Suggested activities

- 1) Make a mental or conceptual map in which you present the assessment of traditional evaluation. Record the objectives of the first, their application areas and techniques, and instruments. Describe in the map your contributions to the subject.
- 2) Discuss how you have practiced the evaluation and assessment, determining your gaps in this field. Consider aspects such as: assessment planning, development of criteria, identification of evidence, the instruments used and assessment of knowledge. Identify the reasons for these gaps and develop a set of guidelines to overcome them.
- 3) Make a learning map for a subject or formative project, considering a competence and certain criteria. It is important the map addresses the five performance levels established from socioformation: preformal, receptive, resolutive, autonomous and strategic.
- 4) Build a story in which you visualize yourself carrying out the assessment of competencies following the recommendations of the chapter.
- 5) Finally, we invite you to share with others the products of the various activities proposed, in order for you to know the point of view of your colleagues and also receive feedback from them on your contributions.

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Integral Formation and Competencies

Complex thinking, curriculum, teaching and assessment

In this fourth edition, the Competency Based Approach from a Socioformation Perspective is consolidated. It is a new approach which seeks to change traditional, educative practices, centered in contents into a process of integral education, according to the challenges of building and living in knowledge society. In this sense, the Ethical Project of Life, collaboration, entrepreneurship and competences are emphasized to face the contextual challenges, by taking the methodology of formative projects and the evaluation with learning maps as a base.

This fourth edition has many improvements and complements regarding previous editions. It is the product of multiple and different suggestions or comments given by some readers. Next, there is a summary about these improvements:

1.- The Decalogue with the main principles of Socioformation in education and Management of the Human talent is described. This helps to evaluate the teaching practice and to implement continuous actions of improvement.

2.- A concrete guide, to identify and to write down the competences emerged from the problems on the context, is given with its components: criteria and evidence. This is illustrated with a variety of examples which facilitate all, the processes of curriculum design and the production of courses under this approach. In this way, there is a tendency for integral performance, opposite to traditional approaches of competences which are centered on the fragmentation of performance through tasks and skills.

3.- Ten essential actions to perform and to evaluate the competences, from the socioformation approach with suggestions of learning strategies, are exposed. This is a very important help for the production of didactic sequences, as it is for the classes, workshops, seminars, and general courses.

4. A new form to design plans and programs of study is described. This is with the objective of achieving a more agile, flexible and focused process in its application with the students. The author has always defended an approach of a more centered curriculum in learning activities and less in philosophical and theoretical aspects.

5.- Answers to frequent questions are given in the implementation of the methodology of formative projects.

We are sure that this book is going to contribute to improve and to innovate the administration of education, teaching and the human talent management.

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