Sustainability Competences in Catalan University Degrees

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Abstract:

Considering that higher education should play a vital role in promoting peace, mutual understanding and tolerance, and in creating mutual confidence among peoples and nations; (Lisbon Convention 1997) the Technological Catalonian Universities have undertaken as a framework the Competences for Sustainability, to develop the new degrees in accordance with the Bologna Declaration of 1999. This way the degree courses' planning has three essential elements (Cordoba et. Al., 2007): a centered learning in students, the competence-based objective achievement and the planning, evaluation and monitoring of any all teaching activity under the ECTS criteria.

The triplet activities-learning-assessment is involved in each and every subject that corresponds to the plan studies. In this way, education by competences is framed in all the subjects developed during the studies, also assumed for the competence in sustainability.

During the planning and development of the new degrees offered in higher education different questions arose: **which competences in sustainability should have the university graduate students to be capable of satisfying today's society's demands? And, what kind of engineer and architect does the actual society need in terms of Sustainable Development?**

Taking this into account, the definition and development of the competence in sustainability at the Catalonians' universities has been developed in different ways in each of the educational programs. Since this has occurred, the interdisciplinary educational research group of EDUSOST of Barcelona has developed a research analyzing to which extent these differences impact in the ease to develop sustainability as a competence in each of the degrees without disturbing the other competences. On the other hand, it allowed analyzing to what extent different knowledge areas focused in which component of sustainability, technical degrees developed much easier the in the environmental component and administration and political science the social one for example.

Key words: *competences for sustainability, education for sustainability, higher education*

1. Introduction

In the past 30 years, environmental education has followed a dynamic and receptive process, which in many areas of our culture works in order to achieve a society more sustainable, just and equitable. The role of education in this process which we are living day by day is vital.

Environmental education has evolved towards education for sustainability (ES) as a result of the great debates at national and international level. Above all, with the Johannesburg Summit (2002), from which it was organized and established the United Nations Decade of Education for Sustainability 2005 - 2014, which presents the views of the ES as a world where every person has the opportunity to have an education and to learn values, behaviors and ways of life necessary for a sustainable future and for a social positive transformation.

Education for sustainability requires complex structures, as there are many links that makes it up, links between environmental quality, equality, human rights, peace, solidarity, equity, etc. Education for sustainability constitutes an aim and a challenge, which implies an educational effort focused when the interpretive models change in relation with the environmental questions and to offer the experience of alternative models which allow its analysis and contrast.

Education for sustainability is understood as a tool to transform society capacity to work cross-analysis, reflection, commitment, determination and action of people.

In addition, the ES is an education in a system of values and an ethics that they place the personal and collective just, equitable and sustainable development in the center of the social worries. It is also an ongoing process of environmental awareness, learning of knowledge, values and skills in relation to the nearest context itself and the most distant ones.

Education for sustainability is not a fixed entity, but a search of the development of our daily lives and our societies in directions that benefit most people, now and in the future, while minimizing the negative impact on the environment. Because of it, there is an active, creative and critical citizenship with willingness to cooperate in the overcoming of the problems and conflicts arising, besides being capable of combining theoretical knowledge with practical ideas and innovations.

Therefore, this research is aware that it didn't started from zero, since there are numerous environmental initiatives already working in universities. It was considered that at this time the research had to work on a theoretical framework of environmental curriculum that could orientate and lead a practice more efficient and more connected to the complexity involved in Education for Sustainability. The methodology of work was based on a opened, holistic, interdisciplinary, participatory, collaborative dynamic between various educational agents, Catalonian's knowledge organization representatives and teachers from different knowledge areas at universities. This collaboration was one of the keystones to work for achieving the objectives defined in the project.

Likewise, the work was framed in the European policies of higher education. It has been framed within the Bologna Process, being this an agreement between 29 European countries established in 1999 which states that higher education would not

have borders and university degrees validity should be across Europe. Today, there are 46 countries which are prepared to enter the European Higher Education Area (EHEA), which must be achieved during 2010-2011. Catalonia is working hard on this development considering that the changes introduced are to be implemented taking into account the interests of students.

The Secretary of Education of the OECD stated that "sustainable development and social cohesion depend critically on people's competences, - competences that include knowledge, attitudes and values" (Stevens, 2008). Therefore, the definition of SD competences is a key issue in education in general; and in higher education in particularly, considering the important role that university graduates have as agents of change towards sustainable development.

Regarding higher education, the question arises: ***What competences for sustainability must have the graduates of universities to be able to meet the demands of society?*** The definition of these skills can help assess how well prepared for challenges of sustainability are the Catalan graduates, as well as target identification generic sustainability of education systems.

This research aims to contribute to elements that facilitate and promote a deepening of the Education for Sustainability, and draws on core competences for sustainability as the basis of university education.

2. Justification

Under the new degrees, learning of competences takes a very important role.

Degree planning involves three essential elements (Cordoba et al., 2007): A student-centered learning, the achievement of goals based on competences, and the planning, evaluation and monitoring of all the teaching activity under the ECTS (European Credit Transfer System - European Credit Transfer) criteria. The synchronization between activities - learning - evaluation is involved in each and every one of the curriculum subjects.

Therefore, in a specific subject the following aspects are thought-out:

- Previous level which the student has in a specific competence.
- The subject's context itself, the condition of the degree, aspects of competence to develop / exercise, and available resources.
- Level that the student should reach at the end of the course, in relation to the competence.

This situation vision must allow the programming learning activity orientated to facilitate the reaching of the formative aims related to its own specific profile competences and detailed to the subject program. Also, it must assist to reach the transversal curricular aims related to the generic competences that the subject works. Finally, it helps with the establishment of evaluation mechanisms, follow-up and relative improvement to the generic competences.

The competences for sustainability map of the different degrees can smooth the progress of the diagnosis in order to analyze the shortcomings and virtues of the degrees that are taught in Catalan universities. This map of competences for sustainability can catalyze the distribution of the competences in each degree and subject. Being this, the starting point for the universities which want to ensure that their students will graduate having competences for sustainability. This will open up new fields and questions; what subjects are responsible of including and assessing this type of competences in each degree? What does the teacher needs to do?, etc.

This study is a first step to ensure the acquisition of competences for sustainability of future graduates of Catalan universities.

3. Objectives and Scope

3.1. General Objective

The purpose of this document is to provide a diagnosis on which competences for sustainability have been incorporated into the new degrees of Catalan universities.

3.2. Specific Objectives

Making a study of competences for sustainability can:

- Define a common framework for defining competences for sustainability (CS) by using keywords.
- Compare the inclusion of CS in different areas: areas of expertise, degrees, and universities.
- Identify gaps in the CS that are defined in the new degrees.
- Compare the CS developed by the Catalan universities with the professional competences developed by the BOE Government Gazette), and to detect breaches on the regulation.
- Identify opportunities for collaboration in the field of CS between research groups in Education of the Catalan universities.

This whole process is intended to encourage those responsible for the definition and review of new degrees and the inclusion of competences for sustainability in a more holistic way.

3.3. Scope of the Study

This research was developed in the context of Catalan universities degrees and therefore the competences for sustainability of new degrees of these universities are discussed during the course offered during the academic year 2009 – 2010.

4. Theoretical Framework

4.1. Professional Skills to Degrees

The learning is conceived as the reconstruction of the schemes of knowledge of the student from the experiences that students have with objects –interactivity– and with the persons –intersubjectivity– in situations of interaction that are significant in

agreement with his/her level of development and the social contexts that give him/her sense (Segura, 2003). The learning process conceived from the constructivist perspective of Ausubel, is the process for which the student processes the information in a systematic and organized way and not only memorizing things; but he/she constructs knowledge (Díaz, 1998:18). In this process there can be identified clearly three factors that are determinant in the learning (Iafrancesco, 2004), since they are the attitudes, the aptitudes and the contents. Nevertheless, from the investigations of Piaget (1975) these aptitudes take two different orientations, the intellectual aptitudes and the procedural aptitudes.

The development of each one of the attitudes, intellectual aptitudes, procedural aptitudes and the contents have correspondence with the formation and structuring of the being, thinking, doing and knowing, respectively. It is as well as the learning reached by means of the convergence of these four dimensions gives place to the so called "significant learning's", which are those where the student reconfigures the new information with the experience, allowing him/her to integrate large amount of knowledge with logic. This integration between knowledge with logic and experience turns out to be the development of the competence (Iafrancesco, 2004).

It's necessary to give an initial look to the factors that intervene in the learning process then it can be discern on how they contribute to the development of the competences. For this, it has been defined four factors (Iafrancesco, 2004):

a. Attitude:

   It's an emotional and motivational readiness tendency required to develop a certain action, has also a cognitive and a behavioral component. Attitude basically is to generate expectations, because this way the student is interested and is motivated in his learning process. Nevertheless, the attitude can be inversely proportional to the aptitude for a compensation mechanism of weaknesses, as in the case that by recognizing a weaknesses in the area of mathematics, with the need to learn, are more interested to learn that those who have more skills to this area.

b. Intellectual skills – abilities

   They are mental skills that determine the learning potential, also defined as the capacity to think and know. Depend on the mental, cognitive functions, thought processes and multiple intelligences.

c. Procedural skills – abilities

   Defined as the capacity to act and do. They are related to methods, techniques, processes and strategies used in performance.

d. Contents

   It's the whole conceptual structure capable of being learned. Its organization is vital for the learning process. To the extent that there is more coherence among the contents learned, students will find the relations between them easier and will increase their level of compression. The understanding of concepts determines the learning, but not the "significant learning's".

Who knows how to act, and does it good, dominates the knowledge, comprehends how it works and the interrelations between concepts during the learning processes, therefore a competence has been developed.

Thus, a competence can be defined easily as “the result of a process of integration of skills and knowledge, knowing, knowing how, knowing how to be, be, knowing how to get started ... " (Chávez, 1998). However, this definition does not indicate the fundamental role of the cultural context in the development of competences.

Competences may also be understood as an "ideal performance that emerges from a particular task in a meaningful context" (Bogonya, 2000), therefore requires the individual appropriation of sufficient knowledge to solve problems with different solutions and in a relevant way, so a competence is developed in a situation or context.

Therefore, to take the points of convergence of the above definitions, one can define the powers and know-how in a dynamic context of a person with capacity for creativity, adaptation and assimilation of change, in specific situations, which in ultimately goes down to "a person who solves something in an appropriate way" (Marín, 2002).

4.2. Competences for Sustainability

Education for sustainability is an ongoing process of cultural production aimed to the training of professionals committed to the ongoing search for the best possible relations between society and the environment for the continued existence of both, taking into account in the models of ethical human development consistent with environmentally and socially sustainable development, the principles of justice, solidarity, equity, or respect for both biological and cultural diversity (Minguet, 2009).

Since the beginning of XXI century, Spanish government and universities have developed different processes for the introduction of sustainability in higher education such as the international seminar on curriculum greening "Introducing sustainability into the college of technology" can also be find different educational and working hours, "Greening and Teacher Education" (2007), "Sustainability in the reform of the curriculum" (2008), "Sustainability in university degrees" (2009), "The State Research in Education for Sustainability in Catalonia "(2009)," Proposals of the World Education in the Strategy for Sustainable Development of Catalonia 2026.cat "(2009)," The State of Research in Education for Sustainability "(2010), among others.

Training professionals committed to sustainability requires a change in the interpretive models in the relationship between human beings and the natural environment and socio-cultural, representing half of facilitating the experience of alternative models more in line with the values of sustainable development, and involves a reorientation of higher education towards sustainability (Minguet, 2009).

More specifically, the concept of competences for sustainability has been defined as the complex and integrated set of knowledge, skills, abilities, attitudes and values that people put into play in different contexts (social, educational, employment, family etc.) to resolve issues related to development issues, as well as operate and transform reality with sustainability criteria (Geli et al., 2004), this is a knowing, knowing how to value and requiring work-related content the environment (natural, socioeconomic and cultural) to be able to provide sustainable responses to problems or work situations.

To obtain lasting changes in the correction of un-sustainability is necessary that these contain a participatory dimension. Participatory mechanisms related to sustainability are diverse: from the responsible contribution to the management of waste or resource consumption, to active participation in decision making and transmission of social values associated with sustainability. It would be said, that a passive component of the participation when the actions of the citizenship limit themselves to adapting at the rate of habits planned from the institutions. In the top-down model, the citizen contributes, consciously or unconsciously, in general lines are given by institutions such as the selective separation of garbage or the implementation of recommendations for saving energy. (Lobera 2009)

The nature of sustainability is clearly transversal as education, but unfortunately, in local contexts it's not easy to articulate in concrete terms. Thus, the challenge was how to transform education for sustainability in a practical tool for mainstreaming the look and political practices causing them to become the stuff of every area of government of each territory and each participatory project (Collet 2009).

4.3. Competences for Sustainability in Catalan Universities

In recent years Spain and Catalonia have been developing various legislative processes and activities to be able to achieve the objectives established by the joint declaration of Bologna agreement in 1999 creating a European Higher Education Area (EHEA).

The Organic Law 5 / 2002 that formalizes the qualifications and training, determines that a "Professional competence: the corpus of knowledge and techniques that enable the exercise of professional activities in accordance with the requirements of production and employment." («BOE - Government Gazette» 147, de 20-6-2002.)

The university systems gradual coordination required by the European Higher Education Area process, launched in 1999 with the Bologna Declaration has acquired a dimension and an unprecedented agility to the process of change initiated by the European universities.

This royal decree, following the principles established by law, builds on the conception and expression of university autonomy. On this way, the new agreement of the law, establishes that universities on their own can create and make suggestions on the way of teaching and the development of the degrees, without being limited to the existence of a previous catalog established by the Government, as it is now compelled.

Furthermore, the new organization of university responds not only to a structural change but also promotes a change in teaching methods, which focuses the objective in the process of student learning, in a context which extends throughout his / her life.

The Law 4 / 2007, amending the Organic Law 6 / 2001, formalizes that universities should encourage the participation of members of the university community activities and projects in international cooperation and solidarity. In addition, foster the implementation of activities and initiatives contributing to the promotion of peace culture and sustainable development and respect for the environment as key elements for progress in solidarity.

It determines that all curricula offered by the universities should take into account that the training in any profession should be based on respect and promotion of Human Rights and the principles of universal accessibility and design for all.

This decree does not forget the university's role as a transmitter of essential values. The challenge of today's society to achieve a tolerant and egalitarian society in which respect for fundamental rights, freedom and equality between men and women, must come in practice at the university.

The university will develop a quality research and effective management of knowledge transfer and technology. This, with the objective of contributing to the growth of knowledge and technological development, innovation and competitiveness of enterprises, the improvement on citizen's life quality, economic and social progress and an equitable, responsible and sustainable development ensuring the development and the achievement of equity.

On the other hand, the Agency for the Quality of University System (AQU) have developed several processes to help universities develop their map of activities, competences, objectives, etc, for each degree.

Since 2004, the Department of Universities, Research and Information Society (DURSI) and the AQU developed four phases for the development of the pilot plan called "Qualification Adaptation to the European Higher Education Area" (EHEA).

In 2008, the AQU of Catalonia start the process of diploma certification developed under the pilot plan on qualification adaption to the EHEA. The process, apart from ensuring the quality of these courses, has been planned by AQU Catalonia in order to generate recommendations that can be applied in assuring the quality of degrees. Nine Catalan universities have participated, with 46 degrees established in the year 2007-2008, of which 40 are master's degrees and 6 are graduate degrees. The result has been 43 degrees certified.

Moreover, the AQU Catalonia has developed guidelines for the competences assessment in the EHEA framework, taking as its starting point the processes implementation of university degrees accreditation, coordinating the development of assessment guides competence in different subject areas:

Table 4.1. Summary of guidelines for competency assessment published by AQU (2010).

Guidelines for the Evaluation of Competence issued by the AQU (2010)
Sciences
Guidelines for assessing competence in the area of Social Sciences
Guidelines for assessing competence in the area of Social Education
Guidelines for the assessment of competences in the thesis in the area of Social Sciences and Law
Guidelines for the assessment of competences in the practice of teacher
Guidelines for assessing competence of Science in Physical Activity and Sport
Humanities
Guidance for assessing competence in the area of Humanities
Experimental sciences
Guide for the evaluation of scientific expertise in science, math and technology

Guidelines for assessing competence of laboratories in the field of Science and Technology
Health Sciences
Guidelines for assessing competence in Medicine
Techniques
Guidance for assessing competence in the area of Engineering and Architecture
Guidelines for assessing competence in the work of final degree and Master in Engineering

AQU under the report "Guide for the assessment of competency of Engineering and Architecture" shows the Tunning report where it describes generic competences through the acquisition of different skills and abilities such as:

Instrumental competences

- Ability to analyze and synthesize
- Ability to organize and plan
- Basic general knowledge
- Basic knowledge of the profession
- Oral and written communication in their own language
- Knowledge of a second language
- Basic skills of computer use
- Skills in information management
- Troubleshooting
- Decision making

Interpersonal competences

- Capacity and self-criticism
- Capacity for teamwork
- Interpersonal skills
- Ability to work in an interdisciplinary team
- Ability to communicate with experts from other areas
- Appreciation of diversity and multiculturalism
- Ability to work in an intercultural context
- Ethical commitment

Systemic competences

- Ability to apply knowledge in practice
- Research skills
- Ability to learn
- Ability to adapt to new situations
- Ability to generate new ideas (creativity)
- Leadership
- Ability to work independently
- Design and project management
- Initiative and entrepreneurship
- Concern for quality
- Motivation to improve

This framework has served the Catalan universities in developing its new type of competences for sustainability.

5. Sustainability Analysis Competences in Catalan Universities

5.1. Methodology

This study aims to evaluate the introduction of sustainability skills in the Catalan universities' new degrees. Taking the opportunity that the research and observation of education for sustainability competences developed through university education could be done from a quantitative perspective.

Given that quantitative research is the one in which quantitative data is gathered and analyzed and crossed over with variables in order to determine the relationship between a them (a dependent variable) and another (outcome or dependent variable) in a population. It can be found designs for quantitative research that are descriptive that determine only associations between the variables and experimental designs which establishes causation. On this way through quantitative research, it can be shown the way that Catalan universities are working in terms of education for sustainability in the different knowledge areas. Likewise, it can be seen across the different components of a competence and their taxonomy, the progress that Catalan universities have had in relation to education for sustainability.

On the other hand, shows comparatively the development of Catalan education with regard to the Spanish government in relation to competences for sustainability.

For the development of this research, it was used the document “VERIFICA” which is the document used by the universities and the Spanish government to evaluate and certify the accomplishment of the minimums required by the university to offer any degree.

Punctually it was done a comparison of the frequencies that every “descriptive word of a competence” had in the objectives described at the “VERIFICA”.

5.2. Taxonomy of Competence

In the ROYAL DECREE 1393/2007, by which there is established the arrangement of the university official educations, it’s found that the study plans conducive to the obtaining of a title must have in the center of its aims the acquisition of competences by the students, …. It’s necessary to do emphasis in the methods of learning of competences as well as in the procedures to evaluate their achievement.

Moreover, in the supposition of titles that enable the access to professional activities or their exercise, there is foreseen that the Government establishes the conditions to which the study plans must be adapted to guarantee that the titles accredit the possession of the competences and knowledge adapted for the professional mentioned exercise.

The general competences are those referred to the set of knowledge, attitudes and behaviors that guarantee the maintenance and progress of the individual inside his daily environment, to obtain the best results and to adapt to other contexts. Nevertheless, the academic competences are those referred to the set of knowledge, attitudes and behaviors that guarantee the maintenance and progress of the individual

inside his/her academic environment and the attainment of efficient results. It is important bear in mind that these competences are of general character and therefore, they must combine with other specific competences of the discipline or subject in which the student is formed. Meanwhile, also the social competences exist and of teamwork that refer to the set of knowledge, attitudes and behaviors that they guarantee the maintenance and progress of the individual in the social relations that take place inside the daily, academic environment and / or individual work.

Table 5.1. Taxonomy Competences (Villada Osorio, Diego 2009)

Competence's Components			
	1	**2**	**3**
1	capacity	knowledge	transforming
2	proven action	do	compliance
3	sufficiency	context	effectiveness

It's therefore, that students will need skills and attitudes related to sustainability being them interconnected to the social, academic and personal competences. Under this vision the process of education - learning must assure that the future graduates should think critically, evaluate ethically, analyze from different disciplines (multi - inter and trans - disciplinary) and to understand the social, environmental and cultural complexity of the current world and its contexts.

The words have been categorized in the way they are developed; through **methodological** competences which are developed through the method of teaching - learning and competences that are learned in the course **content** developed (Table 5.2).

The taxonomy used during the research was determined bearing in mind the key words that show they are related to the competences listed in Table 5.2.

Table 5.2. Competences in Sustainability

Key words related to Competences for Sustainability	
Methodological	**Content**
Multidisciplinarity Interdisciplinarity Transdisciplinarity	Social Context Participation
Ethics Values	Environmental Context Environmental Techniques Technologies
Complexity	Cultural Context
Critical Thinking	

In addition to these keywords, the analysis also adds competences for Sustainable Development, as in some degrees introduced explicitly.

The key words in Table 5.2 are defined as:

It's possible to refer the term **multidisciplinary** to the pursuit of knowledge (Miranda Levy, 2009), interest or development of skills in multiple fields. For example, it's common for students to practice sports, take classes of mathematics and natural sciences in the primary education. But this multidisciplinary approach will not be of much advantage, unless they get to connect the knowledge and values of these fields.

Furthermore, **interdisciplinary** (Tamayo, 2003) incorporates an analysis of the problem from different conceptual frameworks of each discipline and prosecution and finally the integration. It is conducted under the integration of various disciplines in order to present alternative solutions to a problem.

The **transdisciplinary** case study as defined by the TDlab ETH-Zurich (see website http://www.uns.ethz.ch/translab/index (2010)) is a hybrid combination of learning, research, application used to learn skills and abilities necessary to investigate the problems of sustainable development.

The Royal Academy of Spanish Language defines **ethics** as part of philosophy dealing with morality and the obligations of man. Set of moral rules that govern human behavior.

According to the Earth Charter Initiative to document the Earth Charter humanity needs a shared vision of basic **values** that provide an ethical foundation for the emerging world community. Thus affirm the following interdependent principles, for a Sustainable Lifestyle as a common ground with which to be guided and assessed the conduct of individuals, organizations, corporations, governments and transnational institutions: respect and care for the community life, ecological integrity, social and economic justice, democracy, nonviolence and peace.

Complexity is defined as an epistemological rethinking, that is, having to do with the organization of knowledge itself, is a paradigmatic problem in the sense as defined "paradigm" Edgar Morin (1990). Since a paradigm of classical science simplifying controls by imposing a principle of reduction and separation principle to any knowledge, there should be a paradigm of complexity that would impose a principle of distinction and a principle of conjunction. In opposition to the reduction, the complexity requires the understanding of the relationship between the whole and parts.

The knowledge of the parties is not sufficient knowledge of the whole as the total is not enough, if one ignores its parts, therefore, we must consider the whole and parts through an cyclical approach to both views.

Critical thinking is the intellectually disciplined active process and able to conceptualize, implement, analyze, synthesize, and / or evaluate information obtained or generated by observation, experience, reflection, reasoning, or communication as guide to act, proceed and belief. In exemplary form, is based on universal intellectual values that go beyond subject divisions: clarity, accuracy, precision, consistency, relevance, evidence, depth, breadth, and fairness, as defined by Scriven & Paul (1987).

Social perspective: The sociologist Richard Jenkins (1987) raises questions concerning the existence of societies:

1. How humans think and exchange between them - the sensory world is not composed only a fraction of the human being. To understand the world, we conceive of human interaction in the abstract (ie from the social point of view).
2. Many phenomena cannot be reduced to individual behavior - to explain certain phenomena, a vision of something "greater than the sum of its parts" is necessary.
3. The communities survive most of the time taking into account the duration of life of its members.
4. The human condition has always meant going beyond the evidence of our senses, every aspect of our lives is attributed to the community.

Participation: The Economic and Social Commission for Asia and the Pacific (ESCAP) United Nations said in 2002 that everyone would affect or benefit in any way any development effort, so everyone should take an active part in its planning, decision-making and implementation. Therefore, development is everybody's business. Everyone must take responsibility and participate in the pursuit of sustainability, since it is the people's right to have a sustainable life. Operationally, therefore, development is conducted in a manner involving the benefits of the actions of the four key stakeholder groups, public institutions, private enterprises, civil society and resource providers.

Environment is the set of abiotic factors (solar energy, soil, water and air) and biotic (living organisms) comprising the first layer of the Earth called biosphere, support and home to living beings.

Moreover, the **environmental techniques and technologies** are an area of environmental science based on the design, implementation and management processes, technology products and services for prevention, control and solution to environmental degradation problems development and use of natural resources in production and consumption processes.

Cross (et. al, 1989) defines **cultural proficiency (cultural means)** as a set of congruent behaviors, attitudes and policies that come together in a system, agency or group of professionals that enable that system, agency or group to work with efficiency in situations where there is a crossroads of cultures.

The word culture is used because it implies an integrated pattern of human behavior that includes thoughts, communications, actions, customs, beliefs and values and the institutions of a racial, ethnic, religious or social.

Five essential elements contribute to the ability of the institutions of a system or organization to increase cultural proficiency:

1. pluralism value;
2. be able to assess themselves culturally
3. be aware of the inherent dynamics of the interaction between cultures
4. have institutionalized cultural knowledge, and
5. have adapted the service delivery to reflect an understanding of cultural pluralism.

These five elements must be shown at all levels of an organization, including policy formulation, administration and practice. Moreover, these elements should be reflected in attitudes, structures, policies and services of the organization.

Taking into account the definitions of the keywords, we analyzed the powers appearing in degrees and there were few skills were related to each keyword, in order to visualize what competence / key word is given more or less relevant in degrees studied.

5.3. Sample

For the research a sample of 255 degrees offered at 11 universities in Catalonia took, in six different knowledge areas as shown in Tables 5.3, 5.4 and 5.5 respectively.

Table 5.3. Knowledge Areas Evaluated

Knowledge Areas	Number of Degrees studied
Architecture, Urbanism and Building Design	5
Arts and Humanities	44
Biosciences	21
Health Sciences	28
Social Sciences and Law	90
Sciences and Engineering	67
Total	**255**

Table 5.4 Catalan Universities Participants

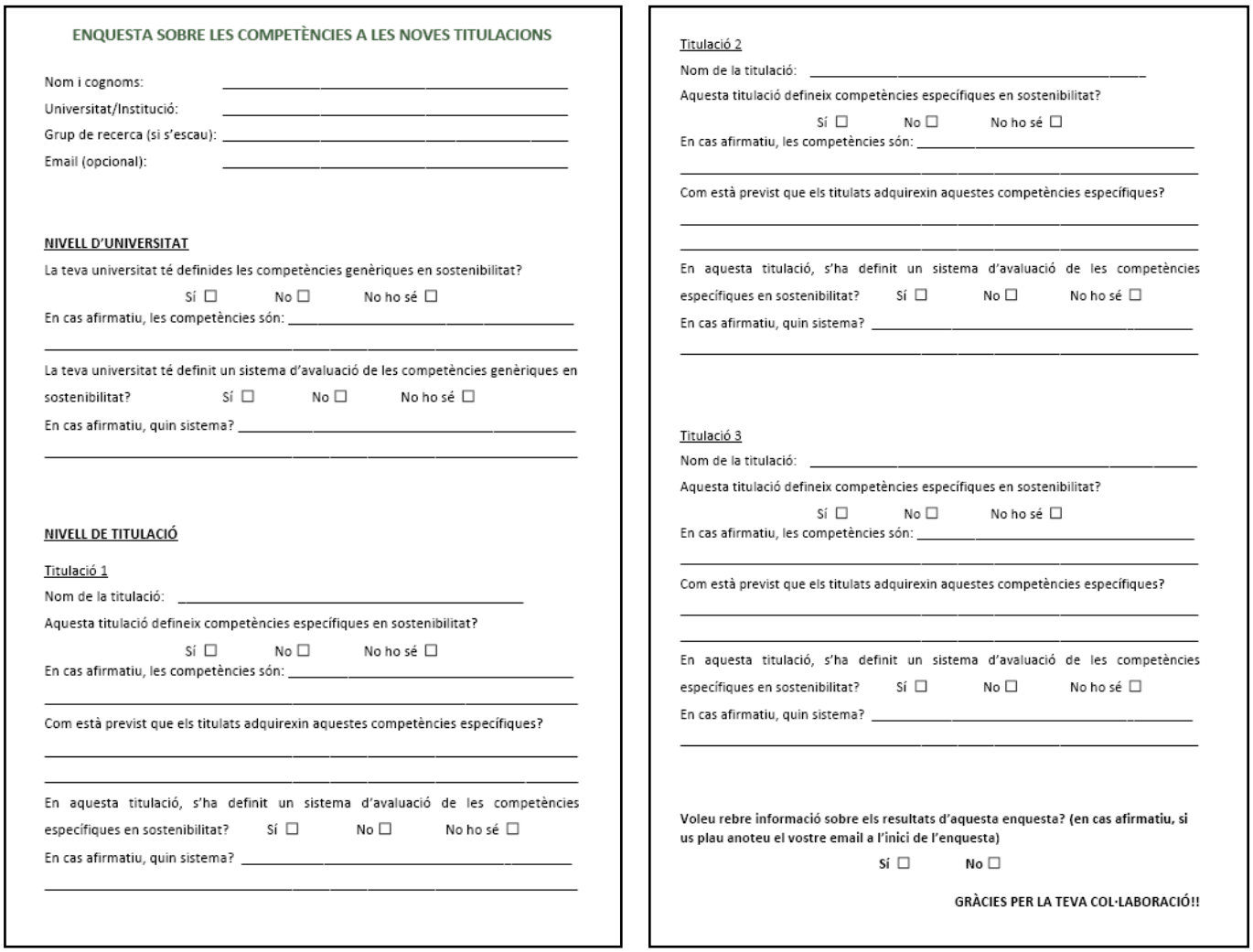
Universidad University	Number of Degrees studied
Autonomous University of Barcelona	50
University of Barcelona	45
University of Girona	27
University of Lleida	11
Universidad de Vic University of Vic	15
International University of Catalonia	9
Open University of Catalonia	12
Technical University of Catalonia	38
Pompeu Fabra University	20
Ramon Llull University	2
Rovira i Virgili University	26
Total Total	**255**

5.4. Surveys and data collection

For the information gathering it was used different methodologies.

1. Surveys sent by email. (Table 5.5)
2. Search online at the websites of each of the universities.
3. Browse through the document “VERIFICA” of the universities presented by to the Spanish government - ANECA - National Agency for Quality Assessment and Accreditation.

Table 5.5. Survey about Competences in the new degrees



ENQUESTA SOBRE LES COMPETÈNCIES A LES NOVES TITULACIONS

Nom i cognoms: _____

Universitat/Institució: _____

Grup de recerca (si s'escau): _____

Email (opcional): _____

NIVELL D'UNIVERSITAT

La teva universitat té definides les competències genèriques en sostenibilitat?

Sí ☐ No ☐ No ho sé ☐

En cas afirmatiu, les competències són: _____

_____

La teva universitat té definit un sistema d'avaluació de les competències genèriques en sostenibilitat? Sí ☐ No ☐ No ho sé ☐

En cas afirmatiu, quin sistema? _____

_____

NIVELL DE TITULACIÓ

Titulació 1

Nom de la titulació: _____

Aquesta titulació defineix competències específiques en sostenibilitat?

Sí ☐ No ☐ No ho sé ☐

En cas afirmatiu, les competències són: _____

_____

Com està previst que els titulats adquirexin aquestes competències específiques?

_____

_____

En aquesta titulació, s'ha definit un sistema d'avaluació de les competències específiques en sostenibilitat? Sí ☐ No ☐ No ho sé ☐

En cas afirmatiu, quin sistema? _____

_____

Titulació 2

Nom de la titulació: _____

Aquesta titulació defineix competències específiques en sostenibilitat?

Sí ☐ No ☐ No ho sé ☐

En cas afirmatiu, les competències són: _____

_____

Com està previst que els titulats adquirexin aquestes competències específiques?

_____

_____

En aquesta titulació, s'ha definit un sistema d'avaluació de les competències específiques en sostenibilitat? Sí ☐ No ☐ No ho sé ☐

En cas afirmatiu, quin sistema? _____

_____

Titulació 3

Nom de la titulació: _____

Aquesta titulació defineix competències específiques en sostenibilitat?

Sí ☐ No ☐ No ho sé ☐

En cas afirmatiu, les competències són: _____

_____

Com està previst que els titulats adquirexin aquestes competències específiques?

_____

_____

En aquesta titulació, s'ha definit un sistema d'avaluació de les competències específiques en sostenibilitat? Sí ☐ No ☐ No ho sé ☐

En cas afirmatiu, quin sistema? _____

_____

Voleu rebre informació sobre els resultats d'aquesta enquesta? (en cas afirmatiu, si us plau anoteu el vostre email a l'inici de l'enquesta)

Sí ☐ No ☐

GRÀCIES PER LA TEVA COL·LABORACIÓ!!

Table 5.5 shows the survey used. This survey was sent to different universities, their vice-directors, members of the network EDUSOST (Education for Sustainability of Catalonia), teachers, etc., which could provide information with regard to skills development in universities and if within this development they were referred to sustainability.

Table 5.6 shows the web pages used in the different universities:

Table 5.6. Competences in Catalonian Universities – web pages

Websites used:	
UAB	http://www.uab.es/servlet/Satellite/bolonya/professorat/estructura-dels-estudis/grau-1227080874710.html
UB	http://www.ub.edu/eees/espaiub/oferta/oferta.html
UDG	http://www.udg.edu/Default.aspx?alias=www.udg.edu/estudia
UDL	http://www.udl.cat/estudis/estudis_ambits.html
UIC	http://www.uic.es/ca/titulacions-uic http://www.uic.es/ca/titulacions-uic
UOC	http://www.uoc.edu/estudis/ http://www.uoc.edu/estudis/
UPC	http://www-ice.upc.es/documents/eees/1086/1086.pdf
UPF	http://www.upf.edu/estudiants/titulacions/graus.html
URV	http://www.urv.cat/estudis/1er_i_2n_cicle/index.html
U Vic	http://www.uvic.cat/titulacions http://www.uvic.cat/titulacions

In Spain the Organic Law 4 / 2007 that modifies the Organic Law 6 / 2001, on Universities, establishes a new structure of the education at Spanish university degrees in agreement with the aims established for the construction of the European Space of Top Education.

The Royal decree 1393/2007, in conformity with the provisions of the Title the VIth of the Organic Law 4 / 2007 on Universities, establishes the normative framework for the management and certification of university official education. In the mentioned Royal decree it's stated that ANECA will set up the procedures, protocols and guidelines for the official recognition of the titles. Also it establishes that ANECA will evaluate the plans of study and curriculums offered, according to their protocols and guidelines ANECA following the established in the Royal decree will develop the following actions:

- Publish the criteria, protocols and evaluation procedures.
- Select the auditors and evaluators from a public call.
- In collaboration with the University Council, made available to universities an electronic tool that allows the processing of applications.

6. General Analysis of Competences in Sustainability in Catalan Universities

For the analysis of the competences for sustainability in university education, the words indexed from the table 5.2. were used as "keywords" in this research. In that way, by having the frequency of appearance of each "key word" in the Objectives document VERIFICA, it was feasible to evaluate the tendency taken by each university degree on the different aspects related to sustainability.

The analysis is structured in the following areas:

1. By areas of knowledge.

2. By degrees
3. Words

This structure allows the systematic analysis of the inclusion of competences for sustainability in Catalan universities as shown in the following paragraphs.

The BOE (Government Gazette) has developed for each of the degrees in the areas of Engineering and Architecture; the most important aspects in relation to sustainability that they think are the minimum requirements to be developed by the Spanish universities. With this it could be analyzed to what extent the Catalonian universities have achieved the government necessities in these educational areas.

7. Conclusions

- During the investigation it was found that in general the Catalan Universities are working hard towards the introduction of competences in sustainability in all new degrees.

- Note that the Catalan universities are above what guidelines will indicate the degrees BOE (Government Gazette) competences regarding the inclusion of sustainability skills.

- It can be seen that the area of health much emphasis on the criterion of ethics and values. Understandably, this happens because of the great responsibility that doctors, nurses and all people have links to health.

- It is noted that the criterion is more important is the environment in general, followed by social.

- Similarly, the criteria for critical thinking, ethics and values in almost all areas of knowledge and universities maintain the same level. There are traces of inclusion of these criteria without demonstrating much in the graphs obtained in the investigation.

- On the other hand, it is clear that the inclusion of trans - inter - multi disciplinarity not identified any areas of knowledge or universities. That is, although universities do not see the importance that their students have a more holistic education.

- It is emphasized that in degrees engineering and science more relevant criteria are the environment, showing that the development of technologies and solutions for sustainable development is still displayed from the perspective of technologies that are environmentally friendly.

- Only the UPC placed the development of skills in sustainability in the general powers of all its degrees, thus maximizing their reach.

- It is noted that there is a guide to assessment of skills in sustainability, which would facilitate development in these universities.

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