Personality, learning patterns and performance of First Year Students

A comprehensive analysis of the interplay between personality traits and learning patterns as factors which predispose and manage the learning process and its relationship with academic performance.

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SUMMARY

FIGURES

TABLES

ACRONYMS

1st Q..... First semester Qualification
ANECA..... National Agency for Quality Assessment and Accreditation (Spanish)
AP..... Academic Performance
AQ..... Access Qualification
AQU..... Catalan University Quality Assurance Agency
BA/MA..... Bachelor / Master System
ECTS..... European Credit Transfer System
EHEA..... European Higher Education Area
ENQA..... European Association for Quality Assurance in Higher Education
ESIB..... National Unions of Students in Europe
EU..... European Union
FYE..... First Year Experience
FYS..... First Year Students
GPA..... Grade Point Average
HE..... Higher Education
ICTs..... Information and Communication Technologies
ILM..... Interactive Learning Model
ILS..... Inventory of Learning Styles
LCI..... Learning Connections Inventory
LLL..... Life Long Learning
LML..... Let me learn
LP..... Learning patterns
MECD..... Ministry of Education, Culture and Sport (Spanish)
OCEAN..... *Openness to experience*, *Conscientiousness*, *Extraversion*, *Agreeableness*, *Neuroticism*
OECD..... Organization for Economic Co-operation and Development
PAU..... University Entrance Exams
PBL..... Problem Based Learning
PISA..... Programme for International Student Assessment
PT..... Personality traits
SAT..... Scholastic Assessment Test
SEM..... Structural Equations model
STAR..... Student Transition And Retention
SWOT..... Strengths, Weaknesses, Opportunities, Threats
T/L..... Teacher and Learning
URV..... Rovira & Virgili University

1 INTRODUCTION

1.1 PROBLEM OF ANALYSIS

To describe and explain the problem that this research will focus on several sections have been defined: the context of the problem, formulating the problem, justifying the problem and facing the problem.

a) the context of the problem

This context encompasses the objective reality, the facts, the conjuncture in which the problem is occurring. To add information to this contextualization, it is necessary to clarify that the place where the problem will be analyzed is geographically located in a Spanish context, more concretely in the Rovira i Virgili University (URV), located in Tarragona (Spain).

In order to describe the problem four aspects must be taken into account. The first one has to do with the process of change that constitutes the construction of the European Higher Education Area (EHEA). This fact derives in an essential change of the educative model, a model that has to be focused on the student and learning. These contextual realities are occurring jointly with an increasing diversity of the young students who enter university, just at the critical moment that constitutes the transition to higher education for these young students.

The main objective of the construction of the European Union (EU) is to improve the quality of life of European citizens, while taking into account the human factor in most of the processes which take place. Personal factors are one of the key elements to promote the well-being of European citizens and to improve their efficiency as professionals.

Therefore, training processes become an essential pillar in the current knowledge society. Bangemann (1994) reported that to prepare Europeans for the Information Society it is necessary to place education, training and promotion in a central role in the construction process of the EU. The educative systems have to be organized taking into account this conjuncture in which personal aspects are essential to well-being, productivity and competitiveness at the same time.

Educational processes have been reviewed by most of the countries in the EU in order to adapt their systems to the new requirements of society. This general review is concreted in the creation of a common EHEA. The EHEA constitutes the educative context in which this work is based.

To build up an EHEA implies transformations that constitute a great opportunity to introduce changes to University systems and the processes which take place. These transformations deal with structural aspects and changes in the educative paradigm.

The structural aspects are described in three vectors that should shape the general framework in which to work. These vectors are: common measurement units, comparable curricula systems and assurance quality systems.

The common measurement unit is concreted mainly with the establishment of the European Credit Transfer System (ECTS). ECTS measures the time that the students need to work in order to achieve the objectives defined in the different modules of the study programmes; this time includes all educational activities (student workload) with or without the presence of a teacher.

The second vector has to do with the configuration of comparable curricula systems using a similar structure based on the implementation of Bachelor / Master (BA/MA) levels in all European countries.

The third vector consists of the creation of a quality assurance system that allows the establishment of systematic processes of assessment and accreditation oriented to

persons as well as institutions around the EU. Each country has to develop its own mechanisms of quality assurance which should be designed in harmony with the rest of the European countries in order to promote the exchange and recognition of educational processes and products.

This structural dimension would facilitate transparency and comparability between the different educative systems as well as promote the mobility and employability of students around Europe.

The structural aspects have an important institutional component. These aspects depend mostly on institutional decisions and their development is defined by the universities' governmental bodies through legal dispositions. The EU countries are defining all these aspects at different rhythms depending on the level of development of their prior educative reality and how similar their systems were with regard to the new ones required.

Nevertheless, completing the structural transformation successfully does not guarantee that the transformation in terms of educative models is occurring. It can even occur that the structural change is identified as a total change. That is to say, to change the box but not the content. That EHEA is reduced to a structural change is one of the dangers that threaten this process.

Therefore, the aspects related to the educative model have to be considered. All the elements that can promote an educative model centered on the student's learning must be taken into account.

This new paradigm places the student in the center of the teaching and learning (T/L) process. The educational model has to move from teacher to student, from content to competences. In other words, it has to move from things that the teacher wants to teach to things that the student needs to learn.

In some European reports the necessity for this change has been stated. The recommendation number 8 of the United Kingdom Dearing report (1997) states that "all institutions of higher education give high priority to developing and implementing learning and teaching strategies which focus on the promotion of students' learning". This idea suggests that it has become necessary to place the student at the center of the process. In the Spanish context, the Bricall report (Informe Universidad 2000, 2000) speaks of the student in terms of bypassing homogeneity, as well as the necessity of moving from a Humboldtian perception of university to a university of the present times, characterized by the diversity of its students and its global dimension.

An educational model that gravitates around the student implies, among other things, the organization of the following processes: the entrance to university considering who the student is and which competences the student has (input); the configuration of the T/L process based on what the student needs to do (during his/her university years); and the design of curricula according to what the student needs to achieve (output).

Regarding output, the Europe of knowledge requires professionals whose assets go further than conceptual and procedural contents. Personal assets are required in order to develop any job efficiently. This integrated idea of the professional is conceptualized in terms of competences.

Consequently, the curricula in HE has to be designed in terms of competences, incorporating the personal component to the rest of the requirements which have to be targeted among the objectives of the training programs.

Several samples can be observed to define the graduates' profiles (output) considering labour market demands and those of society in general. The Tuning project[1] (European context) or White books[2] (Spanish context) are examples of designing study programs based on competences. In both examples the curricula have been designed collecting

[1] The detailed explanation about the *"Tuning project"* can be observed in its web page project [http://www.tuning.unideusto.org/tuningeu/]
[2] This set of *"white books"* can be found in the web page of the Spanish National Agency for Quality Assessment and Accreditation (ANECA) [http://www.aneca.es/activin/activin_conver_LLBB.asp]

triangulated information from three sources: employers, academics and graduate students.

During the students' passage through university, the new educational model implies a cultural change for teachers and students; this change means that both have to assume a new role and participate within the T/L process.

The teacher becomes the person responsible for placing the student in the center of the T /L process. The teacher is responsible for planning the learning process in which the student is able to take an active part.

With regard to the students, they have to assume their new role. Students must take an active part in the process. They have to be independent in the development of their job as students and they have to claim this independence.

To sum up, the construction of the EHEA has to imply a cultural change. The EHEA would be a propitious process to promote a deep educational paradigm change. A new educational model has to be part and parcel of the new panorama of Higher Education (HE) in Europe.

Both transformations, structural aspects and educative paradigm, constitute a big challenge with plenty of opportunities. EHEA is a propitious context to promote innovation in curricula, methodology, tutoring, evaluation, etc. Nevertheless, this change has to be able to recognize and manage the enormous complexity generated by it. Therefore, we are facing a conjuncture that constitutes a challenge and a threat at the same time.

To talk about the educative system makes sense in order to respond to people in their status as learners. The fact is that the current population is immersed in processes of change that occur rapidly; never before have the changes been so quick. But all research work needs to apply a certain diagnosis of the situation, which in turn will allow all kinds of scientific approaches.

In this case, the first statement of the diagnosis is that the current young population presents an increasing diversity. This diversity can be observed in several issues: demographic, economic, in terms of values, participation in the educative system or relationship with Information and Communications Technologies (ICTs). If a surfaced approach in these themes is applied, some statements can be drawn.

The participation of young people in HE is higher than before; this fact is derived from a democratized sense of education that promotes that university classrooms are the reflection of the majority of social classes. The immigration factor generally contributes to heterogeneity but this is not a relevant fact in the Spanish context at this moment. Universities are incorporating new student profiles that combine work and study; the HE system must respond to part-time student necessities. Another relevant change has to do with the increasing participation of women in HE, not only as a simple participation but in terms of women performing better than men. This female incorporation is also increasing in the labour market setting.

Another aspect to consider in this specific young generation is its tendency to consider interpersonal relationships as very important aspects, together with a good life style in terms of leisure, freedom and consumption. In general, young students regard themselves in an optimistic way but with some deficit regarding independence and maturity.

One approach to the economic issue reveals that young people become economically independent much later than some years ago and therefore they tend to leave their family home even later.

Nevertheless, one of the most important factors that distinguish young people nowadays is their relationship with ICTs; this is a nuclear element of their personal, academic and professional development.

The combination and interplay of all these factors contribute to support the increasing diversity of the current first year students at university. These students face the challenge of entering the university setting, while being aware that it is a critical moment that may affect all their academic performance throughout their lives as learners.

University entrance is a critical moment for students, teachers and also for the institution. All kinds of information about students can be of great importance in order to manage this transition and the later stages of their education.

Understanding the complexity of student profile at the beginning of their academic life (Tinto, 2007) is a key element to facing the challenge of success in HE development. It is important to know the students from the beginning, even before they start university. Many authors make reference to this transition period and show that the students who start university go through a special situation that can affect their academic and professional future. In this sense, it is interesting to make some comments about these first year students (*FYS*), also named *freshmen* or *school leavers*.

Pancer et al. (2000) says that these students envision a life free of parental control, filled with interesting and novel activities, new people to meet, and stimulating academic work. In a similar sense Berzonsky & Kuk (2005) describes this as a moment where they face major challenges like establishing new social networks and dealing with more rigorous academic demands and expectations. On the other hand, authors like Parker (2004, 2006) see this transition as a stressful situation where the students must learn to function as independent adults.

b) Formulating the problem

Observing the university student as the center of the T/L process, three processes can be considered: curriculum design (output), the design of learning environments where

different roles have to be assumed by students and teachers and the necessity of knowing the characteristics of the students who enter university.

Each one of these aspects could constitute a big problem in itself. But the nuclear problem in this work has to do with the third aspect. This problem is based on the idea that it is not possible to promote an adjusted training process nor realistic curricular design without relevant knowledge about the audience to work with.

Nevertheless, the formulation of the problem has to start from the acceptance of a prior assumption: knowing the audience (students) is a relevant starting point for organizing any teaching and learning process in the right manner. This condition is in line with the general didactic theories. In fact, this is precisely one of the universities' roles: to organize T/L processes in terms of efficiency, usefulness and personal development.

Considering this assumption, some key questions arise:

- What kind of learners is compulsory education training?
- How do first year students organize themselves as learners?

and summarizing:

- Do we really know the students who enter University?

The answer to the last question is: not enough; at least we do not know the students in the sense of the student-centered educative model as promoted by the EHEA. We have plenty of information about students who enter university but this information is not organized in a learning process sense. Therefore, we do not have enough information to give the right response to the first two questions either.

c) Justifying the problem

The statements made in the previous section are contrasted here. It is necessary to give an overall vision of the matter by formulating questions from two points of view: what kind of information is known and how this information is analyzed. It is necessary to

explore what is being done and where the efforts are being dedicated in order to know more about students.

Most universities have a large quantity of data about students. But this data is not organized in the educative sense. This kind of data can be found in institutional databases, mainly socio-biographic and academic success data, and it is being used to define processes such as the university pre-enrolment systems or the university access requirements.

Data management systems can offer information with regard to the students' prior academic performance. The pre-university curricula give information based on the students' pathway and their performance in subjects or university access tests. Nevertheless, this kind of information is useful for identifying and distributing the students, but more information is needed in order to organize the T/L process focused on student learning. That is to say, to know the students from a broader perspective and to take into account not only their external (socio-biographic) features but their internal or hidden traits as well.

If an exhaustive analysis of first year students is made, it can be observed that this stage has become a much investigated theme in the last two decades. In fact, universities in the Anglo-Saxon context (USA, Australia, UK) have been pioneers in emergent First Year Experience (FYE) research. The majority of these studies focus on the following objectives: to minimize the attrition or dropout of students, to establish certain access to university criteria or to offer a broad sociological description of the students who enter the university. But these studies do not pay special attention to knowing students' internal factors that predispose them to learning. Such information is important in order to plan T/L processes centered on the increasing diversity of students.

The analysis of the literature on student internal factors which predispose learning reveals that there is enough data available to formulate a hypothesis. Most research, however, has analyzed these factors in an atomized way and it is difficult to see any proposal in an educative development sense. Besides, there is the additional difficulty of

choosing the internal factors that determine the primary essence of learning, ie. to identify the more stable factors in the T/L process. Therefore, any research in this sense is a potential contribution to this specific field of study.

The previous arguments can be accepted whichever and wherever the context but, in order to complete this justification, it is necessary to have a look at the Spanish context in order to approach the problem from the specific perspective of the context of this research.

In the Spanish case there is not much tradition of the student-centered model. Consequently, not many efforts have been made to find out the students' characteristics; and even less so to consider this element as the key to designing high-quality educational processes at university.

The EHEA construction is establishing initiatives aimed at taking the students into account in the curricula design. There are also emergent student-centered processes, mostly in the tutoring action plans that are being defined at the different Spanish universities. These tutoring processes have to be a part of the student educative pathway throughout the university stage and they should be continued after finishing the university period.

Considering current society and the state of mind of the teaching community, the educational institutions have to make a big effort in order to organize mechanisms to make coherent transitions between levels, especially between compulsory school and HE. All of these efforts should be designed and developed on the basis of knowing who students are, while taking into account objective data, not only perceptions, beliefs or expectations from teachers, deans and other stakeholders.

In the university context, most of the Spanish universities are trying to improve their T/L practice; and some of them are even making specific plans to achieve this. Most of these projects incorporate the idea of connection between these two levels in order to have a positive effect on the students' performance.

One of the reference projects in the Spanish context can be found at the Rovira i Virgili University (URV). This plan, named Strategic Plan for Teaching (University Rovira & Virgili, 2006, p. 22), was based on a SWOT[3] analysis that made the following statements about students:

"*The students who come to the University have a more diverse and heterogeneous profile than before. This means that other forms of teaching must be considered.*
Freshman students have a reasonably high average qualification and a positive impression of the URV. They are also highly motivated for the studies they are about to begin. It is clear that there is some difference between the level of knowledge acquired during secondary education and the requirements of the first year of an undergraduate course, which affects academic performance. This means that relations with secondary education must be continued and intensified if the transition to university is to be smooth. Once at university, the students accept that they spend little time working on their subjects and show a general lack of commitment to and involvement in university life. Strategies will have to be designed that encourage students to get involved in the teaching and learning process.
Graduates who are working have the overall perception that their general competences (teamwork, leadership, decision making, etc.) are not at the level required by their job".

After several years of development of this strategic plan, a contrast study (URV & Polytechnic University of Madrid UNESCO Chair, 2007) to evaluate this plan was conducted. One of the conclusions reinforced by this study is the necessity of adopting processes that facilitate the transition between secondary education and university. This transition was perceived as a problem that presupposes all learning processes of the student as well as the structure of the institution. This study could be the most recent reference point for suggesting new and different ways of approaching students' nature.

[3] SWOT analysis is a strategic planning tool used to evaluate the Strengths, Weaknesses, Opportunities, and Threats

d) Facing the problem

When the existing literature is explored, there are many kinds of approaches that are useful for analyzing students. The models vary from those that are focused on individual characteristics to the ones that consider the student in a more integrated sense. In fact, these integrated models constitute the core of the freshmen experience projects' theoretical background.

Most of the models of analysis studied are conducted in three vectors: the goals (what is the purpose of the analysis), the contents (what is being analyzed) and the moment in which the analysis takes place (when it is analyzed).

After analyzing FYS literature, a model of analysis must be chosen. The selection criteria have to be founded on the type of problem defined in this work: there is not enough information about students related to their learning process.

Being aware that many factors can affect learning, the educative model of reference for the present research work leads to the search for factors which lie at the basis of learning. The model of analysis used in this work is coherent with the main objective, which is oriented to planning the teaching and learning process.

The internal factors considered in this research are personality traits (PT) and learning patterns (LP). These two aspects are viewed as internal and sufficiently stable factors.

The interesting factors in this research are those that tend to remain invariable in any learning situation. These are factors that allow the transfer of learning in different contexts. In any case, it is necessary to look into the internal factors that are the key for the management of the learning process. Therefore, socioeconomic and institutional factors are not dealt with in this work.

1.2 OBJECTIVES OF THE RESEARCH

The main objective of this work can be defined as follows:

- ➔ To know freshmen in order to facilitate the design and development of their teaching and learning process.

This objective implies the acceptance of the fact that knowing students is one of the main aspects to consider when planning and developing educative actions in an adequate manner.

In order to give a response to this general aim, it is necessary to go deeper into several specific aspects of students. Many factors can affect students as learners, but not all of them have the same relevance. Therefore, we will focus on those aspects that form part of the essence of the T/L process; that is to say, those aspects that can be more stable in time and in different contexts.

To complete this analysis, it is interesting to obtain information related to the educational environment in which the students perform. In this sense, it can be useful to know how educational systems are facing the current students.

Therefore, to give a response to this general objective, three sub-objectives are defined:

1. To provide relevant information about personality traits (learning-predisposition factors) and learning patterns (learning-management factors) of URV freshmen as characteristics that are related to their learning process.
2. To contribute to the analysis of how the pre-university and university educative systems (URV context) manage and respond to the current student population in terms of the T/L process.
3. To identify processes that can promote academic success. Knowing the students can then influence institutional and professors' decision making.

To sum up, success in achieving the objectives defined above could have educative implications that can be useful at different levels of application. In this sense, this work can contribute:

- To helping the university gets organized as an institution. That is, contributing to study plan design processes or formative programmes in general and establishing a comparison between internal features of the entering students and expectations that the institution has laid on them.

- To help teachers plan and develop their teaching process with the help of the didactic proposals based on learning activities adequate to students' profile in LP and PT terms, and taking into account the requirements designed in curricula.

- To help students manage their own learning process, making them aware of who they are (regarding PT features) and how they learn (regarding LP features). This awareness could help them face the different learning situations they will encounter as well as their decision making process through their educative system.

Once the objectives of the research have been identified, the variables that will be dealt with have to be defined. The measurement of these variables will then facilitate the achievement of the objectives. These variables are specified as follows: personality traits (PT), learning patterns (LP) and academic performance (AP). Their explanation is developed in the theoretical part and the empirical context section.

In order to activate the objectives of this research, a set of research questions about the variables are formulated. These questions are centered around the description of a sample with regards to the chosen variables and the analysis of the relationships established between these variables. Therefore, the research questions have a descriptive

and relational nature. These questions are enunciated above, although they will be developed in the corresponding section (section 3.2.2).

The concrete **research questions** are formulated as follows:

Q1. How are personality traits and learning patterns distributed in the sample?

Q2. How is the Academic Performance (AQ and 1stQ) described in the sample?

Q3. Are there any differences between best and worst 1stQ students (10%) with regard to personality traits (PT) and learning patterns (LP) in the sample?

Q4. What is the relationship between first year students' personality traits, learning patterns, prior academic performance and academic performance at the end of the first semester at university?

Q5. What is the predictive capacity of psychological variables, gender, scientific domain, type of study and prior academic performance (AQ) with regard to the 1st semester academic performance at university?

1.3 THESIS STRUCTURE

Following the introduction (chapter 1) the problem of analysis and the objectives to achieve have been presented. Here it is appropriate to describe the thesis structure, which is composed of different sections. This research is organized in three main blocks: *Theoretical approach, Research design* and *Conclusions.*

Chapter 2 *Theoretical approach* places the research as well as the subjects who are dealt with in the theoretical and physical contexts in this study. This chapter is composed of three sections:

Firstly, *The EHEA as a reference context* (section 2.1) tries to give an overview of the general context in which this work is developed. This context is mainly based on the general movement that constitutes the construction of the European Higher Education Area. The first explanation consists of describing the characteristics and the main structural aspects of this process, which takes place from the Lisbon Declaration in 1997 to London Communiqué in 2007. On the other hand, a deeper approach to the philosophical features of the EHEA is presented in order to clarify the basic ideas to be dealt with.

Secondly, *Knowledge about university students* (section 2.2) offers a general description of the subjects that are the study object in this work. This description is made in terms of the young population in general. The following subsection is based on the different ways to analyze FYS and the model of analysis chosen in this research. The last topic of this section tries to provide a context for this work with a description of URV freshmen, who are the specific objects of this research.

The third section, *Study variables* (section 2.3), consists of the detailed description of the variables that are being used in the model of analysis proposed. These variables are: Personality, Learning patterns and Academic performance. The description of these variables is made in terms of conceptualization and the type of relationships among these variables.

Chapter 3 *Research design* describes the development of the experimental part. This chapter is organized in two sections:

In the first section *Empirical context* (section 3.1), once the main objective to achieve is defined in the introduction, methodological aspects and the study variables are described. Finally, the subjects of the analysis and the data gathering methods are also explained.

Secondly, *Analysis and interpretation of data* (section 3.2) contains an introductory subsection to analyze the measurement scales used in this research. The nuclear part of this section consists of consists of the answers to the different research questions defined. These answers are introduced with the objectives set for each question and the type of analysis used. This section concludes with a general interpretation that contains most of the relevant ideas, which will then become the basis from which to write the conclusions.

Chapter 4 *Conclusions* presents the relevant ideas that can be considered the added value of this work. These conclusions are based rigorously on the analysis of the results and incorporate the subjective assessment of the researcher. The conclusions are composed of the main ideas and the educative implications derived in terms of usefulness, and finally of the proposal of further research lines to investigate in the future.

This work is completed by the pertinent literature section (chapter 5) and the annexes of the documents that were used in the development of data gathering.

2. THEORETICAL APPROACH

2.1 THE EHEA AS A REFERENCE CONTEXT

This section gives an overview of the special context that has been and is still taking place in the in the European Union educational system. This context is the construction of the so called European Higher Education Area. The section can be classified in two parts: temporal location and philosophical approach. The first one consists of a brief description of the different events related mainly to the topic of research throughout the last decade, starting from the Lisbon Declaration (1997) and finishing with the London Communiquè (2007).

Regarding the philosophical part, this subsection tries to describe the structural aspects that characterize the EHEA process (European Credit Transfer System, Bachelor/Master system and Quality Assurance Systems) as well as the conceptual questions that define the emerging educative model based on the student being at the centre of the process.

2.1.1 One decade: from Lisbon ’97 to London ’07

The last decade has been characterized by deep structural transformations derived from the Knowledge Society. These big transformations have situated the human factor at the centre of the productive process in the developed countries. These technological, economic and social transformations have generated deep changes in the contents, means, methods and ways of understanding work and the labour market (Echevarría et al., 1999).

The increased complexity generated by this society implies the location of the training processes as a nuclear point in the development of European citizens. The contrast between the past and the future in terms of education and labour market can be observed through the summarized vision of diverse authors.

Delcourt (1999) suggests a comparison in terms of contents and organization of work:

PAST	FUTURE
⇨ Hierarchical Organization of work	⇨ Organization of work based on workers
⇨ Predetermined objectives, limited responsibility	⇨ Participation in the conception of the project
⇨ Predetermined workloads	⇨ Flexibility in activities and functions
⇨ Limited comprehension about global process of work	⇨ Non limited comprehension about process of work
⇨ Fractioned work and specialties. Traditional technologies	⇨ Complex work with horizontal and vertical derivations; current technologies based on computers
⇨ Management of product flows in an invariable environment	⇨ Management of product flows in a variable environment
⇨ Work linked to physical power applied to materials and object manipulation	⇨ Work based on information and intellectuality; transfer of information
⇨ Physical contact with products and materials	⇨ Non direct contact with products and materials
⇨ Manual competences, ability and speed	⇨ Intellectual speed in terms of perception, reaction and coordination
⇨ Management of repetitive situations and predictable problems	⇨ Individual management, non repetitive situations that require experience
⇨ Predominance of qualified and skilled manual workers	⇨ Predominance of qualified workers, technicians, engineers and management professionals
⇨ Work is developed through commands	⇨ Work requires autonomy, initiative,

and specifications	responsibility and creativity
⇨ Controlled work	⇨ Self-controlled work
⇨ Separation between thinking and action	⇨ Integration of thinking and action; problem solving mechanisms.
⇨ Heavy work and occasionally dangerous	⇨ Predominance of intellectual work with stressful situations
⇨ Fixed weekday and job planning	⇨ Autonomy and flexibility in weekday and work planning
⇨ Persons are adapted to operative requirements of machines	⇨ Persons adapted to situational and relational requirements
⇨ Uniform profiles of competences and marked fields of competences	⇨ Non uniform competences, diverse set of competences which include relational ones
⇨ Possibility of substituting qualified workers considering external market	⇨ Personal and specific competences. Mobility inside the own enterprise
⇨ Professional and initial training, more experience obtained in labour development	⇨ Initial training and continuous sequential education: in an implicit or explicit manner, in a formal or informal setting
⇨ Fixed official qualifications	⇨ Qualifications linked to adaptability and capacity to obtain new knowledge
⇨ Salary according to productivity	⇨ Salary according to risks and problem solving and objectives achievements
⇨ Low level of fulfillment feeling	⇨ Personal commitment, feeling of fulfilment
⇨ Structured syndicates in sectors and classes	⇨ Professional and company syndicates

Suárez (2003) aims at describing professional activity:

PAST	**FUTURE**
⇨ Initial training and work	⇨ Permanent work and continuing formation
⇨ Focused activity	⇨ Diverse activities
⇨ Individual knowledge	⇨ Knowledge management
⇨ Centralized creativity	⇨ Individualized creativity
⇨ No-change culture. Reiterated processes	⇨ Change management
⇨ No-risk culture	⇨ Risk management
⇨ Time-space rigidity	⇨ Time-space flexibility
⇨ Rigidity of professional skills	⇨ Flexibility of professional skills
⇨ Irreplaceable workers	⇨ Replaceable workers

And finally, Peters (2003) speaks about the changes in terms of the educational process with regard to the new social context:

PAST	FUTURE
⇨ Oriented to contents	⇨ Oriented to problems and projects
⇨ Teacher as transmitter	⇨ Teacher as planner and supervisor
⇨ One material	⇨ Various materials
⇨ Oriented to knowledge	⇨ Oriented to comprehension
⇨ Oriented to deadlines	⇨ Based on competences
⇨ Predefined programmes	⇨ Individualized follow-up
⇨ Text information	⇨ Internet; e-learning
⇨ Continuous education	⇨ Life Long Learning

These changes can, at the least, illustrate that all training processes are within the essence of any organization. The Knowledge Society requires organizations whose employers have high levels of education and are ready to continue learning throughout their lives.

This continued learning is concreted in the Life Long Learning (LLL) concept. LLL implies the development of an educational environment in which any person can become a student at any given time of his/her life. This concept was added explicitly in the communiqué of Prague (2001), thus consolidating the idea of the student centered process.

In view of this panorama, the design of a specific plan for organizing the higher education system becomes a necessary process.

The construction of the EHEA is a process that starts with the Sorbonne (1998) and Bologna (1999) Declarations. These two formal declarations can be considered the starting points of the process with regards to structural change. The conceptual transformation is traced back to the formal strategy formulated in the Lisbon Declaration (1997).

The Lisbon Declaration points at the conceptual strategy of the EHEA process in terms of modernization of the educational model; to get a new and suitable model is conceived

as an added factor of competitiveness with regards to other HE settings. The EHEA has to be able to attract potential students while competing with the North American or Australian higher education programmes as well as with the emergent universities in Asia.

Since the Lisbon Declaration (1997), many events have occurred and several declarations have been drafted. Each one of these events has been characterized by the incorporation of new factors or improvements to the process.

This is not the place to explain all the details of this process, but to focus mainly on those aspects that can be relevant to the present work. These factors are related to the students as the main target of the education process. In this sense, those events where student affairs are dealt with in an explicit manner will be mentioned.

At the conference in Prague (2001) students were given a special mention. It said that students must participate in the universities' governance and have an active part at all levels of the decision making processes. Furthermore, the students wrote a communiqué in Gotteborg (ESIB, 2001) expressing their willingness to take part, as a group, in the process of designing the EHEA.

On the other hand, all Quality Assurance mechanisms designed in the EHEA context take into account the students at many stages of the process, from enrolment to after graduation.

To finish reviewing this decade, a part of one of the priorities established for 2009 in the London Communiqué can be mentioned (2007, p.7): "....With a view to the development of more student-centered, outcome-based learning, the next exercise should also address in an integrated way national qualifications frameworks, learning outcomes and credits, lifelong learning, and the recognition of prior learning". This text explicitly states the will to emphasize the student role as the center of the construction process of the EHEA.

2.1.2 Philosophy of the EHEA

2.1.2.1 Structural aspects

The structural aspects that define the EHEA are organized in three main axes: European Credit Transfer System (ECTS) as the unit of measurement, a system of degree structures based on two main cycles, Bachelor and Master (BA/MA), and a shared Quality Assurance system.

2.1.2.1.1 European Credit Transfer System (ECTS)

The first one of these axes concerns aspects related to the use of a common unit of measurement, the so called ECTS credit.

The concept of ECTS is one of the explicit representations of the change in the educative paradigm. ECTS measures the time that the students need to work in order to achieve the objectives defined in the different units or modules of the study programmes. ECTS is part of the theoretical evidence that the student has become the centre of the T/L process.

ECTS are allocated to all educational activities (student workload) of any given study programme with or without the presence of a teacher: lectures, practices, independent studies, placements, fieldwork, exams, etc.).

In quantitative terms, ECTS is based on the principle that 60 credits measure the workload of a full-time student during one academic year. The student workload of a full-time study programme in Europe amounts to around 1500-1800 hours per year and in those cases one credit stands for 25 to 30 working hours.

One theoretical approach on how to allocate these credits along the study programmes was proposed by Richard de Lavigne (2003). De Lavigne defined three methods to

allocate ECTS credits: impositional or “top-down” method, compositional or “bottom-up” method and according to the learning outcomes method.

The impositional method consists of the allocation of credits to the programmes depending on the previous distribution managed by the institution. In the compositional system, the credits are assigned after the appraisal of the amount of working hours used by students. Allocation according to the learning outcomes system is characterized by taking into account the time needed to reach the learning outcomes precisely defined in the design of the study programme.

De Lavigne states that none of these systems is better than the others. The use of each system depends on the specific situation of the institution. Indeed he suggests the combination of all methods in order to profit from their specific features.

With regard to the Spanish context, the ECTS system is established by law since 2003 but it is being implemented across universities at diverse rhythms.

2.1.2.1.2 Bachelor /Master System (BA/MA)

The second axis is related to the architecture of the studies. Once a common unit of measurement is defined (ECTS), all university systems have to offer a structural framework that can be comparable and interchangeable by all countries in the European context.

This framework has aimed to converge on a Bachelor/Master system. This system has to promote transparency and exchange/communication between European students and professors around the EU. In this process, most of the countries have already adopted this structure or, at least, are in the process of adopting it.

In a conceptual view (Suárez, 2003), undergraduate degree programmes have to be essentially generic, have an adaptable structure to different sectors and clear

professional orientation. On the other hand, the master degree has a more specific orientation, is adapted to a specific university and has an international projection.

2008 is the deadline given to complete the curricula based on the BA/MA model for all EHEA partners. Every country has made great efforts in this sense, depending on their development level, in order to create their own map of studies in HE. The process of designing the curricula is an important process where many agents have to be taken into consideration. The output of the university studies has to consider different visions: the vision of academics, students and other stakeholders.

This process is supported by documentation generated from different sources: from EU staff, programmes and projects in the EU area or from specific initiatives in each country.

A good example of documentation can be found in the European *Tuning Project* (http://ec.europa.eu/education/policies/educ/tuning/tuning_en.html). This project is being coordinated by the University of Deusto, Spain and the University of Groningen, the Netherlands. The project aims at identifying points of reference for generic and subject-specific competences. Competences describe what a learner knows or is able to demonstrate after the completion of a learning process. Competences are described as points of reference for curriculum design and evaluation.

Other reference documentation in the EU context, the so called Dublin Descriptors (Joint Quality Initiative informal group, 2004) are well known. These descriptors are the base of the generic curricula that will help define the Bachelor, Master and Doctoral programmes and indicate the progression steps between the three cycles.

In the Spanish context, many efforts have been made in order to accomplish the commitment of defining the new curricula in time. During the last years, the Ministry of Education promoted the elaboration of the so called “White books”, which consist of the definition of the formative curriculum of every study program following the terms

set by EHEA. This documentation was managed by the Spanish Quality Agency (ANECA).

The different curricula have to be shown in a set of personal documentation. The educative system has to provide personal information that the students can show anywhere in the world (especially within the EU) in order to find a job or to continue their educational process.

The document that has to facilitate the training and employment process in the EHEA is linked to the so called *Europass*[4]. The Europass is made up the following documents: Europass CV, Europass language passport, Europass mobility, Europass Certificate Supplement and Europass Diploma Supplement.

The Spanish structure of new studies following the EHEA will be defined in two cycles and three levels: Graduate and Postgraduate levels: master and doctorate. This structure is shown in figure 1.

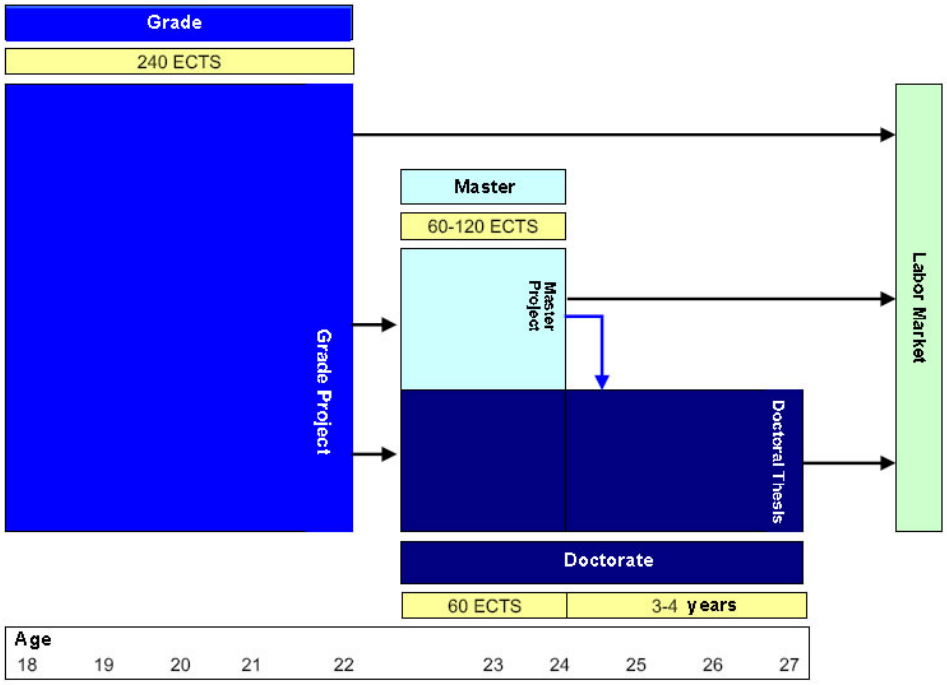

Figure 1: Spanish educational structure (MECD, 2005)

[4] http://europass.cedefop.europa.eu/

This structure is a recent decision of the Spanish Government. This fact has caused a delay in the definition of the studies curricula. Most studies lack the final guidelines in order to organize their study programmes.

However, the majority of Spanish universities have been working on the methodology to design the curricula according to the EHEA. This methodology implies the adoption of the new concepts based on the EHEA parameters.

2.1.2.1.3 *Quality assurance culture*

The third axis is connected with the quality assurance system. All universities have to develop their own quality system; a system with mechanisms that guarantee confidence between partners in Europe. Every person and institution should be able to participate in accreditation and certification processes in terms of trustfulness and comparability.

The quality process introduces the quality culture within the essence of universities. This concept is unusual in these kinds of institutions but universities must get used to it. Universities have to integrate ideas such as the accountability concept, the need for recognizing quality and developing with quality, the consideration of the student as a customer or the recognition of the prior academic performance of students (both formal and informal).

To integrate concepts that are innate to this process is not an easy task for universities. The structures and the human resources have to be assessed in terms of quality. Therefore, other ways of working within the organization and new training processes have to be put in place.

At the beginning of the Bologna process, quality assurance came up as a marginal topic. It only arises as a problem to solve later on, during the process. In fact, the Salamanca Declaration (2001) was one of the first documents in which the quality issue was dealt with as a base concept for trust, reliance, and so on.

At the Berlin conference (2003) the need to develop mutually shared criteria in Quality assurance arose. Furthermore, the Bergen conference (2005) turned around the need to promote the implementation of European standards and guidelines to be used by all members of the EHEA.

The importance of the concept of quality has been increasing throughout the construction and development of the EHEA. This evidence can be observed in the creation of different European quality agencies which are interconnected and with supra-European agencies. These agencies have to ensure the processes to guarantee internal quality, transparency and external recognition of systems and people who are involved in the university context.

The reference agency in Europe is called European Association for Quality Assurance in Higher Education (ENQA). In the Spanish context the National Agency for Quality Assessment and Accreditation (ANECA) was created in 2001 using a Resolution by the Spanish Council of Ministers in 2001. The geographic distribution of Spain has given way to the creation of several quality agencies around the country. The specific agency where this work takes place is the Catalonian Quality Agency (AQU).

Most agencies agree with the following idea expressed in the ANECA guiding principles: “the Agency shall take into consideration in its actions the internationally acknowledged general principles on the subject, it will become part of the existing international networks and establish appropriate mechanisms for cooperation to this end” In other words, the diverse agencies have to promote confidence, independence, objectivity and cooperation within the international university community.

In order to be more specific, most agencies have designed a similar model of analysis for the implementation of study programmes in order to enable compatibility. This framework is composed of four main sections: context analysis (internal and external), educational programme, operative planning and quality assurance mechanisms.

Student analysis is present throughout this framework. The student is an important target to be considered in terms of evaluation, accreditation, certification and all processes derived from the quality assurance process.

An important part of the quality assurance system has to be focused on the student, his/her training process, his/her degree achieved and his/her capacity of integration in the labour market.

We can observe how the student is mentioned in the different documents that support the quality assurance process.

In the guidelines (ENQA, 2005, p.18) given by EU, the students appear in section 1.6. In this section, the students are evaluated in terms of information systems, student progression or profile of the student population.

In the Catalan context the students are mentioned in the following sections of the accreditation criteria (AQU, 2006):

The most important section in which the students are mentioned is section 2.2: approach to the T/L process. In this section, the methodological and evaluation approaches have to be explained and defined focusing the activity on the student.

In section 2.4 the students are explicitly mentioned with regard to their profile for admission. In section 4, the mechanisms to gather and publicize information, and their subsequent use are mentioned as well.

Finally, there is a large section with a report on the results of students' progression. Student progression is in many cases considered as one of the most important factors on which government funding depends.

2.1.2.2 Educative model

The emergent educative model in the EHEA context is mainly characterized by the centered position of the student. The change of the learning model means that the student becomes the center of the T/L process.

If the fact that the students are the center is accepted, then there are, at the least, two aspects to analyze: what does this student-centered model mean and what are the professional requirements defined by the labour market and society in general.

2.1.2.2.1 Student centered model

To talk about a student-centered model implies reflecting about the traditional main aspects related to the learning process.

There are many ways of understanding a learning process, while observing this topic from the historical contraposition between rationalism and empiricism. This debate is related to the origin of the variables that affect what people learn or understand.

On the one hand there are those who think that knowledge is a mental creation independent from the interactions with the context and/or the others; and on the other hand there are those who believe the learning process occurs mainly through interaction with the context. In other words, those who consider learning as pure cognition and those who consider learning as a result of interaction with external experience only.

Any classification or categorization can include a meticulous analysis of the views from where learning can be observed; but in order to facilitate the review of the different learning models, the different orientations to learning can be summarized as shown in table 1 (Merriam & Caffarella, 1991, p.138).

Approach	Behaviourist	Cognitivist	Humanist	Social and situational
View of the learning process	Change in behaviour	Internal mental process (including insight, information processing, memory, perception	A personal act to fulfil potential.	Interaction /observation in social contexts. Movement from the periphery to the centre of a community of practice
Purpose in education	Produce behavioural change in desired direction	Develop capacity and skills to learn better	Become self-actualized, autonomous	Full participation in communities of practice and utilization of resources
Educator's role	Arranges environment to elicit desired response	Structures content of learning activity	Facilitates development of the whole person	Works to establish communities of practice in which conversation and participation can occur.
Learning theorists	Thorndike, Pavlov, Watson, Guthrie, Hull, Tolman, Skinner	Koffka, Kohler, Lewin, Piaget, Ausubel, Bruner, Gagne	Maslow, Rogers	Bandura, Lave and Wenger, Salomon

Table 1: Orientations to learning (Merriam & Caffarella,1991, p. 38)

Following Bandura (1986), human behavior responds to the interaction between personal aspects and contextual situations. Learning occurs by taking into account processes whose nature is cognitive, affective and social. This interaction is not always the same, sometimes one factor predominates over another.

This social-cognitive perspective may be considered a neutral orientation that takes into account the social and individual perspective of the learning process. Nevertheless, in terms of T/L as an intentional process, the Vigotskian idea of social constructivism can be contemplated to illustrate the necessity of knowing the previous aspects of the person who learns, in order to suggest adequate learning strategies and adopt the precise mediation system.

In constructivist terms, students build their own body of knowledge by means of their prior experience and through interaction with one another and their context. It would be convenient for any educational system to consider this concept in order to plan any didactic training sequence.

In accordance with this constructivist conception, student-centered learning can be considered a learning model in which the students are active participants by using their own strategies, which demand intrinsic motivation and individualization.

Observing the different approaches to learning, from behavioural to more situational perspectives, several components which take part in this process can be identified.

Both historic philosophers such as Plato and Kant and also recent learning theorists like Lave & Wenger (1991) or Greeno et al. (1993) have attempted to describe the different elements that make up the learning process.

In general terms, the complex human essence has been described as the product of the interplay of a tripartite configuration: the cognitive, the affective and the conative.

Learning is made up of components of cognitive, conative and affective nature, and is a product of a reciprocal interaction between the individual and the social dimension.

Once a first analysis about the T/L based on the student being at the center has been carried out, several considerations about the specific implications in the change of roles of the agents who participate in the T/L process are presented.

The teacher becomes the person responsible for placing the student at the center of the T /L process. The teacher has to plan activities in which the student develops the skills and knowledge defined in the curriculum. Many of these activities do not require the presence of a teacher. In any case, the relationship between the agents in the L/T process has to change in terms of time, contents, methodology and evaluation.

With regard to the student, Slunt and Giancarlo (2004, p.985) state that student-centered learning involves students actively in the learning process rather than allowing the student to passively gather information from a lecture delivered in the traditional way of instruction.

This intentional T/L process should be active as much as the educative sequence must be oriented to active learning.

With regard to teachers, their mission as teachers of learners of the 21st century is to:

- engage, nurture and respect the learner as a whole,
- provide knowledge and skills to enable the retrieval and use of effective communication of information,
- provide opportunities for autonomous problem solving
- provide weekly occasions to explore and experiment within and beyond the physical boundaries of the classroom.

In addition, Sukkum (2002, cited by Poonruksa, 2007, p.227) divided the principle of student-centered approach into seven aspects as follows:

- Students take responsibility for learning, rather than passively receive knowledge.
- Students use resources to construct their knowledge, based on needs; this means students must participate in positively identifying their learning style and what they need to learn.
- Teachers provide students with clear expectations and desired outcomes before lessons begin.
- Students learn how to learn by developing problem-solving skills, critical thinking, and reflective thinking.
- Learning is considered in a context of differences that account for, and adapt to the various learning styles of students.
- Teachers guide and facilitate the learning process so that students encounter learning opportunities as they need.
- Teachers are responsible for their knowledge of content and of the learning process.

This can be summarized with an idea by Valcárcel (2003), who states that the change of model or paradigm consists of moving from what the teacher wants to teach to things

that the student needs to learn. This implies an important transformation in the role adopted by teachers and students.

To illustrate this idea of the student-centered model, the educative model proposed by URV can be observed in figure 2. In this model, one can see that all structures and figures are focused on the student.

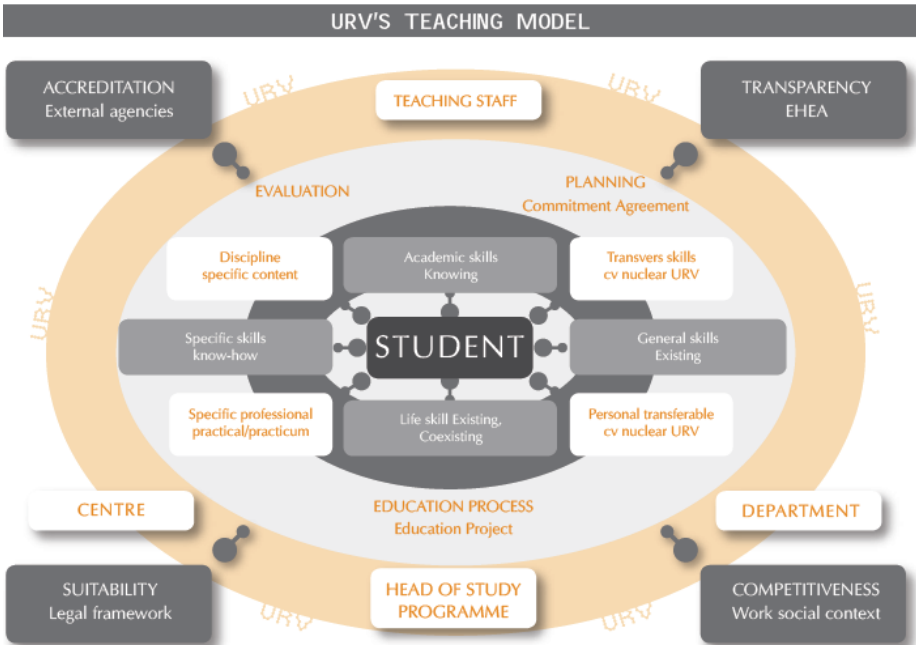

Figure 2: URV teaching model (2007, p.33)

These educational relationships have to be considered taking into account that current students are not the same as 20 years ago. The students who get into university are technologically alphabetized, not only in the use of computer tools but also in the technological environment where they are used to working. In this sense, several authors name this generation *net generation students* (Oblinger & Oblinger, 2005; Mcneely, 2005). Technology is a part of their lives beyond the formative settings in an integrative/integrated way, in the so called *e-live* (Windham, 2005, p.5,12).

One of the representations of these innovative experiences is related to the methodologies supported by or based on the Information and Communication

Technologies (ICTs). These experiences can show the potential of the ICTs in the educational setting, such as the design of technological environments based on blended learning in HE (Dziuban et al., 2004) or advanced technological environments for learning (Schank 1994, Prensky, 2004; Siemon et al., 2003). In the Spanish context several projects about educational innovations and ICTs (Michavila, 2004; Mora, 2005) have also been developed.

The context around us and the nature of the students themselves create an environment with plenty of opportunities in which to explore new learning methodologies. A set of initiatives focused on the exploration of new ways of teaching according to this new model can be observed.

However, the new T/L model should show the need for varied T/L strategies and assessment methodologies, and it should also recommend the combination of diverse proposals in order to offer adequate responses to the diversity of learners.

A varied proposal of methodologies is being disseminated around the Spanish universities that are involved in generating specific and adapted documentation in each particular context.

Following the conclusions generated by the Commission to Educational Methodologies Renovation in University created by Spanish Ministry of Education (MECD, 2006), methodologies in the new European educative context are characterized by a combination of a theoretical part and a practical part, the extended use of ICT, the implementation of tutoring processes, the lecture as the predominant methodology and the arisal of new integrated methodologies as problem based learning (PBL) or project working. In any case, the increasing tendency is to facilitate methodologies orientated to the active participation of learners.

2.1.2.2.2 Requirements of the Knowledge Society

Many efforts have been made to identify what the student needs in order to enter the labour market successfully. It is very important to define the output or product that should result from the university period.

This output is shown in the different curricula that are still being designed in many countries of the EU. The curricula have to be coherent with the student-centered model defined and must respond to the requirements of current society.

This coherence has to be reflected in the terminology in which the curricula are expressed. While in the pre-EHEA phase, the study programmes were defined in terms of learning contents.

Nowadays, output must be defined in terms which incorporate the global dimension of the learner as a citizen. The terminology has to go further than static knowledge and it must speak in terms of skills, capacity, competences or literacy that the student needs to achieve at the end of his/her university period.

Much research has been conducted in order to define the terms in which the curricula have to be formulated. In this sense, Bunk (1994, p. 9) offers a description of a qualitative evolution of terms going from qualification to competence (Figure 3). More recently, the PISA report (OECD, 2003) uses terms such as skills, abilities or, the new one, literacy.

	Capacities	**Qualifications**	**Competences**
Professional Elements	Knowledge, skills, aptitudes	Knowledge, skills, aptitudes	Knowledge, skills, aptitudes
Action field	Defined and established for each profession	Flexibility de personal amplitude	Professional environment y organization of job
Work features	Compulsory work execution	Compulsory work execution	Free work planning
Level of organization	Organization by others	Autonomous organization	Own organization

Figure 3: Comparison of capacity, qualification and competence (Bunk, 1994, p. 9)

This terminological change towards the use of competences is more than a simple change of words (Grootings, 1994). Sarasola (2000) proposes three reasons to justify the importance of education based on competences in all developed countries:

- It focuses the effort of economic and social development on the value of human resources and human capacity to construct the development. In this sense, it constitutes a way of recovering the human dimension of work, while centering the process of economic growth and social development on the human being, as an agent and beneficiary of change.
- This approach seems to respond better than others to the necessity of finding a point of convergence between education and employment. The premise is not only to create more jobs, but better jobs. The quality and capacity of each human being become key aspects to employability and the quality of the employment to which each one aspires.
- The competences approach adapts to the necessities of the structural changes. Professional competence is a dynamic concept that brings emphasis and value to the human capacity to innovate, to face the change and to manage it.

Competences are not only composed of the knowledge acquired through the formative processes, but also of the capacities, abilities and attitudes that allow the people to respond in the most suitable manner to the demands of their labour trajectory.

Competence is an integrative and dynamic concept. It integrates skills and attitudes and it is dynamic because is developed through the action. It is a concept that considers the training processes and incorporates the human dimension to traditional technical (knowing) and methodological (know-how) knowledge.

Despite the integrated and integrating character of the competence concept, these competences have been categorized while trying to divide and atomize a reality whose nature is indissoluble.

The classification of competences responds to an option that has to be adapted to a specific domain. This dissection, although unreal, becomes a necessary requirement to facilitate the design of study programmes and the ulterior definition of learning outcomes.

As a starting point, the classification based on Delors (1996) and Echeverría (1996) is presented:

- Technical competence: to have specific knowledge that facilitates management, as an expert, of a specific domain.
- Methodological competence: to apply knowledge to concrete labour situations using adequate procedures (problem solving, transferring experiences to new situations,...)
- Participative competence: predisposition to interpersonal relationships, communication, cooperation or working group.
- Personal competence: to act in agreement with one's own convictions, to assume responsibilities, to make decisions or to accept frustrations.

Following this categorization, Echevarria (1996) goes a step further, stating that these four competences make sense when they are backed up with in action. Thus it results in the more complete term called action competence.

Nevertheless, the final output is not only defined by the sum of competences. Output must be defined in terms of being competent. A competent person (Figure 4) is one who has assumed professional competences, who has been integrated and transferred them to a concrete professional activity (transfer) and, moreover, who is able to be efficient in different professional contexts (transferability).

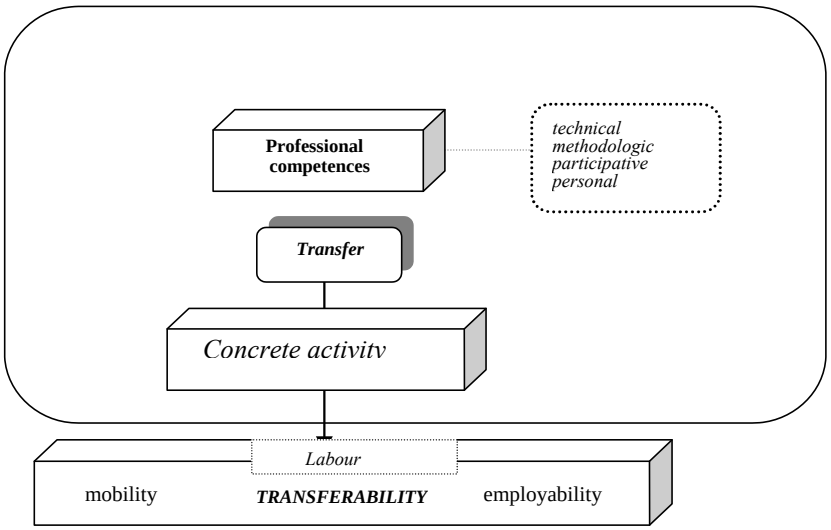

Figure 4: Whole dimension of professional concept

All elements in Figure 4, including transfer and transferability, have their own theoretical explanation. The main ideas on which these concepts are based can be shown.

Transfer is understood as the process that occurs when the knowledge acquired is put into practice in any concrete activity.

Throughout the 20th century various attempts to conceptualize this term were made. The theory of the mental process states that transfer depends on the development of certain superior mental faculties.

In terms of the Thorndike theory of identical elements, transfer is a mere reflex depending on the similarity of structures between different situations.

Traditional theorists such as Bruner (1966) or the gestaltics stated that transfer has a reflective character, ie. each task has a general principle or strategy that can be recognized and used in new tasks later on. Authors who defend the cognitive schemata go a step further by saying that transfer implies the interpretation of the symbolic schema that are hidden in each transfer situation.

For Sternber & Frensch (1993), transfer occurs via a meta-cognitive exercise in which the individual defines a problem, recognizes the requirements and selects the general and learned specific abilities to solve it.

The authors linked to the situated cognition theory such as Lave & Wenger (1991) or Greeno et al. (1993), incorporate the concept of social participation in concrete activity contexts. On the other hand, Gröhn & Engeström (2003) add the idea that transfer requires the questioning of practice with a debate and a collaborative analysis of contradictions in practice.

Blending some of these concepts, we can conclude that transfer occurs by means of the construction of the competence of situated situation, ie. when the person effectively integrates the four kinds of competences in a specific labour situation. An individual can develop his/her job effectively, however, a professional is not competent if he/she is only effective in the development of a certain labour activity. The main target is that the person has to be effective in diverse contexts of activity (transferability).

The essence of transferability does not lie in the acquisition of packages of knowledge or abilities (Brown & Keep, 1998); the key lies in the process that can generate the conversion of competences to competence of action.

Taking into account all that has been stated above, it would be convenient to propose an ideal didactic sequence based on processes whose nature is cognitive, affective and social. This process should integrate the previously cited four basic competences around an activity in order to facilitate situations of collaboration, transformation and questioning of practice.

The previous theoretical analysis shows the evident complexity that is generated by current society and by the professional needed for it. University is usually delayed in comparison to society, because it is very difficult to adapt the necessary structures and processes that should take place within its confines.

In this sense, we give a summary of the possible actions to develop in university steaming from this work and in coherence with the EHEA. These set of actions are organized in three different dimensions: institution, study and professor.

Institutional

- To develop adequate rules to facilitate any process.
- To gather information of students in terms of learning relevance.
- To organize tools for teaching planning in personal and relevant information.
- To adapt and/or create specific structures and typologies of teachers.
- To determine mechanisms oriented to assure the Quality System.
- To define channels of communication with 2ary School.
- To organize adequate training processes for professors.

Study

- To design of curricula considering personal information of student.
- To analyze and propose a set of recommended activities for professors in the study.
- To communicate with the corresponding 2ary school of reference.
- To coordinate the Quality Assurance follow-up.

Professor

As a teacher

- To receive the personal profile of students.
- To develop the adequate educational proposal based on knowing the students.
- To create working groups.
- To check the educational proposal with students AP.

As a tutor

- To report and share the profile with students.
- To help in the decision making process: 1st year, free choice courses, transition to labour market.
- To develop complementary activities.

2.2 KNOWLEDGE OF UNIVERSITY STUDENTS

This section contains information related to the current young population emerging in the Knowledge society.

The first part presents the Spanish youth characteristics in terms of demographic data, work and housing matters, ideas about citizen features and aspects such as democracy culture, values and attitudes. Afterwards, information about participation and performance in the Spanish Higher Education system in terms of enrolled students, graduated students and some notes about Spanish drop-out in HE is given. Finally, an approach to the concept of young students from a sociological point of view can be seen, closely linked to the students' relation with Information and Communication Technologies.

The second subsection is centered on the way of studying the specific cohort that constitutes the first year students (FYS), as well as the different variables that are usually analyzed. Lastly, this subsection describes the model of analysis chosen in this research in order to know the students' features; this model is defined in three directions - the moment, the objectives and the variables of study.

Finally, the last part of this section is dedicated to describing these FYS in the specific context of the URV. This description seems necessary in order to facilitate the sense of interpretation and conclusions of the current research work in a specific context.

2.2.1 Young population in the Knowledge Society

Many studies and reports that give different information about the youth population can be found. These documents offer general information related to education and the role of current young people as students.

These reports can be described with regard to the context of application. The context of application is defined attending to two dimensions: the level of education and the application's geographic range.

Organizations such as UNESCO or OECD (Organization for Economic Co-operation and Development) have been defined several general goals related to education in the world, such as to decrease gender-related differences or increase access to technology. In those countries that are not conditioned by the economic situation the amount of population concluding obligatory education is increasing. On the other hand it states that the curricula are not satisfying between 10% and 20% of the necessities of the population in developed countries. It also comments on the challenge implied in the enhancement of education to new concepts such as distance education, peer education, lifelong learning and so on.

In the same global context of application and referring to education in general, the OECD has made public a quantity of relevant information about students, organized in several sections, such as participation in education and its impact, investment in education, participation in education and progression and school environment.

Observing the European context and Higher Education a striking report based on the Eurostudent project can be found. This report (EUROSTUDENT, 2005) gives information (in Spain dating from June 2003) about students in European HE from a social dimension and it shares specific data about demographic characteristics, access to HE, study performance, background, funding and state assistance, costs, employment and time budget and internationalization.

In the Spanish context, the last report "Spanish University in figures" (Hernández, 2006) gives information oriented to knowing the figures, the statistical data about Spanish students (age, gender, amount of graduated population, drop-out, etc). If the different universities are observed, most of this data is available in their own data management systems, which provide structured information about the students as one of the components of its organization.

All data of this kind can facilitate sociological description in terms of bio-demographic characteristics and, furthermore, it can provide a representation of who the student is as a participative element in the educational system, in terms of academic performance, progression, duration of studies, access to labour market and so on. This data offers an insight into the output of the system throughout different levels without the description of the interaction between student and system.

The information given by these reports is not oriented to intervening in the essential elements that compose the T/L process. This data constitutes one part of the information that can facilitate description of the essence of the complexity that defines current youth students.

A well-known aim to go further than this general information can be observed in the OECD context as well. OECD analyzes students around the world every three years by means of the Programme for International Students Assessment (PISA). This program is addressed to 15 year old students, that is to say, students near the end of compulsory education. The PISA report (OECD, 2004) goes further than assessing the curricular contents, incorporating the term "literacy" as the capacity of students to apply knowledge and skills and to analyze reason and communicate effectively as they pose, solve and interpret problems in a variety of situations. At the least, this conceptualization is coherent with the educative model that must be defined in the EHEA.

Some information about the Spanish context can be extracted from this kind of study. This information can contribute to contextualize this research.

2.2.1.1 Spanish young population

Firstly, the information available in the Annual youth report published by the Spanish Youth Institute (Spanish Ministry of Work and Social Affairs, 2006) is extracted. The information is classified in the following subsections: demographic data, work and housing, youth as citizen and democracy culture, values and attitudes.

- Demographic data

The data provided by the Municipal Population Register of the 1st of January 2006 reveals that the youth population aged 15 to 29 is 9,009,566 inhabitants. The young population in Spain slightly exceeds one fifth (21%) of the whole population (20.3%). In the last six years, the youth population has decreased by 2.1% (in 2000 the percentage was 22.4%).

The youth in the highest age group (aged 25 to 29) represents the largest young population group, both in absolute and relative terms. The number of young people up to 19 years old decreased as a result of the falling birth rate in Spain since the second half of the 1970s.

In general terms, the average age of first year students in Spain is 20.9 years old.

The foreign population in Spain is 3,884,573. Of those 1,168,280 are young people aged 15 to 29, representing 30% of the foreign population as a whole. Foreign youth accounts for 13% of the total young population in Spain; the percentage of men (53%) is slightly larger than that of women.

The majority of this foreign population comes from South America (35%), particularly Ecuador, followed by Colombia and, in smaller number, Argentina and Bolivia; the next largest collective comes from Africa (22%), the vast majority coming from Morocco, followed by youths from non-European Union countries (20%).

The main countries of origin of young immigrants in Spain are Morocco (16%), Romania (14%), Ecuador (12%) and Colombia (6%)

- *Youth, work and housing*

The amount of young people who live in an economically independent way in 2004 is 6% higher than in 2000.
The dedication of young people in 2006 in Spain is as follows: exclusively work 39%, studying 32%, unemployed 12% and combining education with work 11%. The rest are in a 'different situation' and are women between the age of 25 and 29.

The Spanish youth population which has experienced remunerated work accounts for 71%. Only 21% of the youth population declares that their first job was quite or very much associated with their academic background. In 2003, 55% of Spanish students declared that their current job had no relation to their studies and only 17% of them found that these relations were fully met.

With regard to the type of first work, 66% were temporary contracts; this data is related to structural problems in the Spanish labour market.

A feminization of work is arising, that is to say that women are gaining increasing access to work. The percentage of young women in total employment increased from 39% to 43% between 1990 and 2003. However, in 2004, women's salaries were 27% less than men's. In this sense, unemployed young women take twice as long to find work (7.5 months) as young men (3.5 months).

With regard to the attitude towards accessing work, the majority of young people would change their place of residence and lower their professional category in order to get a job with good conditions.

Young men are more willing to accept jobs with working hours that are incompatible with their personal and family lives than women.

The majority of young people aged 18 to 34 still live in the family home (51%), although the number of those who live independently is quite high (42%). The tendency changes in youths from 25 or even 29 years of age. However, most of this young population who leave the parents' home (more than 20%, even after the age of 30) needs additional finance in order to live independently.

In the framework of the Eurostudent project, a comparative analysis was carried out between several European countries, among other issues, of the percentage of students who live with their parents or on their own. Table 2 shows that in Spain, together with Italy and Portugal, the tendency is to stay at the parents' home longer than in the rest of countries.

	living with parents/ relatives (%)			own lodging/sublet/private flat		
	total	21 years old	< 20 years old	total	21 years old	> 27 years old
Spain	69	71	77	23	21	61
Italy	76	79	79	23	19	59
Portugal	55	63	57	42	35	72
Netherland	37	48	69	31	34	92
Austria	24	31	46	67	52	89
Germany	23	30	43	65	54	84
Finland	5	7	nd*	64	55	87
France	42	43	55	42	41	81
Ireland	35	40	nd	59	54	89
Latvia	38	48	44	39	26	90
UK (W/E)	22	nd	nd	49	nd	nd

* no data availabe

Table 2: Students who live in / out of their parents' home (2003)

This data, at least in Spain, can be closely related to the type of assistance that each country offers to students. In this sense, this project gives certain information in terms of state assistance for students (see table 3). As can be seen, only Italy (in terms of rate) and Portugal (in terms of average assistance) present lower values than Spain.

	state assistance rate (%)	average amount of assistance for recipients per month
Spain	23	134
Italy	9	159
Portugal	24	49
Netherland	62	342
Austria	27	343
Germany	23	352
Finland	71	427
France	53	278
Ireland	31	317
Lietuva	nd*	nd*
UK (W/E)	85	694

* no data availabe

Table 3: State assistance for students (2003)

From 1996 to 2004, the percentage of youths who preferred to leave their parents' house increased by 9 points (18% to 27%). However, young people (between 18-34 years old) declared that they are satisfied with the living conditions of the houses where they live . The immense majority of young people in Spain (90%) prefer to buy a property rather than to rent it (7%).

- Youth as citizen

Youth has its own idea about what being a good citizen means. They give values to the following sentences (scale 1-7):

Helping people in our country who live under worse conditions than you	6.2
Helping people in other parts of the world who live under worse conditions than you	6.0
Trying to understand people who do not share our opinions	5.9
Not evading taxes	5.9
Always respecting laws and regulations	5.8
Choosing consumer goods that, although more expensive, do not harm the environment	5.7
Always voting in elections	5.3
Remaining well informed on the Government actions	4.6
Participating in social or political associations	4.0
Willing to serve in the army in times of need	3.4

The percentage of young people who belong to some type of association or organization is 37%. For younger youths who are still dependent it is easier to find time to spend on participating in associations. When youths begin to take work or financial responsibilities it is not so easy to spend time on this kind of participation.

The type of associations in which young people participate are: sports (50%), cultural (20%), recreational (15%), student (15%), religious (13%) and outings (11%).

- *Democracy culture, values and attitudes*

In the last few years, democracy has become consolidated among Spanish young people as the preferred form of government.

The majority of young people are not interested in politics. Twenty eight percent of young people in Spain believe that no political party properly defends the ideas, problems, concerns and interests of young people.

Young people in Spain tend to identify more with political parties of a left-wing ideology (33%), and they are less attracted to the proposals of conservative parties (12%), but the rest (46%) is made up of young people who do not respond/not know.

On the other hand, and contrasting with the previous idea, young people give increasing importance to defending ecology and the environment.

Young people show optimism and happiness linked mainly to harmony in their interpersonal relationship (friends, couples or family).

The level of life satisfaction in the Spanish young people has increased in the last year (20% satisfied + 68% quite satisfied). The aspects that satisfy young people the most are, in order of importance: interpersonal relationships (family and friends), conditions of life (level of freedom, leisure time, consumption) and education/training and employment.

The youth generation sees itself as: tolerant, supportive, assertive, but sees some deficits such as dependence and maturity.

2.2.1.2 Participation and performance in the Spanish HE system

After a marked increase in the number of students accessing university, the number of the Spanish students who reach HE has decreased in the last 10 years. The percentage of students who access HE decreased by 5.7% from 2000 to 2005 and the number of students who are involved in university entrance exams (PAU[5]) decreased by 31.3% between 1996-2006.

The university entrance exams (PAU) are intended to evaluate the academic maturity of students and check whether they have acquired the necessary knowledge of the *Batxillerat* curriculum content.

Access to HE is mainly by PAU, with over 75% of students accessing by PAU in the last decade. In the Eurostudent report (2005) the data shows that the percentage of

[5] The PAU are made up of two parts: the first part estimates the maturity of the student and consists of four surveys about the common subjects of the last course in compulsory education. The second part tests specific knowledge in subjects related to the specific areas in the last courses of compulsory education.

Spanish students who access HE by non-traditional ways (mainly vocational education and training) is 7.2%.

Performance in the PAU has maintained an increasing tendency. Since 1995 the success rate (in terms of student who passed /enrolled students) in PAU is always over 75%. In 1995 the success rate was 77%, with 78% in 2000, 80% in 2004 and 81.7% in 2005. The distribution between knowledge areas is balanced. The health area could be mentioned as the highest percentage, with 87.35 % of success. In any case, all domains are over 80%.

In terms of participation, more than 50% of the young people in the reference age-group participated in Spanish HE during 2005-06 (in terms of enrolled students and graduated students).

The number of enrolled students in 2005-06 was 1,405,894, and these were distributed among the areas as shown in table 4; the Social & Law area contains almost half of the students (49.8%), followed by the Technical area (25.9%) and the rest are distributed in the Humanities (9.2%), Health (8.5%) and Experimental (6.6%) areas.

domains		%	% women
Total	1.405.894	100	54
Social & Law Sciences	699.870	49,8	
Technical Sciences	363.580	25,9	
Humanities	128.753	9,2	
Health Sciences	119.481	8,5	
Experimental Sciences	94.210	6,6	

Table 4: Enrolled students by domains (2005-06)

If these enrolled students are observed by age range (see table 5), the biggest number of students are in the range 18-21 (38.4%) and 22-25 (31%), whilst the rest (30.6%) are distributed in the over 26 age groups.

range of ages		%
Total	1.405.894	100,0
18 to 21	540.108	38,4
22 to 25	436.048	31,0
26 to 30	220.207	15,7
over 30	209.531	14,9

Table 5: Enrolled students in 1st and 2nd cycle by age range (2005-06)

With regard to foreign enrolled students, in 2005-06 this collective still accounted for only 2.,1% of the total, 26.6% belonging to the EU and the rest (73.4%) belonging to other countries outside the EU.

The students who are first-timers, ie. new access students, total 213,832. They are distributed by areas and percentages as shown in table 6 . The tendency is similar to the total enrolled percentage; only the Health domain shows a slight increase.

domains		%
Total	213.832	100,0
Social & Law Sciences	108.156	50,6
Technical Sciences	51.510	24,1
Humanities	17.566	8,2
Health Sciences	22.279	10,4
Experimental Sciences	14.321	6,7

Table 6: New access students in 1st and 2nd cycle (2005-06)

The number of graduated students in the course 2005-06 was 187,531 (see table 7). The percentage by domains is similar to the enrolled students. The highest number belongs to the Social and Law domain (51.8%) followed by the Technical (21.8%) domain. The rest are Humanities (7.8%), Health (11.8%) and Experimental (6.8%).

domains		%	% women
Total	187.531	100,0	61%
Social & Law Sciences	97.222	51,8	
Technical Sciences	40.844	21,8	
Humanities	14.646	7,8	
Health Sciences	22.082	11,8	
Experimental Sciences	12.737	6,8	

Table 7: Graduate students in 1st and 2nd cycle by domains (2005-06)

The age range of graduate students is shown in table 8. Graduates of up to 25 account for 47.4% of the total, 40.6% are between 25 and 30 and the rest (12%) are over 30.

range of ages		%
Total	187.531	100,0
up 25	88.813	47,4
25 to 30	76.135	40,6
31 to 40	16.055	8,6
over 40	6.528	3,4

Table 8: Graduate students in 1st and 2nd cycle by age range (2005-06)

The foreign graduated students are 1.2 % of the total; 28.6 are EU citizens and 71.4 % belong to non-European countries.

In order to know what the academic performance is in university, there is some data related to academic success in terms of drop-out. The total drop-out in Spain (1^{st} and 2^{nd} cycle) was 12.4% during the academic course 2004-05.

The 12.4 % of total drop-out distributed by domains is shown in table 9. The data shows that Humanities has the highest drop-out value in relation to the students enrolled in the domain and that Health is the domain that shows a lower drop-out value in relation to its enrolled group. In absolute terms the biggest number of drop-out students is found in Social and Law sciences; these are also the two areas with the largest number of enrolled students.

domains	drop-out	%	% drop-out/ enrolled	% enrolled students
Total	147.452	100,0	12,4	100
Social & Law Sciences	78.548	53,3	14,3	45,98
Technical Sciences	31.805	21,6	9,5	28,08
Humanities	23.666	16,1	21,5	9,24
Health Sciences	3.273	2,2	3,2	8,58
Experimental Sciences	10.248	7,0	10,6	8,12

Table 9: Drop-out in 1st and 2nd cycle by domain (2004-05)

The data shows that dropping out in the 1st course is a real problem, and even more so if the following data extracted from the National Plan of Spanish University System Quality (Council of Universities, 2003) is taken into account: 60% of the total drop-out in HE takes place in the 1st course. More concretely, the drop-out percentage in the 1st course at the Rovira and Virgili University between 1992-2006 accounts for 22.3 % and 21.3% in the last course 2005-2006. This data supports the idea which claim that the greatest attrition tends to occur between the freshman and the sophomore year (Murtaugh et al., 1999, p. 356).

High participation in HE increases heterogeneity in terms of the population accessing university. Being aware of this heterogeneity gives more relevance to the fact of knowing how each student manages his/her situation as a university student. The university classrooms are a reflection of Spanish society. Analyzing social and demographic factors related to increasing immigration in Spain, it can be said that currently immigration is not an aspect that determines the complexity of the HE population (2.1% foreign students enrolled in HE in 2005-06).

On the other hand, it is clear that academic performance and the transition to university can be considered as contrasting elements in order to know more about the university students.

2.2.1.3 Students from a sociological view

After giving relevant information about students in terms of figures, it is necessary to analyze what the students are like as citizens from a sociological view. This perspective is mainly dealt with from the technology field. The current generation that is studying at university is characterized by its relationship with the Information and Communication Technologies (ICTs).

This generation, understood as the group of persons who share peculiar characteristics because one or more criteria that promote that group members perform similar behaviours (Ferreiro, 2006, p.2), is made up of the young people born after 1980 (digital natives) and those people who have to adapt to it (digital immigrants) (Oblinguer & blinger, 2005, p.1,2). In any case they are people who use and master ICTs, and this fact is a nuclear element of their personal, academic and professional development.

There are many terms to conceptualize this generation: Y Generation, NET Generation, Millenials, Nintendo, SMS, gamers, DIG Generation, NML and even Homo-zappiens. All these terms try to identify the current young people who are entering university by means of the use of certain technological features.

In the context of the Educause[6] project, a non-profit association whose mission is to advance higher education by promoting the intelligent use of information technology, attempts have been made to describe the specific characteristics of the NET Generation in a concrete way. On the other hand, there are some authors such as Prensky (2001), Oblinger & Oblinger (2005), o Mcneely (2005) who complete the description of the NET Generation from an educative point of view.

Observing both contributions, authors and Educause, the NET Generation characteristics can be summarized theoretically as follows:

[6] http://www.educause.edu/

- Practical and experiential learning by means of inductive reasoning, with selective attention and not too much preoccupation about possible errors.
- Unable to keep a commitment for a long period.
- Used to being permanently connected
- Like mobility in tasks and professional and geographic mobility
- Interaction, working groups and social relationships
- Optimism, confidence, voluntarism and poor sense of competitiveness
- Capable of transmit feelings by technological means
- High estimation of the value of time, and belief in the possibility of structuring any task in a sequential manner
- Expect and search for immediate responses

Considering this set of characteristics and the critical moment that represents transition, it is necessary to analyze the different models of analysis that are used to describe and understand the students in their first year at university.

2.2.2 Analyzing First Year Students (FYS)

This subsection tries to describe the different approaches to the study of freshmen or first year students taking into account that the transition to HE constitutes a specific moment that is being dealt with as a generic topic of study. Therefore, this description has a generic character that makes up a first part of the complete state of the art of this work. This state of the art will be completed in a more focused way with the concrete description of the specific variables used in this research.

2.2.2.1 General analysis

To collect information about students in transition to HE is a common practice that takes place in most of the developed countries. In fact, a real movement exists to find the key factors that can explain good performance at university in this transition period.

The different initiatives linked to this fact can be currently grouped around the First Year Experience projects. These projects are oriented to managing the key aspects that can influence new HE students in their academic achievement at university, from the personal characteristics to the institutional ones. In this general framework, most of these programmes are based on theoretical foundations that go from individual to social conceptions.

Exploring the literature, many different types of approaches aimed at analyzing students can be found. The theories/models of analysis have moved from those focused on individual characteristics, such as that of Summerskill (1962), who states that the personal attributes of students are the main reasons for persistence, to those models that consider the student in a more integrated sense.

These integrated models are the main part of the first year experience projects' theoretical base. Some relevant authors can be considered to be the point of reference when following this line. For instance, Vincent Tinto undertakes the social component

at the moment of adapting to university by going deeper into the aspects that promote the sense of belonging to the community in terms of collaboration (1993; 1997; 2000). Astin (1984, p. 297) states that the quality and quantity of the student's involvement will influence the amount of student learning and development; Metzner and Bean (1987) speak about the dropout decisions for non-traditional students, posing that the most significant variables are academic performance, intention to leave, background and defining variables, high school performance, educational goals, and environmental variables. Authors such as Bernal et al. (2000) pay special attention to aspects related to the students' socioeconomic background.

Moreover, much research into this growing diversity of the student population has been carried out during the last decade (Pascarella & Terenzini, 1991, 1998; Cabrera et al., 2001).

In order to give an exhaustive overview of the different ways of analyzing FYS, it would be useful to cite the document developed by Evans (2000) at the Australian Monash University. Evans' document entitled *Planning for the transition to tertiary study: a literature review,* contains a detailed description of the different approaches for studying FYE in different countries, discipline areas, type of study and type of analysis. Evans's extensive research is mainly done in terms of transition, adjustment, attrition and performance.

Whatever the approach used in each case, it could be interesting to know how these approaches are being concreted in some of the most relevant university contexts.

In the USA context, the majority of USA universities have their own systems to help freshmen, by means of offices, specific programmes, seminars, etc. The National Resource Center for The First-Year Experience and Students in Transition[7] (University of South Carolina) can be considered one of the main references in the USA context; this center has as its mission to support and advance efforts to improve student learning and transitions into and through higher education. In fact, this center is one of the

[7] Web page accesed 14th october 2007 [http://www.sc.edu/fye/]

pioneers in giving impulse to international events linked to the FYE topic around the world.

Regarding the European context, there is a less developed culture for dealing with this topic. On May 2007, the University of Gothenburg was the headquarters for the 2nd European Conference on the First Year Experience. The UK universities are those that present a higher level of development in the European context; in that sense, it is interesting to observe the STAR project[8] (Student Transition And Retention) made up of four partner institutions (University of Brighton, Liverpool Hope University, University of Manchester and University of Sunderland), which focuses on the identification, analysis, dissemination and uptake of good practice in supporting students during periods of rapid transition from one learning environment to another with an underlying aim to increase student retention.

Deepening in the exploration of points of reference regarding the FYE topic, the Australian HE system presents valued experiences that can be concreted in a useful model. Since 1995 this model has been used to develop an extensive periodic report (every four years) that considers the entering students from different perspectives. The Australian model proposes gathering student information on the following items:

Aspirations, change and uncertainty in first year

- Reasons for enrolling
- Sense of purpose
- Performance prior to enrolling
- Factors which contribute to uncertainty about the future in HE

Student expectations and adjustment to university study

- Student expectations of the first year at university
- Adjusting to university assessment and standards
- Adjustment in the gap between compulsory education and HE
- Comparison between school leavers and mature age students expectations of university
- Adjusting to study in the first year

Engaging with learners and learning at university

[8] Web page accessed in november 2007 [http://www.ulster.ac.uk/star/index.htm]

- How students spend their time
- Factors that facilitate student engagement in first year
- Patterns of subgroups engagement

Managing commitment in the first year

- Financing of study
- Full-time students and paid work
- Coping with study, employment and other commitments

Perceptions of Teaching and Satisfaction with Courses

- Changes in perceptions of teaching in the first year
- Perceptions of the overall course

The First Year Experience of Significant Student Groups

- Indigenous students
- The effects of socioeconomic background
- Students from urban and rural backgrounds
- Females and males
- The influence of age
- Full-time and part-time enrolment
- Students who deferred study the previous year
- "First-timers" in Higher Education
- Students from non-English speaking backgrounds
- International students
- Full fee-paying domestic students

The sections and subsections presented in the Australian model seem to be an exhaustive reference model to use in order to take relevant information about the first year students experience. Many researches have been made efforts oriented to facilitate the entrance to HE (Gardner, 1986; Gardner & Upcraft, 1989; Barefoot, 2005; Clark, 2005; Upcraft et al., 2004).

Barefoot (2000) noted that the last twenty years have experienced the creation of thousands of first-year programmes in the United States, the primary aim of which is to increase first year retention. But whatever the concrete programme to be developed, Engle, J. Bermeo, A. & O'Brien C. (2006) made a report in which the first-generation students expressed, in their words, the actions that could ease the transition from high

school to HE. These actions would be focused on: raising students' aspirations for college, helping students to navigate the college admissions process, preparing students academically for college, acclimatizing students to the college environment, involving parents in the college-going process, helping students manage the financial aspects of college and developing personal relationships with students.

In general terms, the development of this set of FYE programmes is being defined in all kinds of personalized educational experiences. The Pell Institute for the Study of Opportunity in Higher Education concretes these experiences as follows: making early contact with students through first year programs, closely monitoring student progress through advising and early warning systems, limiting class size and/or reducing the negative effects of larger class sizes through supplemental instruction programmes; and offering students individualized services and support in special programmes.

After exploring the different initiatives, it can be seen that any study of freshmen has three vectors: a) the goals (for what it is analyzed), b) the contents of analysis (what is analyzed) and c) the moment that the analysis takes place (when it is analyzed).

a) With regard to the objectives, the analysis of FYS is oriented mainly to the following:

- To offer a sociological description of freshmen as an age range in contrast with the rest of the general population.
- To find out the relationships among the variables that can affect attrition, can facilitate adjustment in the first year at university or can predict academic success.
- To determine efficient access-to-university criteria. This consists of the analysis of different processes of enrolment in university. These are usually selection processes which, therefore, require establishing a precise system of measurement.
- To plan the teaching and learning process from the design of study programmes to the development of the educational instruction.

b) The contents/variables considered in any kind of analysis can be grouped as follows:

- Bio-demographic characteristics: This group of characteristics is made up of factors such as age, gender and race or ethnic group.

- Psychological characteristics: many psychological variables have been the object of study: emotional intelligence, attribution style, perceptions of learning environment, identity processing style, psychosocial maturity, motivation, well-being, adjustment and stress, emotional intelligence, locus of control, personality traits, learning styles, intelligence, cognitive ability, expectations and so on.

- Academic performance: the group of variables that has mainly been used before starting HE in the USA context is the High School Grade Point Average (GPA), and admissions test scores such as the SAT reasoning test (SAT) or the American College Testing Program (ACT)[9], which measures critical thinking skills that are needed for academic success in college. The combination of these two indicators provides a very good indication of university success.

- Socio-economical aspects: some studies analyze the parenting style, full-time / part-time students, living away from parents, financial status or political orientation.

- Institutional factors: these factors have to do with all aspects that affect students but depend on organizational factors of each institution.

Lizzio et al. (2002, p.28) suggests that the variables cited above can be organized in a continuum made up of *presage, process* and *product.* Moreover the contents of study can be organized in each part of this continuum.

[9] ACT and SAT are standard achievement examinations that contain scores for English, Maths, reading, science reasoning and writing (ACT) and Maths, critical reading and writing (SAT). The use of each one depends on the geographical location in the USA.

c) In order to give an answer to the third vector of analysis related to the moment of analysis of students, three techniques for general student analysis can be pointed out.

The students are analyzed during secondary school, just before they start the university period. PISA reports (2000, 2003, 2006) can be a good example of this moment for analyzing students. However, 15 is not exactly their age just before they start university.

Students are analyzed during the first year in university. This period is that most commonly used by researchers for analyzing students at this transitional moment (Grayson, 2003; Pancer et al., 2000; Pascarella et al., 1996).

Lastly, there are also studies made in a longitudinal way. Students are analyzed from the first year until graduation. These studies have to take place over time and are oriented to describing the students' progression during their years in the university environment.

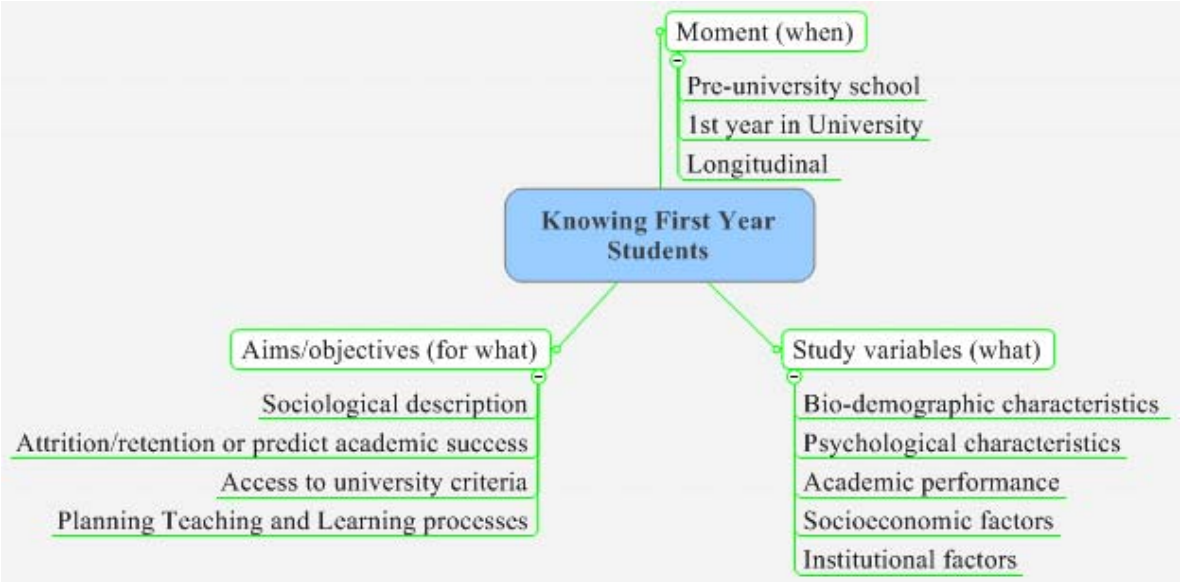

Figure 5: Different models of analyzing FYS

2.2.2.2 Model of analysis

Having seen the FYS analysis methods, it is necessary to choose an appropriate model of analysis. The selection criteria have to be founded on the type of problem defined in this work: there is not enough information about students related to their learning process.

Taking into account that many factors can affect learning, the educative model defined in section 1.1 underlines searching for factors which lie at the base of learning. The model of analysis to be used in this work is coherent with the main objective, which is planning the teaching and learning process. This aim is undertaken by Yorke (2000) in two directions:

- To design and deliver their curricula in such a way that students are inducted into the process of learning autonomously. This implies an emphasis on formative assessment early in the programme, with detailed feedback and associated tutorial support. The withdrawal of a student means a financial loss to UK institutions, and so it is in their own interests to find ways of maximizing student retention.

- To ensure that the approach to teaching is conducive to student learning. This ramifies into institutional learning and teaching strategies, now a requirement of English institutions, and associated matters like recognition and reward mechanisms for teaching.

The interesting factors are those that can remain in any learning situation. They are factors that allow the transfer of learning in different contexts. In any case, it is necessary to investigate the internal factors that are the key to the management of the learning process. Therefore, socioeconomic and institutional factors are not dealt with in this work. With regard to bio-demographic aspects, these are analyzed from a descriptive and comparative point of view.

The first choice is to investigate psychological factors. Most psychological factors could intervene in the learning process. In fact, the different psychological factors have been dealt with by many authors. examples of such are Parker (2004, 2006) on emotional intelligence, Gibb et al. (2002) and Bridges (2001) on attribution style, Lizzio (2002) on perceptions of the learning environment, Pascarella et al. (1996) on locus of control, etc.

Parker (2004) developed a work about relationships between emotional intelligence and academic performance in terms of high school GPA and first year GPA. The sample consisted of 372 freshmen and full-time students of Psychology. Parker used a short form of the Bar-on Emotional Quotient Inventory (EQ-I) to asses social competences such as interpersonal or intrapersonal abilities, stress management adaptability defined in the emotional intelligence construct. Results by means of correlation analysis showed that EQ-I total scores are poor predictors of AP but specific competences such as intrapersonal ability, stress management and adaptability are important factors for students in transition to HE.

Parker (2006) also developed further post-hoc research analyzing 213 freshmen distributed between those who persisted and those who dropped-out with regard to the same emotional intelligence construct. Findings using ANOVA analysis were that students who persisted had significantly higher interpersonal, intrapersonal, adaptability and stress management than those that withdrew.

As cited above, Bridges (2001) analyzed attribution style as the construct that influences academic performance. Concretely, the research used Peterson's Attribution Style Questionnaire (ASQ) on 127 first year students of Psychology. The late correlation analysis showed inconsistency of attribution style as a predictor of academic performance. However, Gibb et al. (2002) analyzed the same relationship adding SAT as a variable of analysis and using a revised version of ASQ (Abramson et al. 2002) and reported results (by means of ANOVA, correlation and multiple regression analysis), indicating that the students who have an internal and stable attribution style and who score well in SAT may have a better academic performance.

On the other hand, Lizzio et al. (2002) investigated the relationship between the perceptions learning environment and AP by analyzing a large number of university students (n=2130) from 14 universities in the USA. Once a Structural Equation model analysis (SEM) had been developed, it was reported that a positive perception of the learning environment positively influences AP and the achievement of learning outcomes. Deepening in this work, Lizzio proposes that certain areas of the learning environment, such as workload and type of assessment, should be the object of special attention in order to improve the students' performance.

To conclude this set of examples of research into psychological factors, Pascarella (1996) investigated 2,685 university students in order to analyze the factors that can promote the internal locus of control so as to improve AP.

One could state that all psychological factors could have some weight in the learning process. Nevertheless, the factors which are considered for this work are personality and learning styles or, more exactly, learning patterns. These two factors are close to the essence of the educative paradigm defined in EHEA, which is characterized by permanency, stability and capacity of transferring to diverse situations.

The choice of these two factors is a personal decision founded on the theoretical analysis shown in the last section 2.3.

The second decision is to determine elements to contrast the information given by the analysis of psychological factors. The Academic Performance (AP) of students in terms of access qualification and 1st semester scores is used as an element of contrast. The late theoretical analysis (section 2.3) offers information that supports the choice of this variable separately and in combination with personality and learning pattern factors. In fact, AP has been considered as a dependent variable in many analyses because it is an objective element for contrasting prior and current performance in an academic setting. AP can be measured in terms of current achievement through the observation of performances in exams, working papers, seminars, tutorial sessions, etc.

According to this framework a decision has been made about the model to be used to analyze the first year university students in this research. This decision is shown in figure 6.

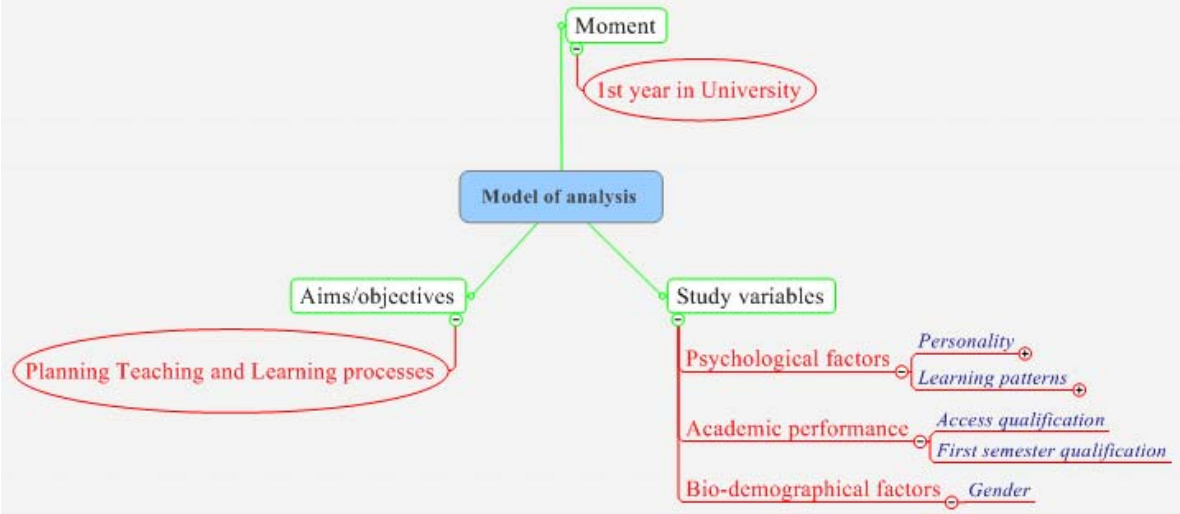

Figure 6: Model of analysis

2.2.3 FYS at the Rovira & Virgili University

In order to contextualize the research, it is necessary to give some information about FYS at the URV. Much data from different sources will be used. The following information concerns freshmen of the 2005-06academic course and it is structured in the following sections: general data (a), performance in terms of academic success (b) and learning environment (c).

2.2.3.1 General data

This general data contains information about general situational factors that characterize FYS at the URV, such as demography, university access path and literacy in foreign languages and ICT.

- *Age and gender*

69% of freshmen are between 18 and 20 years old and 22% of them are between 21 and 25 years old.
With regard to the distribution by gender, 63% are women and 37% are men.

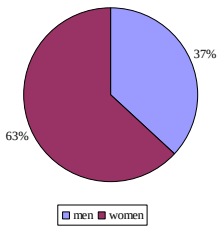

Figure 7: Freshmen by gender in URV

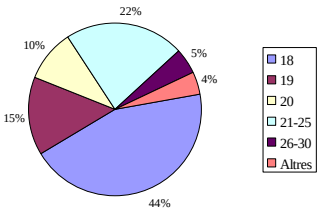

Figure 8: Freshmen by age in URV

72% of women and 61% of men are in the age range 18 to 20.
Special attention must be drawn to the high percentage of men who enter university in the age range of 21 to 25 (26%).

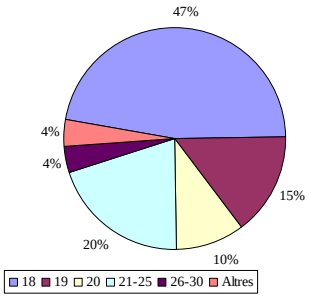

Figure 9: Women by age range in URV

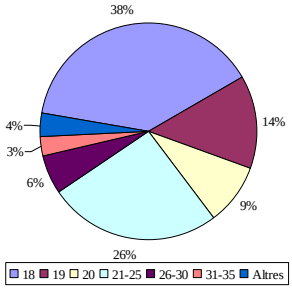

Figure 10: Men by age range in URV

- *Access mark to enter university*

Most of the 1st and 2nd cycle students (68%) enter university with marks between 5 and 7. 32% of students enter with a mark over 7.

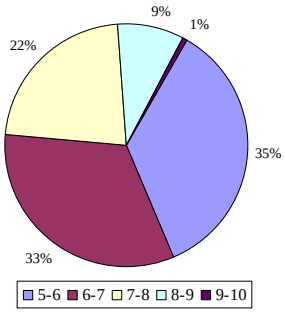

Figure 11: URV students'access grades

- *Access path to enter university*

Most of the freshmen enter university via PAU (64%). 13% of students have already started a study and 17% access via vocational educational training. Only 2% enter via "over 25".

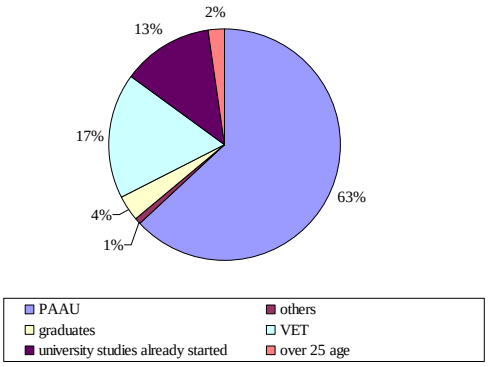

Figure 12: Access path in URV

- *Perception about foreign language literacy*

Most of the students consider that they have good Spanish and Catalan language skills. The percentages are similar in oral and written comprehension and expression, although they are lower in expression.

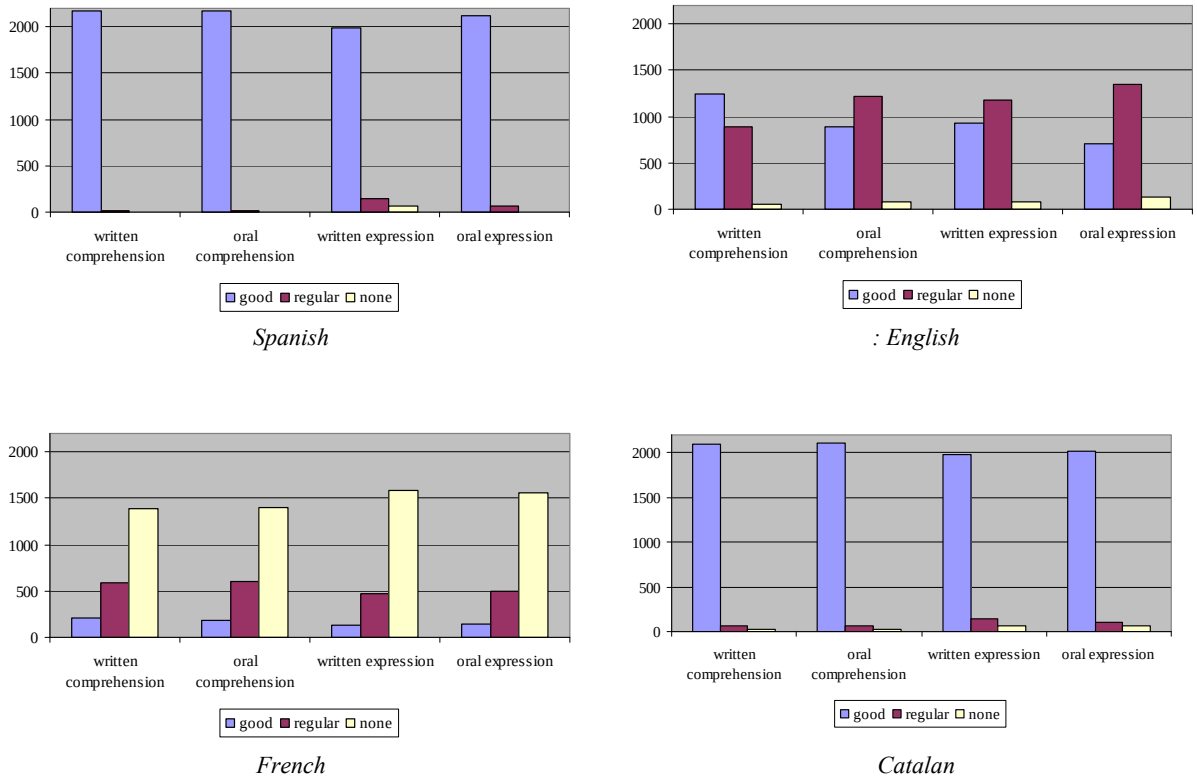

Figure 13 : Perception of foreign language literacy in the URV

- ICTs literacy

Freshmen declare that they have a good level of test processor programmes. But, on the other hand, the level is notably lower in spreadsheet and database programmes.

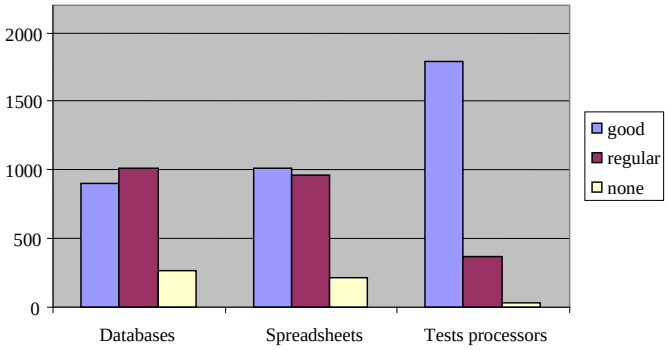

Figure 13: ICT literacy in the URV

2.2.3.2 Academic performance

A generic summary of academic performance in the academic year 2004-05 is given. This performance is expressed in terms of academic success and takes into account the analysis of several indexes.

In table 10 it can be observed that in the Faculty of Economic and Business Sciences and the School of Engineering less than 55% of students passed the 1st course, while the faculties of health stand in the strongest position (with over 80% pass rate).

Faculty	Acronym	% success[10] 1st course	% Total courses
School of Nursing	SN	87,2	89,1
Faculty of Medicine and Health Sciences	FMHS	82,3	82,9
Faculty of Education Sciences and Psychology	FESP	74,6	76,9
School of Tourism and Leisure	STL	74,3	78,3
Faculty of Oenology	FO	72,2	63,9
Faculty of Arts	FA	71,1	72,6
Faculty of Chemistry	FCh	67,7	61,8
School of Chemical Engineering	SchE	67,3	74,2
Faculty of Legal Sciences	FLS	66,3	62,1
Faculty of Economic and Business Sciences	FEBS	54,3	55,6
School of Engineering	SE	44,9	53,2

Table 10: Students success by Faculty

Figure 14 shows the evolution of student academic success (% students who passed / students who enrolled) in the 1st year. All faculties have increased their academic success except the Faculty of Economic and Business Sciences, the Faculty of Arts and the Faculty of Education Sciences and Psychology.

[10] Students who passed / students who enrolled

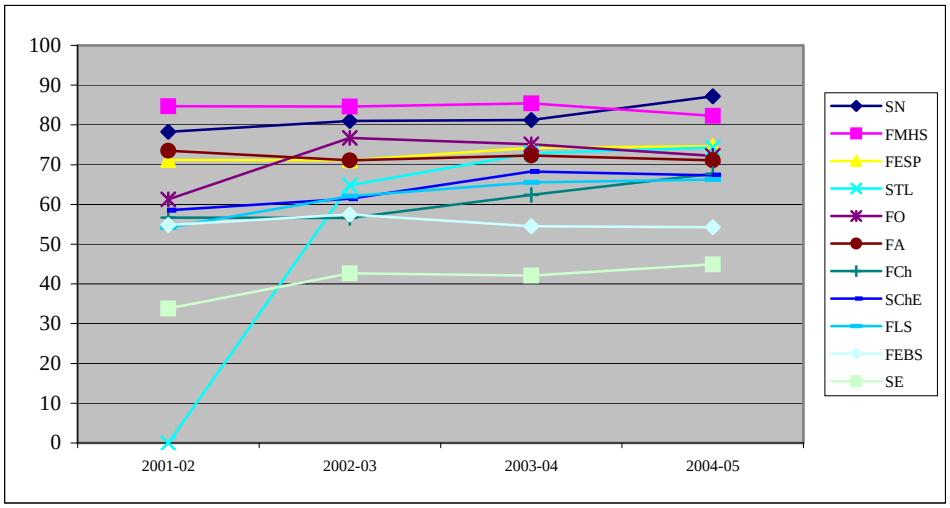

Figure 14: Evolution of academic success by faculties (2001-05)

Table 11 shows the academic success of the 1st and 2nd cycle studies in terms of % students who passed / students who attended.

In conclusion, if academic performance is analyzed in terms of drop-out data, it can be seen that the drop-out rate in the 1st course at the URV between 1992 and 2006 is 23 % (average) while the percentage in the last academic year 2005-06 is 21.3%.

Results by studies (1st cycle and 1st +2nd cycle)	
Studies	**Success index (% passed/attended)**
Social Work	99,14
Teacher Training: Infant Education	96,87
Publicity and Public Relations	96,72
Nursing	95,65
Teacher Training: Musical Education	94,86
Teacher Training: Special Education	94,77
Catalan Studies	94,6
Physiotherapy	94,26
Teacher Training: Primary Education	94,07
Pedagogy	93,73
Teacher Training: Physical Education	93,37
Medicine	92,44
History of Art	92,13
History	92,13
Teacher Training: Foreign Language	91,68
Nursing (Ebre land campus)	91,53
Hispanic Studies	91,48
Geography	91,13
Labour Relations	90,75
Tourism	90,64
English Studies	90,45
Industrial Engineering: Industrial Chemistry	90,11
Human Nutrition and Dietetics	90,1
Tourism (Ebre land campus)	90,03
Economy	89,9
Social Work	89,28
Chemical Engineering	88,84
Industrial Engineering: Mechanics	88,8
Technical Engineering: Information Management	87,68
Law	85,77
Telecommunications Engineering: Telematics	85,12
Business Administration and Management	84,44
Technical Engineering: Information Systems	84,13
Chemistry	83,74
Psychology	83,31
Industrial Engineering: Electricity	83,18
Business Sciences (Ebre land campus)	82,55
Business Sciences	81,38
Agricultural Engineering: Farming and Food industries	79,91
Industrial Engineering: Industrial Electronics	76,33
Mean=89,67; sd=5,11	

Table 11: Students success by studies

2.2.3.3 Perception of the Teaching / Learning environment

The information in this section is extracted from a periodic report carried out by the URV in order to analyze students who enter university. These studies, named *The incorporation of 1st year students at University,* began in 2003 and they emerged with the main objective of developing a culture of student participation as a member of the university community.

Nevertheless, this first objective was accompanied by a data series that is very useful for detecting the difficulties experienced by freshmen. This report, which has been improved with time mainly by observing the Australian model of analysis of school leavers, gathers information about freshmen students during the first semester at university.

This information[11] is presented classified in two sections: the students' perception of their task as students and the perception of teaching matters.

- *Students perception of their task*

To the question *"Do you feel integrated in university setting?",* 90% of the students in 2004-05 answered that they agreed or absolutely agreed; only 2% of them absolutely disagreed. The answer of the students in 2005-06 was even better than the previous year (none of them absolutely disagreed).

To the question "*Do you think that at university you have to solve your problems all by yourself?"*. The majority of them (83%) agreed or absolutely agreed in 2004-05. In 2005-06, the percentage was 81%.

[11] This research includes a summarized general information about this report. The specific information has a confidential use in privaticity conditions.

In 2004-05, 76% of the students agreed or absolutely agreed with the following sentence: *"Experienced students at university are a very useful source of information".* In 2005-06, the percentage increased to 79%.

Striking data is that 31% of students in 2004-05 disagreed or absolutely disagreed with the following sentence: *"Perception of the study in which I am involved has improved".* This perception increased slightly in the course 2005-06.

To the sentence *"I think that I can finish my studies successfully",* 85% of the students in 2004-05 agreed or absolutely agreed; only 2% absolutely disagreed. The percentages in 2005-06 were 79% and 2%, respectively.

90% of the students in 2004-05 agreed or absolutely agreed with the following sentence: *"The relationship with other students is positive; there is a good climate in the classroom".* This percentage increased slightly (92%) in the academic year 2005-06.

- *Student's perception of teaching matters*

A high percentage (38%) of the students in 2004-05 disagreed or absolutely disagreed with the following sentence: *"Professors indicate clearly what they expect from students by means of documents (study guides, programmes, etc)".* This percentage increased to 40% in the course 2005-06.

In 2004-05, more than half of the students (61%) disagreed or absolutely disagreed with the sentence: *"I think that the amount of proposed contents by professors is adequate in the current university study***".** In the course 2005-06 the percentage is the same.

64% of the students in 2004-05 disagreed or absolutely disagreed with the following sentence: *"The contents of different subjects seem to be coordinated".* The tendency in 2005-06 was the opposite, as 65% of students agreed or absolutely agreed with that sentence.

75% of the students in 2004-05 agreed with the following sentence: "*The level of subjects was adequate in the current university study".* The percentage was the same in 2005-06, although it must be pointed out that the percentage of absolutely agreed increased by 3 points.

With regard to the sentence *"The teaching methodologies promote the possibility of learning in different ways",* 46% of the students agreed or absolutely agreed. In 2005-06 this percentage was 60%.

2.3 STUDY VARIABLES

The current chapter will focus on the contents or variables which will be analyzed in the defined population.

Attending to the defined model of analysis, internal factors - personality and learning patterns - and academic performance (AP) measured in terms of Grade Point Average (GPA) will be developed.

The aim of the following analysis is not to give an exhaustive explanation of what the different factors are. Rather it attempts to explain how these variables have to be contemplated in order to describe the nature of the students to be known.

Furthermore, the predictive capacity of the student analysis in relation to academic performance will be analyzed, along with the relationships with other variables used in the model of analysis.

2.3.1 Personality: what people are like

2.3.1.1 Concept and models

There are many internal variables that can be analyzed, such as intelligence, motivation, self-concept, and so on. Nevertheless, personality is one of the most common variables used in order to analyze the internal characteristics of students. Personality is the construct that defines what the person is like and, moreover, what determines his/her actions.

Although the study of personality as a psychological construct is not a main question of this work, we will try to incorporate several considerations about its theoretical base.

Personality can be considered from different theoretical approaches that determine its definition. Personality can be defined in terms of description (to describe the characteristics of individuals), action (how these characteristics determine the action) and development (how personality is formed).

Moreover, the personality construct can be dealt with from diverse perspectives that derive from theoretical movements. Cloninger (2003) classifies these perspectives in psychoanalytical, psychoanalytical-social, traits, learning, social learning and humanist. Another source makes the following classification (Carver et al., 1997): dispositional, biological, psychoanalytic, neo-analytic, learning, phenomenological, cognitive self-regulation.

This research works with a mainly descriptive approach using dispositional perspectives based on the traits theories. We need to know the characteristics of the students in order to relate them to other variables in terms of action.

While observing these ideas we can select three definitions with different criteria: firstly, from an integrative criteria, secondly, by defining the psychology of personality and finally, in terms of predisposition to action factors:

"Personality is a dynamic and organized set of characteristics possessed by a person that uniquely influences his or her cognitions, motivations and behaviours in various situations" (Ryckman, 2000, p.5).

"Psychology of personality studies the psychological characteristics that identify one individual or a group of individuals, their genesis, structure and functionality, from their origin to their disappearance" (Pelechano, 1996, p.21).

In Cattell's (1950) terms, personality is what allows us to make a prediction about what a person will do in a given situation.

It is very difficult to define personality because of its grade of abstraction. Carver et al. (1997) justifies great efforts on this issue in order to transmit a sense of coherency and continuity to the individual, to consider that the origin of human behaviour resides in the person and that human essence can be summed up in certain qualities.

This kind of thought is the basis of the trait-based theories. These theories support studies that aim to describe individuals from different points of view. They have been analyzed from different perspectives: humanistic, biological- biosocial, phenomenological and lexical (Big-five theories).

Most of these theories are developed by trying to describe individuals through a factor analysis. Sometimes theories are separated by small differences. Eysenck's followers agree on the fact that factors start from solid theories to be confirmed later on, but people who follow Cattell's theories believe that the factors are measured after arising. On the other hand, the Big-five theorists observe the factors by analyzing quotidian language based on Norman's lexical approach of personality.

In order to be coherent with the aim of this work, it is better to use the traits theories to analyze the personal characteristics of students. Although traditional thinking about the intelligence construct could explain the levels of performance well, the traits theories according to authors such as Eysenck (1992), who states that personality traits are better academic success predictors than other variables, will be used.

Like other hidden variables, personality is composed of factors which are shown in individual performance; moreover, these factors are hidden and they have to be recognized and measured through indirect mechanisms. These factors can vary depending on the reference literature. The factors can be found and explained through different levels of aggregation (primary traits, supertraits, etc) and, as Eysenck (in Brody, 2000) says, there can be more than one possible factor structure for the same data.

Unanimous consensus exists about the factors which integrate the personality construct, McCrae & John (1992) posed that the dominant paradigm of research into personality is based on a construct composed of the Big Five factors (Saucier, G., & Goldberg, L. R. 1996). In the same sense, Carver et al. (1997) states that the Big Five factors theory constitutes the best possibility of consensus for the dimensions of personality.

These five factors are named with different terminology, but the most common terms are the following: *Openness to experience*, *Conscientiousness*, *Extraversion*, *Agreeableness* and *Neuroticism* (the acronym O.C.E.A.N is widely used).

With regard to measurement, like many other researchers, Duff et al. (2004) says that the Big Five factors theory is the best way to measure personality. In terms of measurement, there are several tools such as surveys or tests (NEOPIR, Quintax, etc) that are used in educational research.

2.3.1.2 Personality Traits (PT): definition and relationships.

The PT which will be used for the current work are *Openness to experience*, *Conscientiousness*, *Extraversion*, *Agreeableness* and *Neuroticism* (O.C.E.A.N). Some ideas about these traits are presented below. This exposition consists of a concise explanation of each concept, their relationship with other variables and their predictive capacity with regard to academic performance.

- *Openness to experience* trait

The Openness trait involves active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, and intellectual curiosity (McCrae & Costa, 1997). Openness is traditionally associated with creativity (McCrae, 1987) in general and related with creative thinking (Chamorro-Premuzic, 2006) in particular. In socio-political terms, individuals who are high in Openness are open, tend to be liberal and tolerant with diversity.

It is important to consider the nature of students with this trait in the sample. The reason is that scores in *Openness to experience* can vary or even be opposite depending on the reference type of study. In general terms it can be said that a positive relationship with academic performance predominates, but this relationship tends to be slight or mediated by other variables.

Phillips et al. (2003) investigated the relationships between personality traits, cognition and examination performance in 165 UK university students (covering arts, sciences and social sciences) by means of an intercorrelation matrix and SEM. The results reported that *Openness to experience* exerts an indirect effect on AP mediated by intention, ie. the students who have high scores in this trait can get better results in AP but this operates mainly through strength of intention.

Duff et al. (2004) developed a work in which the relationships between personality, approach to learning and AP were analyzed. The sample was 146 social science undergraduate students at the University of Paisley. The correlation matrix and SEM analysis show that *Openness to experience* presents a negligible positive correlation with AP.

- *Conscientiousness* trait

Conscientiousness is the trait of being painstaking and careful, or the quality of acting according to the dictates of one's conscience. It includes such elements as self-discipline, carefulness, thoroughness, organization, deliberation (the tendency to think carefully before acting), and need for achievement. *Conscientiousness* implies confidence in one's own capacities, order, self-discipline as well as a reflective, resolved and oriented to objectives attitude.

This factor is close to motivational variables. Moreover, it is important to note that *Conscientiousness* has a strong positive relation with performance in the professional setting, ie. in the workplace (Salgado, 1997; Barrick & Mount, 1991).

With regards to the relationships with academic performance, Duff et al. (2004, p. 1914) states that *Conscientiousness* shows the strongest positive relation with AP. Many authors have shown empirically that *Conscientiousness* relates positively to AP.

Chamorro-Premuzic & Furnham (2003a) analyzed longitudinally the relationship between personality traits and AP in 247 undergraduate students at the University College London. The results presented after a correlation and hierarchical regression analysis showed that *Conscientiousness* was the most significant positive predictor of exam marks as a supertrait and when analyzing its facets as primary traits separately.

Furnham et al. (2002) developed an investigation to analyze the relationship between personality, cognitive ability, beliefs and intelligence as predictors of AP. The sample was composed of 93 British undergraduate students and a hierarchical regression and

correlation analysis were used to extract results. The conclusion, observing the correlation matrix, is that *Conscientiousness* is positively related to AP, contrasting with the negative association of the *Extraversion* trait. It could be said that students who are conscientious and introverted are likely to perform better at university.

Chamorro-Premuzic (2006) analyzed creativity versus *Conscientiousness* as predictors of AP in a sample made up of Psychology undergraduate students (n=307). The results confirm that *Conscientiousness* was positively and significantly correlated with all indicators of AP used in the study (overall exam grades, final dissertation and continuous assessment). Once a hierarchical regression was applied to this working data, the results showed that *Conscientiousness* was a significant predictor in the three measures of AP as well.

- *Extraversion* trait

As the Merriam Webster Dictionary (2007) states, *Extraversion* is the act, state, or habit of being predominantly concerned with and obtaining gratification from what is outside the self. Extraverts tend to enjoy human interaction and to be enthusiastic, talkative, assertive, and gregarious. They take pleasure in activities that involve large social gatherings, such as parties, community activities, public demonstrations, and business or political groups. An extraverted person is likely to enjoy time spent with people and find less reward in time spent alone.

The definition implies opposition between *Extraversion* and introversion. This differentiation can be seen in Jungiang theory depending on the direction of physical energy or in accordance with Eysenk theory, depending on the degree to which a person is outgoing and interactive with other people.

Extraversion correlates positively with enterprising jobs (Costa, McCrae & Holland, 1984) and some authors find a certain relation with the idea of happiness (Myers, 1992).

With regard to the relationship with AP, in general terms, fluctuant predictive capacity has been found. However, There are many examples of works that show the negative relationship of *Extraversion* and AP. For example, Busato et al. (2000) developed research at the University of Amsterdam with freshmen psychology students. This work tried to find relationships between intellectual ability, learning style, personality and achievement motivation with regard to AP. Results related to *Extraversion* by correlation analysis were that this trait was negatively related to the first examination in AP.

It can be stated that in an academic setting, *Extraversion* relationships are very linked to the different disciplines. The predictive capacity of this trait also depends on aspects such as the kind of assessment tool (tests), the teaching methodology or level of education (introverted usually do better in higher education). This factor is associated with habits of study and the capacity to consolidate learning.

- *Agreeableness* trait

Agreeableness is a tendency to be pleasant and accommodating in social situations. People who score high on this dimension are empathetic, considerate, friendly, generous, helpful, and generally likable. They also have an optimistic view of human nature. They tend to believe that that most people are honest, decent, and trustworthy.

Agreeableness implies amiability, confidence in the others and sincere, altruistic, and sensible attitude to the others.

In general, it can be said that there is no relationship between *Agreeableness* and AP. Therefore, it is not possible to establish any predictive capacity. However, there is a positive relationship with AP but mediated by methodological aspects and adding how important its interaction with other variables is in order to establish any relationship. For example, in Farsides & Woodfield work (2003, p.1238), *Agreeableness* was positively associated with academic success considering seminar attendance as a mediated variable in the cited relation.

- *Neuroticism* / *Emotional adjustment*

Neuroticism can be defined as an enduring tendency to experience negative emotional states. In our case, we will use the term "*Emotional adjustment*". The individuals who score high in *Emotional adjustment* tend to be calm, even tempered, and less likely to feel tense or rattled.

EA relates to whether or not someone has the tendency to feel negative emotions and have irrational thoughts as well as to control the impulses when facing a stressful situation. Characteristics of this dimension are moody, touchy, irritable, anxious, unstable, pessimistic, and complaining versus controlled, secure, calm, self-satisfied, and cool (Rubio et al., 2007).

This factor is related to emotional intelligence, which involves emotional regulation, motivation, and interpersonal skills (Goleman, 1997). In professional settings (assessed by superiors) negative correlation between *Neuroticism* and performance can be seen (Judge, Erez & Bono, 1998; Rust, 1999).

The predictive capacity of the *Neuroticism* trait with regard to AP is predominantly negative.

Chamorro-Premuzic & Furnham (2003b) poses that *Neuroticism* has a specific negative relation with respect to exams and general AP but it can be affected by the exam anxiety situation. In Chamorros-Premuzic's work (2006) the results of students analyzed by correlation and hierarchical regression are coherent with the previous idea of *Neuroticism* as being negatively associated with overall exam and continuous assessment grades such as AP variables.

On the other hand, Duff et al. (2004) reveal by means of correlation analysis that *Neuroticism* is slightly negatively related (but not significantly) to AP. This negative relationship between AP and *Neuroticism* can support the De Raad and Schouwenburg's

(1996, p. 326) idea that particularly at a university level, highly neurotic students are probably handicapped compared to low neurotics.

Observing the OCEAN factors as a whole, Busato et al. (2000, p.1059) states that *Extraversion* and *Agreeableness* are close to the concept of sociability, and moreover *Conscientiousness*, *Neuroticism* and *Openness to experience* are close to intellectual or culture concepts.

2.3.2 Learning patterns: how people learn

2.3.2.1 Concept and models

Learning patterns are the second internal factor which is considered important in order to analyze first year University students. Before starting to explain this concept it is important to mention that the term learning style is the most commonly used concept in studies related to the description of students or the way that a person learns.

The previous section is about personality in terms of "who the person is". In this case, the learning patterns concept is used as "how the person learns". Learning patterns have to do with how people manage their learning process.

The way of learning has been observed from diverse perspectives (Schmeck, 1988) such as phenomenological (based on the experiential component), behavioural (based on the observable change in a person's reaction in cross-situational situations) and neurological (based on the nervous system activity).

These perspectives are not mutually exclusive. Even this work is developed by observing the mixed idea of searching the expected performance/behaviour in a scholarly setting from a cross-situational view.

Taking into account the nature of this work, it is important to highlight two ideas or definitions about the way in which people learn.

On the one hand, Schmeck (1988) defines learning style as the predisposition to use the same learning strategy in various situations. On the other hand, Sternberg (1990) states that the style of learning represents the link between intelligence (in terms of academic performance) and personality.

The first definition underlines the cross-situational characteristic that is stated in the student-centered model in the EHEA. The second one emphasizes the tendency to learn in a given situation; the way of learning can be considered as a mediated variable between personality traits and performance or action.

Going further into the conceptualization, it is important to emphasize two ideas. The first one is related to Shapiro's idea of the crystallization process, which argues that the use of a certain learning style determines the same style in the future.

On the other hand, it is important to emphasize the concept of predominance, that is to say, a person does not have an exclusive learning style/pattern. A person tends to learn using a particular style over the others, but does not use one exclusively.

The terminological variety of learning conceptualization has to do with the way that the concept is understood. As Boyle (2003) argues, this variety agrees with the rising educational models based on diverse views (constructivist, situated cognition, etc). The student-centered model is coherent with the existing variety of different ways of learning.

Conceptualizing the different ways of learning, four singular terms can be used: styles, strategies, approaches and orientations towards learning. These terms can be observed in relation to their place in a continuum that goes from the most general to the specific.

Learning style is used as the most general term, close to the cognitive style; it is stable, consistent and student-centered in the person. Learning strategy is centered on tasks and can be defined as the style expressed in terms of performance. Approach to learning is a concrete expression of learning, it has a phenomenological/experiential origin and is related to observed experience. Orientation to learning is a concrete expression of learning as well and is generally applied in scholarly settings (Vermunt, 2005).

Concretely, Busato et al. (1999) makes a review of authors describing the different ways of understanding how people learn. These ways of learning can be considered as a kind

of general strategy (Marton and Saljo, 1976; Pask,1976; Schmeck, 1983), as types of learning (Kolb, 1984), as different orientations to learning (Entwistle, 1988) or approaches to learning (Biggs, 1993). Elaborating on these theories, it is possible to find different conceptualization approaches.

Marton and Saljo (1976) classify approach to learning in terms of deep and surface learning. Schmeck (1988), and more concretely Biggs (1993), proposed a model where the approaches to learning are the deep, surface and achieving approach to learning depending on two components: strategy (how students approach a task) and motive (why they want to approach it in the first place). In accordance with Biggs' idea, Hativa (2000) also stated that the approach to learning is composed of two components: motivational/emotional and cognitive/strategic.

Sternberg (1990) interprets the learning style as the way of using intelligence. He identifies the styles with the governing functions, that is to say, they can be legislative, executive and judicial.

Vermunt (in Busato et al., 1999, p.130) describes the concept as consisting of four aspects: processing strategies, regulation strategies, mental models of learning and learning orientations. Vermunt developed a framework with four learning styles: meaning directed learning, reproduction directed learning, application directed learning and undirected learning .

Kolb's model suggests that people develop their way of learning through three stages (Acquisition, Specialization and Integration) and defines four learning styles: diverging, assimilating, converging and accommodating. On the other hand, Honey and Mumford (1992) defined four types of learning styles as well: activists, reflectors, theorists and pragmatists.

Following a set of different learning style approaches, the theory based on the Interactive Learning Model (ILM) developed by Johnston (1995, 1996) can be highlighted. This model states that learning is composed of three components: cognition

(to know), conation (to act), affectation (to feel). Johnston establishes four different patterns of learning: sequential, precise, technical and confluent. Learning pattern has been added as a recent term in order to conceptualize the different ways of learning.

The diversity of theories and models to conceptualize the way of learning make it difficult to determinate instruments to make a diagnosis in an adequate manner. In this sense, Alonso and Gallego (2003) make a summary of the different ways to consider the diagnosis of learning styles and the different tools used in their classification. They count four different perspectives: the first has to do with the location in the continuum that goes from external to internal, the second is based on diagnosis methods, the third is based on the processes that include knowledge and the last one is based on a comprehensive and flexible taxonomy.

The term learning style is one of the more widely used to determine the way of learning by students or people in general. There are several perspectives from which learning styles can be observed: from experience (Kolb, 1976; Honey and Mumford, 1992), from perception (Dun & Dun, 1978; VAK and VARK models), from intelligence (Gardner, 1985; Sternberg, 1990) and through information processing (Schmeck, 1988; Pask, 1976; Marton & Saljo, 1976; Biggs, 1993; Vermunt, 1996).

The term used in this research has to contemplate two criteria: firstly it has to be coherent with the student-centered model, and secondly it has to be conceived as a process of internal construction that models the interaction with context and with others.

Vermunt (2005, p.207) argues that the term learning style is too often associated with unchangeability, an invariable feature of students, deeply rooted in their personality. This could be useful in order to know what people are like. But the decision of researching this most hidden factor by means of personality traits had already been made.

Observing the different terms and models, the use of the term learning pattern, understood in the line of Interactive Learning Model (ILM) seems to be right. ILM is

mainly based upon cognitive science, brain science, and multiple intelligences and understands learning patterns as a result of the temporal interplay between personal and contextual influences.

From the ILM perspective, learning patterns are the natural foundation of how we interpret and understand the world around us. ILM states that learning patterns are the simultaneous interaction of the three fields of the mind: cognition (our thinking), conation (our acts), and affectation (our values) that work jointly to guide our individual patterns of learning.

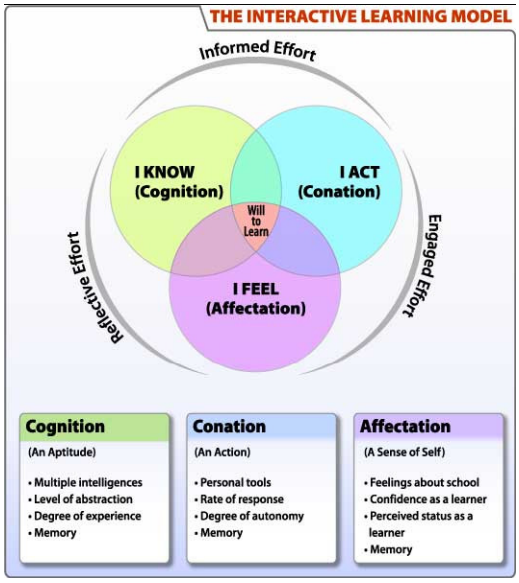

Figure 15: Interactive Learning Model (Johnston, 1996)

This way of understanding learning is totally coherent with the idea in which this work lies and the student-centered model defined upon the paradigm of EHEA. Furthermore, this ILM model has a continuity in terms of educative action. That is to say that there is an action plan for students derived from the results of the questioning of the *Learning Connections Inventory*® (LCI), which is the specific instrument used to determine the students' learning pattern profiles. This action plan is concreted in the so called "*Let me learn®"* (LML). LML is an advanced learning system based on the ILM model that uses knowledge of learning patterns as a starting point to develop processes and

strategies to improve the learning process in students and to make the teaching instructional proposals more efficient.

2.3.2.2 Learning Patterns (PT): definition and relationships

The interplay of the three fields of mind forms four learning patterns called sequential**,** precise**,** technical and confluent. A brief definition of the patterns follows, as well as specific explanation in terms of preferential use or avoidance.

- Sequential Pattern

The learner follows a plan and seeks step-by-step directions S/he organizes, plans work carefully and likes to finish assignments from beginning to end without interruptions.

- Precise Pattern

The precise learner looks for and retains detailed information. S/he reads and writes in a highly specific manner and asks questions to find out more information.

- *Technical Pattern*

The learner likes working autonomously at hands-on activities. Paper and pencil tasks are very often avoided and the learner reasons out technical ways to do things. S/he works alone without interference and shows what s/he knows by physically demonstrating skills. The technical learner likes to learn from real world experiences.

- *Confluent Pattern*

Confluent learners avoid conventional approaches and seek unique ways to complete any learning task. The learner is ready to take risks, to fail and to start again. More often than not a confluent learner starts before all directions are given and likes to improvise.

The definition of the mentioned patterns is fostered from a multidimensional perspective. This feature becomes essential because the tools, inventories, o questionnaires to test people should be built in a multidimensional view. That is to say, each pattern is formed by elements belonged to different dimensions.

Tables 12 and 13 (extracted from Johnston, 2006) present a deeper description of these patterns:

When I use First a Learning Pattern				
	How I think	**How I do things**	**How I feel**	**What I might say**
Sequential	I organize information. I mentally categorize data. I break tasks down into steps.	I make lists. I organize. I plan first, *then* act.	I thrive on consistency and dependability. I need things to be tidy and organized. I feel frustrated when the game plan keeps changing. I feel frustrated when I'm rushed.	Could I see an example? I need more time to doublecheck my work. Could we review those directions? A place for everything and everything in its place. What are my priorities?
Precise	I research information. I ask *lots* of questions. I always want to know more.	I challenge statements and ideas that I doubt. I prove I am right. I document my research and findings. I write things down.	I thrive on knowledge. I feel good when I am correct. I feel frustrated when incorrect information is accepted as valid. I feel frustrated when people do not share information.	I need more information. Let me write up the answer to that. I'm currently reading a book... Did you know that…. Actually…
Technical	I seek concrete relevance – what does this mean in the real world? I only want as much information as I need – nothing extraneous. How does this work?	I get my hands on it. I tinker. I solve the problem. I *do!*	I enjoy knowing how things work. I feel self sufficient. I feel frustrated when the task has no real world relevance. I do not feel the need to share my thoughts.	I can do it myself! Let me *show* you how… I don't want to read a book about it, I want to *do*it! How can I *fix* this? I could use a little space…
Confluent	I think outside the box. I brainstorm. I make obscure connections. Unique ideas.	I take risks. I am not afraid to fail. I try new things. I might start things and not finish them. I will start a task first – *then* ask for directions.	I enjoy improvisation. I feel comfortable with failure. I feel frustrated by people who are not open to new ideas. I feel frustrated by repetition.	Why do we have to do it that way! Can we try this? Let's bend the rules. I have an idea……. I have another idea…

Table 12: Preferent use of learning patterns

When I Avoid a Learning Pattern				
	How I think	**How I do things**	**How I feel**	**What I might say**
Sequential	These directions make no sense! I did this before. Why repeat it? Why can't I just jump in?	Avoid direction; avoid practice. Can't get the pieces in order. Ignore table of contents, indexes, and syllabi. Leave the task incomplete.	Jumbled Scattered Out of synch Untethered/Unfettered Unanchored	Do I have to do it again? Why do I have to follow directions? Does it matter what we do first? Has anybody seen…?
Precise	Do I have to read all of this? How am I going to remember all of this? Who cares about all this stuff'?	Don't have specific answers. Avoid debate. Skim instead of read. Take few notes.	Overwhelmed when confronted with details. Fearful of looking stupid. Angry at not having the 'one' right answer'!	Don't expect me to know names and dates! Stop asking me so many questions! Does it matter? I'm not stupid!
Technical	Why should I care how this works? Somebody has to help me figure this out! Why do I have to make something; why can't I just talk or write about it?	Avoid using tools or instruments. Talk about it instead of doing it. Rely on the directions to lead me to the solution.	Inept Fearful of breaking the object, tool, or instrument. Uncomfortable with tools; very comfortable with my words and thoughts	If it is broken, throw it away! I'm an educated person; I should be able to do this! I don't care *how* it runs; I just want it *to run* !
Confluent	Where is this headed? Where is the focus? What do you mean, imagine?	Don't take social risks. Complete one task at a time. Avoid improvising. Seek parameters.	Unsettled Chaotic No more change or surprises, please!	Let's stay focused! Where did that idea come from? Now what? This is out of control!

Table 13: Avoidance of learning patterns

➔ *Specific profiles in LCI*

Each person can present a personal combination of patterns. As result of these special combinations, some specific profiles can arise. Some of these profiles are characterized by specific features that define the way of managing learning.

Following this idea, two important and specific profiles can be identified: *Strong-willed* persons and *Bridge* persons.

Strong-willed scores high values in three of the four patterns. These persons tend to stress autonomy and ultimate control over any assigned task. These persons tend to perform using those patterns in which they score high and they tend to avoid one of the patterns, ie. they are also characterized by the pattern in which they do not score high.

The *Bridge* profile belongs to persons who score mid-values in all patterns. These persons are able to use any pattern if it is necessary. The *Bridge* profile is especially useful to facilitate tasks as a working group. This kind of person is very valued in organizational settings because they facilitate interpersonal relationships and are used in solving problem tasks.

Relationship with other variables

The research and studies in terms of relationship with other variables have been carried out mostly with regard to the term of learning style. Several relationships in terms of the ILS Vermunt model are expressed.

Vermunt (2005) developed an investigation with 789 students from a middle-sized Dutch university. The sample was made up of students of several disciplines. This study analyzes the relationships between learning patterns and personal and contextual factors and academic performance. The results extracted by means of correlation and regression analysis revealed that “meaning directed learning” was generally positively associated with different indicators of academic performance, in various types of subject domains; “reproduction directed learning” mainly showed negative relations with exam performance; “application directed learning” was rather neutral with respect to exam performance and finally, “undirected learning” was negatively and consistently associated with academic performance in all academic disciplines.

Boyle (2003) tried to test the generalisability of the Vermunt ILS model in the British context by means of a confirmatory factor analysis and late regression analysis. The results showed that “undirected learning style” had a low negative association with academic performance, while the “meaning-directed learning style” had a low positive association with academic performance.

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In general terms, meaning directed learning is positively related to AP and undirected learning has a negative relationship with AP. This second style can even be associated with students who are “academically at risk” (Busato et al., 1999, p.137).

Finally, some relationship between learning patterns and certain variables can be found. The strongest related variable is academic discipline (Vermunt, 2005). Relationships with personality traits (Furnham, 1992 in Busato et al. 1999; Duff et al., 2004) and other variables such as prior education or gender can also be found.

In any case, this work represents a first approach to analyzing the relationships between the learning patterns based on the ILM Johnston model and other variables such as personality traits and academic performance. That is the reason why it is not possible to present elements to contrast the results at this point. Nevertheless, this first approach can be useful to validate and consolidate the ILM and the LCI as a means of knowing how learning processes occur in HE students.

2.3.3 Academic Performance (AP)

AP is a common variable used as a dependent variable in most of the analyses related to student performance at university. Moreover this AP is measured in different ways, with a variety of tools and at different moments of the process.

AP is usually considered in terms of marks as the product of any test, surveys or exams. But this AP can be measured in different terms such as course satisfaction (Lizzio et al., 2002), final projects or classroom observational techniques (seminars or tutorial sessions).

Many authors have used AP as a dependent variable, measured in terms of Grade Point Average (GPA) resulting from exams marks at specific moments in the terms referred.

There are also several research papers that establish a temporal sequence. Authors such as Bridges (2001) or Reason (2003) make exclusive use of the GPA obtained at the end of secondary school. Moreover, Lizzio et al. (2002) uses this variable obtained at the end of the first year in University. Murtaugh (in Reason, 2003) only uses the GPA obtained in the first semester of the first course at university.

Furthermore, there are some researchers who use GPA in a combined way. McKenzie & Gow (2004) and Berzonsky & Kuk (2005) analyze exam marks in the first and second semesters of the first year at university. Authors who analyze the GPA at the end of secondary school and during the first academic course (Parker, 2004; Grayson, 2003) can be found and there are even some, such as Baker (2004), who analyze the GPA at secondary school, after the first course at university and during all courses at university.

Busato et al. (2000) gives empirical data about the importance of first examinations with regard to late AP. The results in the first examination have a strong positive relationship with AP after the first year at university. Therefore, the first qualification can be a strong predictive variable of student retention.

The final decision is to collect data from students at two moments: first at the end of secondary school, ie. the Access Qualification (AQ). Secondly, data is collected at the end of the first semester at university. This data is the 1st semester qualifications (1stQ).

AQ is the result of the combination of several qualifications during the last three years of school. This data is sufficiently objective to enable the later AP to be determined.

Furthermore, we think that using 1stQ data will give us information in relation to the academic achievement of first year students as well as on how the transition moment affects them.

3. RESEARCH DESIGN

3.1 EMPIRICAL CONTEXT

Starting from the problem and the goals defined in this investigation, the methodology used is explained in order to clarify the nature of the work and to facilitate suitable interpretation of the results.

Furthermore, there is also a description of the data collection process detailing the subjects participating in the investigation, the procedure used to gather information, the instruments used to measure the different variables and the analysis of measurement scales.

3.1.1 Methodology

This section consists of the explanation of the methodological framework in which this research is developed. This framework has been built as a personal decision-making process in terms of epistemology, methodology and methods of investigation.

The first decision to make is to decide on the epistemological approach that should inspire this research. This decision responds to the question: for what?.

Three paradigmatic approaches are identified in the educational research area: the rationalist, inspired by Comte's theory of positivism, the naturalistic or phenomenological approach based on the Husserl idea, and the critic theory. Traditionally these three approaches have been incompatible but this absolute statement is being questioned lately.

Therefore, bearing this in mind, this research is mainly based on a **positivist paradigm**. We aim to know, describe and explain reality from an empirical-analytical perspective.

This decision leads to the second step, which is concreted in the following key question: How is this research developed?This question is related to the methodology. In our case, the investigation is conducted within a **non-experimental methodology (ex-post facto)**. It is based on the observation of phenomena that have already occurred. Reality is not modified without having a direct control over variables.

The personal (PT and LP) characteristics of first-year university students are statistically analysed in order to observe the relationships with regard to their academic performance. A **variety of methods** will be used to make inferences about the objective data, including descriptive, comparative, causal and predictive.

3.1.2 Study variables

Of the bio-demographical data (BioData) the specific variables that take part in this investigation are personality traits (PT), learning patterns (LP) and academic performance (AP).

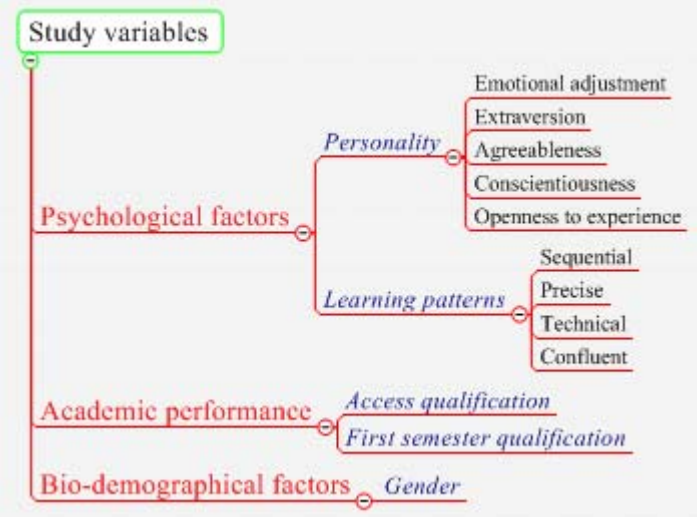

Figure 16: Study variables

Before offering a brief explanation of these variables, it is important to explain the reasons why these variables were included in this work.

Many psychological factors could be treated as variables that can affect the learning process. Personality and learning patterns were chosen because both can be considered sufficiently stable and durable variables that can be transferred to different learning activities independently of the context and environmental factors. This decision is coherent with the idea of an educative model centered on the learner and oriented to competence promoted by the EHEA.

Regarding the academic performance variable, AP is a common variable used as a dependent variable in most analyses related to student performance at University. Moreover this AP can be measured in different ways, with a variety of tools and at different stages of the process. In the present research, both access qualification (AQ) and 1st qualification (1stQ) are taken as variables, taking into account that there is empirical evidence that both variables present a strong positive relationship with students' performance throughout their time at the university. Moreover 1stQ can also give information about how the transition to the HE moment affects these students.

Bio-demographical data

Information about the gender and age of the students will be registered.

Academic performance

In operative terms, the academic performance (AP) is defined by two grades:

- Access Qualification (AQ): grades registered at the end of secondary school
- First semester Qualification (1stQ): grades registered at the end of the first semester at university

Personality

Personality is defined as "who the student is". Personality traits are considered as factors of predisposition towards learning and can explain who people are. In other words, , PT are part of the essence of the person and tend to be consistent during his/her whole life.

The PT model used in this investigation defines five factors of analysis:

- *Emotional adjustment*, this factor measures tranquility in the face of daily situations, stability and control of impulses.

- *Extraversion*, this factor measures cordiality and sincerity, preference for company, as opposed to the solitary, assertive, active and optimistic attitude.
- *Agreeableness*, this factor measures amiability, confidence in others as well as a sincere, altruistic and sensitive attitude to others.
- *Conscientiousness*, this factor measures confidence in one's own capacities, order and self-discipline as well as a reflective, decisive and oriented-to-objectives attitude.
- *Openness to experience*, this factor measures imagination and interest and sensitivity to art, receptivity to one's own feelings and emotions, with tendency towards the search for new sensations, intellectual curiosity and a critical attitude

Learning patterns

Learning patterns can be defined as "How the student learns". Learning patterns are elements that determine the management of the T/L process. These ways of learning are understood as a personal construction derived from formal and informal learning contexts. The use of certain patterns is the result of a construction based on the experience of interaction with context, others and oneself.

The LP model used in this investigation defines the following four learning patterns:

- *Sequential* persons follow a plan and seeks step-by-step directions. S/he organizes, plans work carefully and likes to finish assignments from beginning to end without interruptions.
- *Precise* persons look for and retains detailed information. S/he reads and writes in a highly specific manner and asks questions to find out more information
- *Technical* persons like working autonomously at hands-on activities. Paper and pencil tasks are very often avoided and the learner reasons out technical ways to do things. They work alone without interference and shows what s/he knows by physically demonstrating skills. The technical learner likes to learn from real world experiences
- *Confluent* persons avoid conventional approaches and seeks unique ways to complete any learning task. The learner is ready to take risks, to fail and to start again. More often than not a confluent learner starts before all directions are given and likes to improvise.

3.1.3 Data collecting

Participants

The reference study group of this work consists of first-year university students, also called freshmen or first year students (FYS). In this case they were freshmen at the Rovira i Virgili University (Tarragona, Spain).

The total number (see table 14) of participants is 2,103 (= N) freshmen (age 18-19 = 90% of population) from URV for the academic course 2006/07. These 2,103 students constitute the population of the investigation. The students belong to all scientific domains[12] and consist of 1,296 females (61.6%) and 807 males (38.4%).

[12] The grouping criteria is established by the investigator attending to the five traditional scientific domains: *Experimental, Health, Humanities, Social* and *Technical*. It has been decided to distribute the *Social* domain in three sub-domains: *Business, Education* and *Law*. This classification allows a more specific view of these students who, in fact, are physically separated in the URV campus.

Domain	Study	Acronym	n	%	% women
Business	Business Administration and Management	BAM	153	7,3	59,5
	Economy	Ec	31	1,5	35,5
	Business Sciences	BS	130	6,2	53,8
	Business Sciences (Ebre lands)	BS(E)	34	1,6	76,5
	Tourism	Tr	77	3,7	70,1
	Tourism (Ebre lands)	Tr(E)	13	0,6	61,5
	subtotal		*438*	*20,8*	
Education	Teacher Training: Special Education	TTSE	40	1,9	97,5
	Teacher Training: Physical Education	TTPhE	43	2,0	46,5
	Teacher Training: Infant Education	TTIE	42	2,0	97,6
	Teacher Training: Musical Education	TTME	39	1,8	76,9
	Teacher Training: Primary Education	TTPE	39	1,8	84,6
	Teacher Training: Foreign languajes	TTFL	39	1,8	79,5
	Social Education	SE	43	2,0	81,4
	Psychology	Psy	85	4,0	76,5
	Pedagogy	Ped	43	2,0	90,7
	subtotal		*413*	*19,6*	
Experimental	Biotecnology	Btch	40	1,9	65,0
	Chemistry	Ch	46	2,2	58,7
	subtotal		*86*	*4,1*	
Health	Medicine	Md	111	5,3	66,7
	Human Nutrition and Dietetics	HND	75	3,6	85,3
	Nurse	N	77	3,7	93,5
	Nurse (Ebre lands)	N(E)	73	3,5	90,4
	subtotal		*336*	*15,9*	
Humanities	Catalan studied	CS	17	0,8	82,4
	Hispanic studies	HS	7	0,3	71,4
	Publicity and Public Relations	PPR	82	3,9	67,1
	Geography	Geo	4	0,2	60,0
	History	H	30	1,4	43,3
	History of Art	HA	20	1,0	75,0
	subtotal		*160*	*7,7*	
Law	Law	Law	98	4,7	62,2
	Labour Relations	LR	71	3,4	60,6
	Social work	SW	74	3,5	85,1
	subtotal		*243*	*11,6*	
Technical	Industrial Engineering: Electricity	IEE	50	2,4	4,0
	Industrial Engineering: Industrial Electronics	IEIE	49	2,3	2,0
	Industrial Engineering: Industrial Chemistry	IEICh	30	1,4	43,3
	Agricultural Engineering: Farming and Food industries	AEFFI	22	1,0	68,2
	Industrial Engineering: Mechanics	IEMc	55	2,6	10,9
	Telecommunications Engineering: Telematics	TET	50	2,4	14,0
	Technical Engineering: Information Management	TEIM	37	1,8	21,6
	Technical Engineering: Information Systems	TEIS	49	2,4	10,2
	Chemical Engineering	ChE	29	1,4	51,7
	Architecture	Ar	56	2,8	53,6
	subtotal		*427*	*20,4*	
	Total		*2103*	*100,0*	

Table 14: Total of participants in the research

The grouping criteria is established by the investigator attending to the five traditional scientific domains: *Experimental, Health, Humanities, Social* and *Technical*. It was decided to divide the *Social* domain into three sub-domains: *Business, Education* and *Law*. This sub-classification allows a more specific view of these students who, in fact, are physically separated in the URV. Moreover, this division configures a more balanced sample.

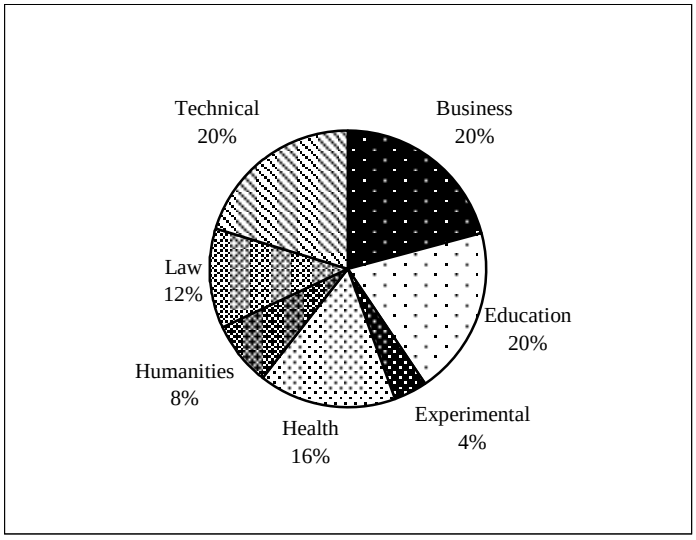

Figure 17: Distribution of participants distributed by domains

During the investigation, several samples were taken by means of a non-probabilistic sample method in order to give response to the different questions to face in the investigation and the available data. This method aims at getting freshmen from all scientific domains in a representative percentage.

The population and the different samples are summarized in the table 15:

	Variable	Number of Students
Population (**N**)	Socio-biographical data Academic performance	2103
Sample PT (**n1**)	Personality traits	531
Sample LP (**n2**)	Learning patterns	699
Sample LP+PT+AP (**nT**)	All variables	510

Table 15: Samples to analyze in the research

The separate description of each sample is as follows:

Sample PT (n1)

This sample (see table 16 and figure 18) is composed of students who participated in the *personality traits (PT)* survey.
The total sample is 531 students, consisting of 333 females (63%) and 198 males (37%). The mean age of the sample is 18.77 (sd=2,621).

Domain	*Study*	*n*	*%*	*% women*
Business	Business Administration and Management	93	17,5	58,1
	Economy	14	2,6	50
	Business Sciences	37	7,0	64,9
	Tourism	19	3,6	63,2
subtotal		*163*	*30,7*	
Law	Law	49	9,2	65,3
	Labour Relations	13	2,4	46,2
subtotal		*62*	*11,7*	
Health	Medicine	24	4,5	58,3
	Human Nutrition and Dietetica	2	0,4	100
subtotal		*26*	*4,9*	
Experimental	Chemistry	12	2,3	66,7
subtotal		*12*	*2,3*	
Humanities	Catalan Studies	5	0,9	60
	Hispanic Studies	3	0,6	66,7
	Publicity and Public Relation	33	6,2	72,7
	History	11	2,1	54,5
	History of Art	4	0,8	100
subtotal		*56*	*10,5*	
Technical	Architecture	34	6,4	52,9
	Industrial Engineering: Mechanics	20	3,8	15
	Technical Engineering: Information Management	13	2,4	7,7
	Technical Engineering: Information Systems	10	1,9	0
subtotal		*77*	*14,5*	
Education	Teacher Training: Special Education	16	3,0	100
	Teacher Training: Physical Education	27	5,1	51,9
	Teacher Training: Infant Education	31	5,8	100
	Teacher Training: Primary Education	20	3,8	90
	Psychology	20	3,8	66,7
	Pedagogy	21	4,0	85,7
subtotal		*135*	*25,4*	
Total		531		

Table 16: Distribution of PT sample

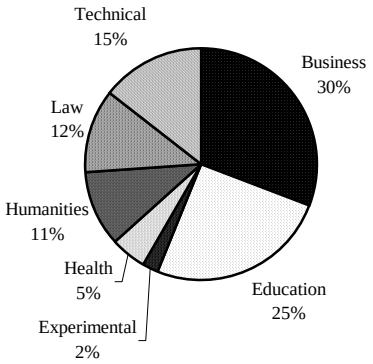

Figure 18: Distribution of PT sample by domain

Sample LP (n2)

This sample (see table 17 and figure 19) is composed of students who participated in the *learning patterns (LP)* survey.

The total sample is 699 students and consists of 414 females (59%) and 285 males (41%). The mean age of the sample is 18.89 (sd=2,618).

Study	*n*	*%*	*% women*
Business Administration and Management	100	14,3	56
Economy	14	2,0	50
Business Sciences	43	6,2	69,8
Tourism	16	2,3	75
	173	24,7	
Law	47	6,7	66
Labour Relations	15	2,1	46,7
	62	8,9	
Medicine	30	4,3	53,3
	30	4,3	
Chemistry	19	2,7	57,9
	19	2,7	
Catalan Studies	7	1,0	57,1
Hispanic Studies	4	0,6	75
Publicity and Public Relation	40	5,7	72,5
History	10	1,4	60
History of Art	5	0,7	100
	66	9,4	
Architecture	44	6,3	56,8
Industrial Engineering: Mechanics	19	2,7	10,5
Telecommunications Engineering: Telematics	15	2,1	13,3
Industrial Engineering: Electricity	15	2,1	6,7
Industrial Engineering: Industrial Electronics	8	1,1	12,5
Industrial Engineering: Industrial Chemistry	13	1,9	46,2
Technical Engineering: Information Management	15	2,1	6,7
Technical Engineering: Information Systems	31	4,4	9,7
Chemical Engineering	9	1,3	44,4
	169	24,2	
Teacher Training: Special Education	16	2,3	100
Teacher Training: Physical Education	31	4,4	51,6
Teacher Training: Infant Education	37	5,3	100
Teacher Training: Primary Education	23	3,3	91,3
Psychology	37	5,3	81,1
Pedagogy	36	5,2	88,9
	180	25,8	
	699		

Table 17: Distribution of LP sample

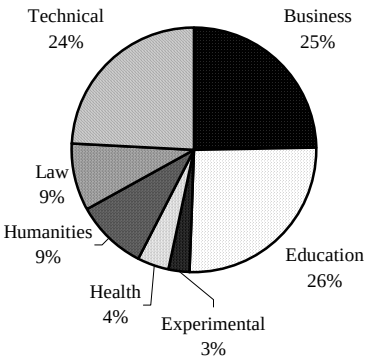

Figure 19: Distribution of LP sample by domain

Sample PT+LP+AP (nT)

This sample (see table 18 and figure 20) is composed of students who participated in the survey of the three variables *personality traits (PT), learning patterns (LP)* and *academic performance (AP: access qualification* and *1st semester qualification)*.

The total sample is 509 students and consists of 323 females (63.5%) and 186 males (36.5%). The mean age of the sample is 18.78 (sd=2,852). In terms of Academic performance, the mean of the access qualification (AQ) is 6.65 (sd= 0.990) and the mean of the 1st semester qualification (1st Q) is 5.84 (sd=1.557).

Domain	*Study*	n	%	% women
Business	Business Administration and Management	91	17,9	58,2
	Economy	14	2,8	50
	Business Sciences	34	6,7	67,6
	Tourism	15	2,9	73,3
subtotal		*154*	*30,3*	
Law	Law	44	8,6	65,9
	Labour Relations	12	2,4	50
subtotal		*56*	*11,0*	
Health	Medicine	26	5,1	57,7
subtotal		*26*	*5,1*	
Experimental	Chemistry	14	2,8	64,3
subtotal		*14*	*2,8*	
Humanities	Catalan Studies	5	1,0	60
	Hispanic Studies	3	0,6	66,7
	Publicity and Public Relation	32	6,3	75
	History	9	1,8	66,7
	History of Art	4	0,8	100
subtotal		*53*	*10,4*	
Technical	Architecture	32	6,3	53,1
	Industrial Engineering: Mechanics	18	3,5	11,1
	Technical Engineering: Information Management	12	2,4	8,3
	Technical Engineering: Information Systems	11	2,2	0
subtotal		*73*	*14,3*	
Education	Teacher Training: Special Education	16	3,1	100
	Teacher Training: Physical Education	26	5,1	50
	Teacher Training: Infant Education	30	5,9	100
	Teacher Training: Primary Education	19	3,7	89,5
	Psychology	20	3,9	80
	Pedagogy	22	4,3	86,4
subtotal		*133*	*26,1*	
Total		509		

Table 18: Distribution of nT sample

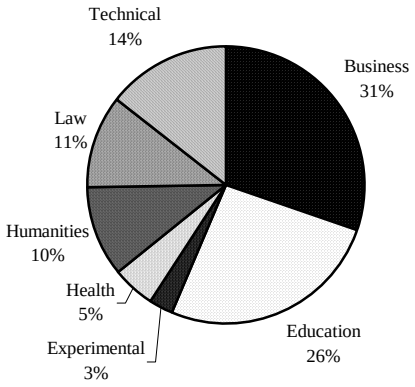

Figure 20: Distribution of nT sample by domain

Procedure

Once the study subjects were defined we asked the institution for the use of its databases, assuring its educational-research use as well as the anonymity of the students.

In the same way, before passing each test, we asked the students for the use of their test results under the same terms as above.

The chronological sequence of the research data collection is explained below.

Step one (June'06-November'06)

Firstly, we collected information about the access qualification (AQ). This data was extracted from the databases of the pre-enrolment university process. This is an official and centralized process that the Catalonian government subsequently distributes around Catalonian universities.

The university integrates all this information in its own database system so that is available to be exploited.

We extracted the rest of the relevant socio-biographical data from the data management system set up at the URV.

Step two (September'06-October'06)

In this period we passed the personality test and the learning pattern test to the students distributed by centres.

This activity was one of the activities programmed in the schedule of the "welcome week" of each centre within a general tutoring program designed for freshmen by the university.

Each of the two surveys took approximately 15 to 20 minutes. Both surveys were designed in web format on a database in order to facilitate subsequent statistical analysis of the data.

Step three (February'07)

In February 2007 we extracted the information about the 1st semester qualification. We extracted this data from the data management system of the URV when the exam marking process was completed.

Measurement instruments

The measurement instruments were selected with regard to three main criteria: conceptual criteria (as explained in the theoretical section), viability criteria (accessibility to students, testing time and available data), and scientific rigor criteria.

An explanation of the data collection instruments through the different study variables is presented: socio-biographical data (BioData), academic performance (AP), personality traits (PT) and learning patterns (LP).

Socio-biographical data (BioData)

We registered information about the gender and age of the students.

This information was extracted from data management system (DataWarehouse) set up at the URV.

Academic performance (AP)

The academic performance (AP) consists of two marks: the mark registered at the end of secondary school (called access qualification-AQ-) and the mark registered at the end of the first semester at university (named 1stQ).

AQ

This admission mark (AQ), also used in the university pre-enrolment process, is calculated as:

AQ = 0.60B+0.40P, where B is the Bachillerat[13] grade, and P[14] is the overall PAU[15] mark.

1st Q

This mark contains the exam marks obtained during the 1st semester at university.

These two marks can be typified by means of a process of standardization that can be different depending on the specific analysis requirements. Therefore, each process of standardization is explained for each type of analysis.

Personality traits (PT)

PT were assessed through the *E-value* test (developed by the Institute of Knowledge Engineering) based on the Big Five personality factors (Saucier, G., & Goldberg, L. R. 1996). This test is a short self-report composed of 5 scales with a variable number of items in each one. The test assesses five major dimensions of personality: *Emotional adjustment*, *Extraversion*, *Agreeableness*, *Conscientiousness* and *Openness to experience*. Responses are computed on a 6-point scale ranging from "strongly disagree" (1) to "strongly agree" (6). These values have been recalculated in a scale from 1 to 10 in the analysis process.

Learning patterns (LP)

LP were assessed through *Learning Connections Inventory (LCI)*, an instrument developed by Johnston & Dainton (1997). The theoretical background of LCI is based on an/the Interactive Learning Model (Johnston, 1996), which states that the learning process occurs through 4 different learning patterns: sequential, precise, technical and confluent.

[13] Bachillerat is the final part of secondary school in the Spanish educational system. This period generally comprises students aged 16 to 18.

[14] P is an average of the marks for the seven exams taken:
P=0.125a+0.125b+0.125c+0.125d+0.2e+0.2f+0.1g
where a, b, c, and d are the marks for the common subject areas, e and f are the marks for the obligatory modality subject areas, and g is the mark for the exam covering the modality subject area selected by the candidate.

[15] PAU is a Spanish acronym for University entrance tests.

This survey is composed of 28 likert scale - selecting one of the five responses ranging from "never ever" to "always"- and 3 written responses that are used to validate it. The values are calculated in a scale from 1 to 5 in the analysis process. Referring the theoretical learning approach, the LCI scale can be considered as a multidimensional formative scale; this fact is relevant in terms of validity of the scale.

This survey has his own methodology of interpretation that is expressed graphically in figure 21. The different patterns are expressed in terms of avoidance (values up to 17), use if it is needed (values between 18 and 25) or preferential use (values over 25).

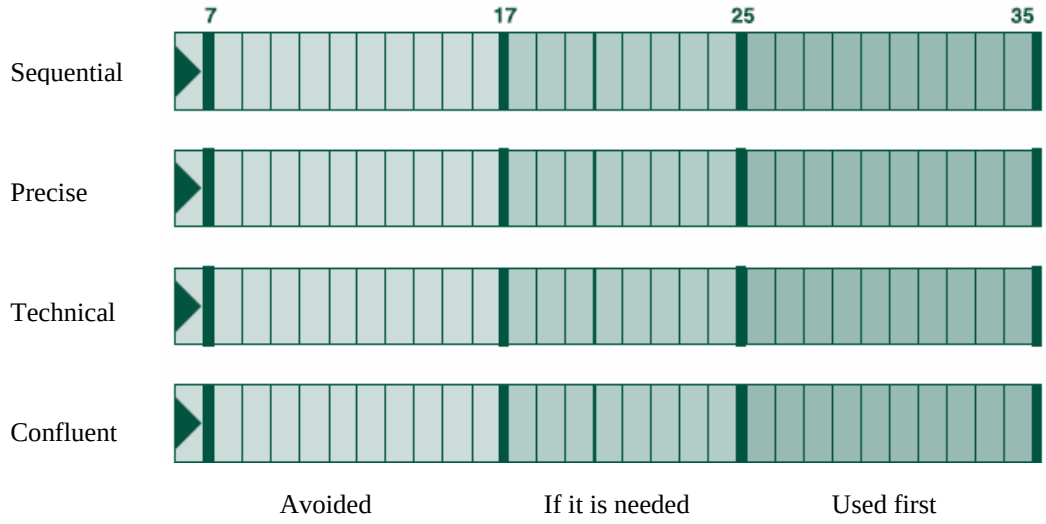

Figure 21: Learning combination (interpretation template)

Each case or group of cases describes a profile depending on these values. These profiles are diverse and can adopt several forms that define the differences and learning preferences. In this sense, the specific profiles mentioned in section 2.3.2.2 must be mentioned (strong-willed and bridge). Observing the interpretation template (figure 21) the “strong-willed” profile is presented by persons who score over 25 in three of the four patterns. The “bridge” persons’ score for the four patterns is between 17 and 25 in the template.

3.2 DATA ANALYSIS AND INTERPRETATION

In order to give a structured response to the objective of the investigation, several research questions have been formulated. Data analysis requires a prior step to contrast the validity and reliability of the measurement scales used in the research.

The analysis will be developed distributed across these different research questions by means of two statistical packages, concretely SPSS v15.0 and EQS v6.1 (Bentler, 2004). The different results and later analyses are presented organized by research questions. Each question contains a brief interpretation in a disaggregated manner.

The third part of this section consists of the general interpretation organized according to the different variables dealt with in the work. This interpretation is based on the most relevant results of this work and constitutes the base for subsequent conclusions.

3.2.1 Analysis of measurement scales

A previous requirement in order to develop any kind of statistical analysis is to verify the measurement scales used in the research. This explanation is very important in order to justify the subsequent statistical analysis.

Both scales have been analyzed in terms of validity and reliability. In table 19 we can observe the different procedure used in prior studies in order to establish the degree to which a measure accurately represents what it is supposed to –validity- and the degree to which the variable measures the true value and is error free –reliability- (Hair et al., 1998).

	Learning patterns ***(Learning Connections Inventory-LCI)***	**Personality traits** ***(E-value)***
Reliability	- Factor analysis - Test-retest analysis - Alpha cronbach coefficient	- Factor analysis - Alpha cronbach coefficient
Validity	- Content validity - Construct validity • Factor analysis • Matching scores with written responses (see survey)	- Correlation with values from similar instruments (NEO-PIR)

Table 19: Reliability and validity verification

Based upon studies completed to date, both *LCI* and *E-value* constitute instruments with a stable structure and, furthermore, they are reliable and valid for use in a context such as the current one. The statistical values of these studies can be observed in documents such as the LCI users' manual (Johnston & Dainton, 2005) or in the Big Five internal document (Aguado & Lucía, in press).

As it was stated before, this work is a non-experimental investigation. That is to say, it is an observation of the reality without intervening. A specific sample is taken and it is analyzed without manipulating any variable. That is an important reason because, in general terms, the prior analysis to suppose the validity and reliability of the scales is carried out.

Therefore, the alpha coefficient was calculated in order to estimate internal consistency and to compare with previous studies. Tables 20 and 21 show the alpha values in each scale factor for the sample n1 (PT[16]) and n2 (LP[17]).

Personality traits (PT)

	α	*n1*	*α (prior studies)*
Emotional adjustment	.92	531	.94
Extraversion	.85	531	.90
Agreeableness	.82	531	.88
Conscientiousness	.87	531	.88
Openness to experience	.85	531	.82

Table 20: Reliability test of PT scale

Learning patterns (LP)

	α	*n2*	*α (prior studies)*
Sequential	.67	699	.65
Precise	.57	699	.58
Technical	.74	699	.85
Confluent	.56	699	.55

Table 21: Reliability test of LP scale

[16] The alpha values of prior studies for PT are extracted from the *Big Five internal document* (Aguado & Lucía, in press), in which a test of reliability and validity was developed.
[17] The alpha values of prior studies are calculated through the mean of the different alpha values in the previous study applied over more than 5,000 students shared in different grades.

It can be observed that the alpha values of the PT scale are more than 0.82 for all factors. This means that this scale has a strong reliability by itself in terms of the alpha cronbach coefficient (Nunnally, 1978).

On the other hand, considering that LP scale is based on a multidimensional model, her formative nature and their 5 options to response, high scores in alpha values are unexpected using LCI survey. Covariation among the indicators is not necessary by formative indicator models because the measures do not necessarily capture the same aspects of the construct's domain. Therefore they are not necessarily interchangeable and there is no reason to expect them to have the same antecedents and consequences (Jarvis, C.B. et al., 2003). According to that, Elosua and Zumbo (2008) state that the alpha coefficient is not an adequate index to estimate reliability for ordinal scale; in the same direction, these authors cites several studies that show that using alpha Cronbach coefficient to measure the internal consistency in Likert scale with less than 5 options produces a decrease in its magnitude; this magnitude works better with scales that use more than 6 options. However, to observe these scores can be useful in order to be compared to previous researches. This comparison can support its reliability in terms of stability of the tool in different contexts of application.

The alpha values for the LP scale range from 0.56 to 0.74. These values are coherent with regard to the values and tendency observed in previous studies using *LCI*.

3.2.2 Research questions

Each question has its own structure which attempts to respond to specific objectives by means of adequate statistical analysis. The specific sample is described in each question in order to locate the referenced students. The data derived from the different analyses are presented in each question as well as a brief interpretation that can be a preliminary analysis to the subsequent general interpretation.

Before the development of the research questions, these and its contents are summarized as follows:

Q1. How are personality traits and learning patterns data distributed in the sample?

To develop this question, the PT and LP results are presented separately and for both variables the statistical analysis based on the following methods will used: *comparison of means for independent samples*, *1 Factor ANOVA* analysis and *MANOVA*.

Q2. How is the Academic Performance (AQ and 1^{st}Q) described in the sample?
This general question is developed in two specific goals:
- To describe AQ and 1stQ regarding gender, type of study and domain.
- To find out if there are differences between AQ and 1^{st}Q regarding gender, domain and type of study

This variable will be analyzed by means of the following statistical approaches: *Comparison of two means for independent samples, 1 Factor ANOVA* and comparison of *Quartile* 3^{rd} in sample.

Q3. Are there differences between best and worst 1stQ students (10%) with regards to personality traits (PT) and learning patterns (LP) in the sample?

The objective of this question is to analyze the possible differences between the 10% better scored-1stQ students and the 10% worst scored-1stQ students with regard to their personality traits and learning patterns. The method of analysis to be used will be *comparison of two means for independent samples*

Q4. What is the relationship between first year students' personality traits, learning patterns, prior academic performance and academic performance at the end of first semester in university?

Path analysis is used to respond this question. *Path* is a method of multivariate data analysis which belongs to the family of Structural Equation Model (SEM), which is characterized by analyzing the causality relationships between latent variables (hidden / not observable) and observable variables. This multivariate analysis method implies a *correlation analysis* that makes it possible to observe the bivariate correlations between variables.

Q5. What is the predictive capacity of psychological variables, gender, domain, type of study and prior academic performance (AQ) with regard to 1st semester academic performance in university?

A *Multiple Regression analysis* is applied to respond to this question. This kind of analysis is appropriate when one metric dependent variable is presumably related to two or more metric independent variables.

Summarizing, the description of the methods used in the research are presented in the Table 22:

Method	**Approach**	**Description**	**Process / Research Question**
Statistics(Mean, Median, Standard Deviation)	Exploration	Descriptive statistics are used simply to describe the sample and subsamples. There are three possible uses of them: to take a whole picture, to use themselves as indicators and to clarify the possible errors associated with results or graphical output.	Description of sample and subsamples
Kolmogorov-Smirnof test		*Kolmogorov-Smirnof* test is a broadly goodness-of-fit test for normal and uniform data sets.	Pre-analysis of scales: normal distribution of samples
Cronbach α	Validation	Alpha de Cronbach is based on the internal consistency of the construct. The average correlation between an item and the rest of the items in the scale gives us an idea of the common body of test (Bagozzi y Yi, 1988)	Pre-analysis of scales: reliability of scales
Comparison of two means for independent samples	Relation Comparison	*Comparison of two means for independent samples* is used to compare two groups in a quantitative variable.	Q1, Q2, Q3
1 Factor ANOVA	Comparison	*1 factor ANOVA* is used to compare several groups in a quantitative variable. It is a generalization of the *t-test* in the case of designs with more than two samples. (Ferran Aranaz, M. 1996). This method use to require a further multiple comparison test to complete the process of comparison.	Q1, Q2, Q3
Effect size (Cohen's d)	Comparison	Cohen's *d* (Cohen, 1988) is a value that measure how big is the level of significance in a comparison of means , as well as determine the magnitude of the change if the sample is modified.	Q1, Q2, Q3
MANOVA	Comparison	MANOVA is used to see the main and interaction effects of categorical variables on multiple dependent interval variables	Q1, Q2

		http://faculty.chass.ncsu.edu/garson/PA765/manova.htm#effects (Garson, D.)	
Bivariate correlation	Correlation	It computes statistics such as Pearson's correlation coefficient. Correlations measure how variables or rank orders are related. Correlation coefficients range in value from –1 (a perfect negative relationship) and +1 (a perfect positive relationship). A value of 0 indicates no linear relationship.	Q4
Path Analysis	Causal relation	*Path* is a method of multivariate data analysis which belongs to the family of Structural Equation Models (SEM), characterized by analyzing the causality relationships between latent variables (hidden / not observable) and observable variables	Q4
Multiple Regression analysis	Predictive capacity	This method used to be used when one metric dependent variable is presumably related to two or more metric independent variables. Multiple regression is recommended for investigations that aim at predicting the magnitude of the dependent variable (Hair et al., 1998)	Q5

Table 22: Methods of analysis (summary)

Q.1 Personality traits and Learning patterns in the sample

QUESTION 1
How are personality traits (PT) and learning patterns (LP) data distributed in the sample?

To develop this question, the results[18] for PT and LP are presented separately.

Question 1.1: Results for personality traits (PT) across sample by gender, domain and type of study.

Question 1.2: Results for learning patterns (LP) across sample by gender, domain and type of study.

Question 1.3: As additional information, an analysis of special profiles derived from LCI results (*Strong-willed* and *Bridge*) is developed.

To develop this question the statistical analysis will be based on the following methods: *MANOVA analysis, comparison of means for independent samples*, *effect sizes calculation*[19], *1 Factor ANOVA* analysis.

[18] Gender, Domain and Type of study have been analysed by means of a Kolmogorov-Smirnof test in order to check their normal distribution. After file segmentation, each sample presented a normal distribution. This data enables use of the parametric analysis to compare values between samples.

[19] *Effect size* is calculated with Cohen's *d* (Cohen, 1988) using the following expression:

$$d = \frac{\overline{x}_t - \overline{x}_c}{\sqrt{\frac{(n_t - 1)s_t^{\,2} + (n_c - 1)s_c^{\,2}}{n_t + n_c}}}$$

Question 1.1: Personality traits (PT) results

The reference data is: N=531, 333 female (62.7%), 198 male (37.3%)

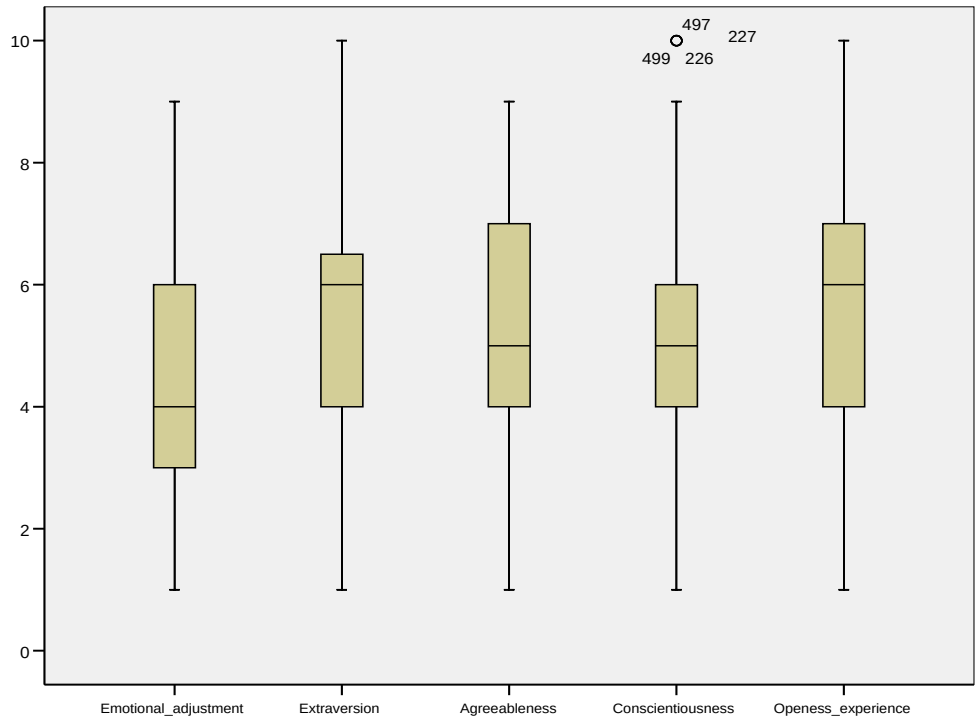

Figure 22: Distribution of PT in sample

The distribution of personality traits in the sample (see figure 22) shows that *Emotional adjustment* and *Agreeableness* present a positive asymmetry (the most extreme values are greater than the mean). *Extraversion* and *Openness to experience* present negative asymmetry and the *Conscientiousness* trait has a symmetrical distribution, or slightly positive symmetry observing the atypical values.

If the mean values of traits are analyzed in the sample, the results show that *Emotional adjustment* (4.31) presents the lowest value and *Openness to experience* is the highest (5.56) in the sample. The other three traits present mean values of more than 5.00 (*Agreeableness*=5.51; *Extraversion*=5.44 and *Conscientiousness*=5.00).

The results observed in the sample show a certain coherence with the values presented in previous works. Most of revised investigations (Bastian, 2005; Chamorro, 2006; Phillips, 2003; Farsides, 2007) show that *Openness to experience*, *Extraversion* and *Agreeableness* present the highest values; on the other hand, *Conscientiousness* and especially *Neuroticism* present the lowest values. That is to say, high marks in the traits that contain the relational and openness component and low levels for the traits traditionally related with the knowledge component.

Analysis of PT in the sample by gender, domain and type of study

Several kinds of analysis are developed in order to analyze the sample with regard to the desegregation criteria defined by gender, domain and type of study.

The first analysis is a multivariate analysis of variance (MANOVA), which indicates whether statistically significant differences exist with regard to the gender, domain and type of study in a very conservative way.

The second one is based on two kinds of analysis, a comparison of means for independent samples (gender) and ANOVA (domain and type of study); these analyses are more sensitive to differences and, although they allow less forceful statements, they can be useful for supporting the descriptive analysis of the different groups defined. In order to complement the statistic analysis, the *effect sizes* are estimated considering that this measurement is an important tool to report and interpretate and describe differences (Coe & Merino, 2003; Ledesma et al. 2008).

MANOVA analysis

This MANOVA analysis measures the differences for two or more metric variables based on a set of categorical variables acting as independent variables (Hair et al., 1998. p.326), In other terms, the *MANOVA* analyses the dependent variables in the k

subpopulations or groups formed by the combinations of the independent variables values. (Ferrán, M. 1996).

This MANOVA analysis is defined by the following design:

The dependent variables are *Emotional_adjustment, Extraversion, Agreeableness, Conscientiousness, Openness_experience*; and, as independent variables, *gender, domain* and *type of study*, taking into account the interactions among the independent variables. The variables are expressed as follows:

*Intercept + gender_code + domain_code + Study + gender_code * domain_code + gender_code*Study + domain_code * study + gender_code * domain_code * Study*

The *Box test* is applied as a previous test in order to verify one of the required assumptions in the *MANOVA* analysis. This assumption is related to the equality of variances- covariance matrices.

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Emotional_adjustment	1,307	42	488	,099
Extraversion	1,205	42	488	,183
Agreeableness	,868	42	488	,707
Conscientiousness	1,344	42	488	,078
Openess_experience	1,156	42	488	,238

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+gender_code+domain_code+Study+gender_code * domain_code+gender_code * Study+domain_code * Study+gender_code * domain_code * Study

Table 23: Levene's Test of Equality of Error Variances in MANOVA analysis of PT

The result of the *Box test* (equality of variance-covariance matrices) is as follows: M=539.054; F=0.999; df1=435;df2= 17498.561; Sig.= 0.497. This means that significant differences were not observed in the covariance matrices. That is to say that all variables have similar variance values.

Upon verification the test between-subjects effects is applied. Here statistically significant differences (F=7.235;p=0.007) were observed in the values for the variable *Conscientiousness* on gender.

These results allow to state that, in the sample, women show a statistically significant higher predisposition than men to develop activities that imply order, self-discipline and aim for achievement; this attitude is defined by the capacity to be responsible and accurate to follow a plan designed without distractions.

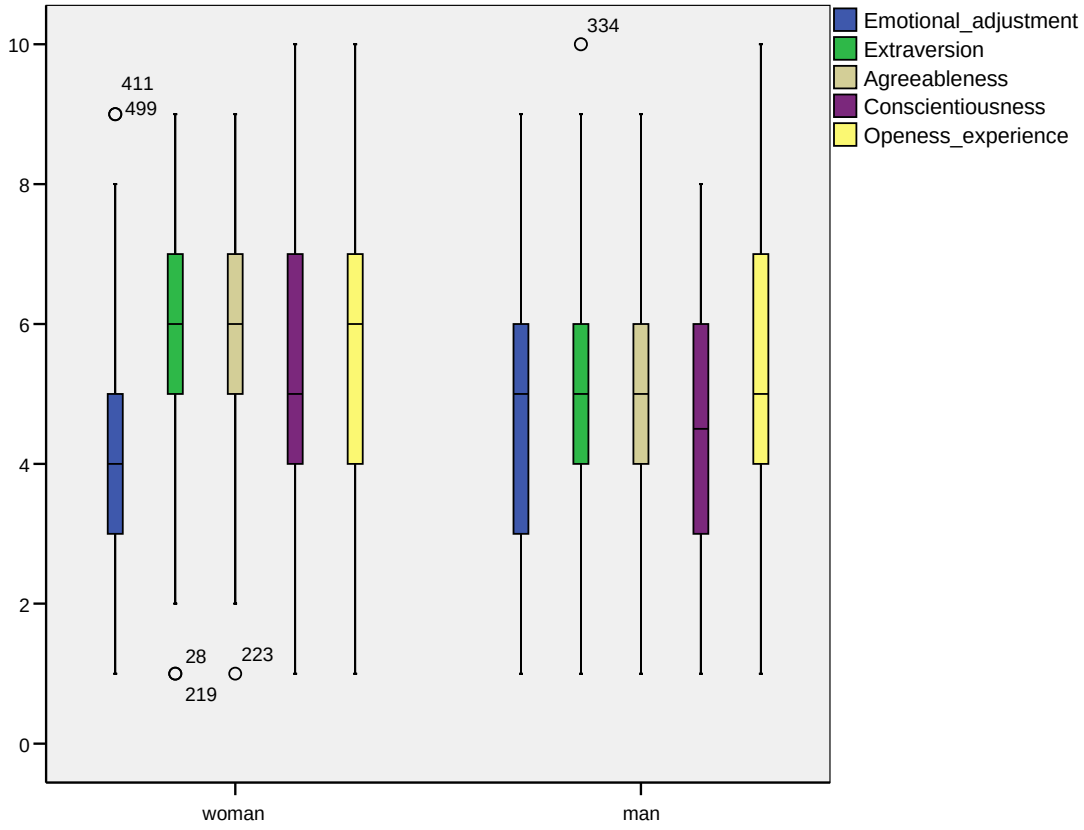

Figure 23: Distribution of PT in sample by gender

Applying *comparison of means for independent samples,* Some significant differences are observed between the PT with regard to gender.

	woman	man	mean dif.
Emotional_adjustment	4,05	4,73	-0,68
Extraversion	5,57	5,23	0,34
Agreeableness	5,74	5,13	0,61
Conscientiousness	5,31	4,49	0,82
Openness_experience	5,71	5,30	0,41

Table 24: Mean differences regarding to PT between men and women in sample

In the sample, women show a statistically significant higher predisposition than men to develop activities that imply attitudes like order, self-discipline and aim for achievement. In the same direction, women in the sample present higher values in traits that are related to establishing relationships with others in terms of helpfulness, compromise and an optimistic view of human nature. Recent cross-national research (Schmitt et al., 2008) supports our results, exposing that women present higher levels than men in the traits *Agreeableness*, *Extraversion* and *Conscientiousness*.

On the other hand, women present lower values than men in aspects that imply facing specific critical situations. They are more vulnerable, and that fact can give rise to blocking of decision-making, as well as difficulty to perform and cope effectively in a stressful situation. This data is coherent with Costa et al. (2001), whose results state that women present higher values for the *Neuroticism* trait, while men show attitudes that promote assertiveness and openness to ideas. In contrast, women show sensitive attitudes such as warmth and openness to feelings.

							STANDARDISED EFFECT SIZE						
PERSONALITY TRAITS	WOMEN			MEN			Effect Size	Bias corrected (Hedges)	Standard Error of E.S. estimate	Confidence Interval for Effect Size		Effect Size based on control gp SD	Percent change
	mean	n	SD	mean	n	SD				lower	upper		
Emotional adjustment	4,051	333	1,868	4,732	198	2,006	-0,35	**-0,35**	0,09	-0,53	-0,18	-0,34	17
Extraversion	5,571	333	1,542	5,232	198	1,673	0,21	**0,21**	0,09	0,04	0,39	0,20	-6
Agreeableness	5,739	333	1,608	5,131	198	1,828	0,36	**0,36**	0,09	0,18	0,54	0,33	-11
Conscientiousness	5,309	333	1,908	4,49	198	1,974	0,42	**0,42**	0,09	0,25	0,60	0,42	-15
Openess_experience	5,709	333	1,913	5,298	198	2,017	0,21	**0,21**	0,09	0,03	0,39	0,20	-7

P= 0,05

Table 25: Effect sizes of PT means comparison regarding gender

Observing the effect size and percent changes (see table 25), both traits *Emotional adjustment* and mainly *Conscientiousness* present medium effect and medium change between groups. Therefore, these values support that women has significant higher levels in *Conscientiousness* than men and men has significant higher levels in *Emotional adjustment* than women.

To analyse PT by **domain,** *1 Factor ANOVA* analysis is applied. The results are interpreted by the *Tukey post-hoc test* because the *Levene* test shows no different variances in the sample.

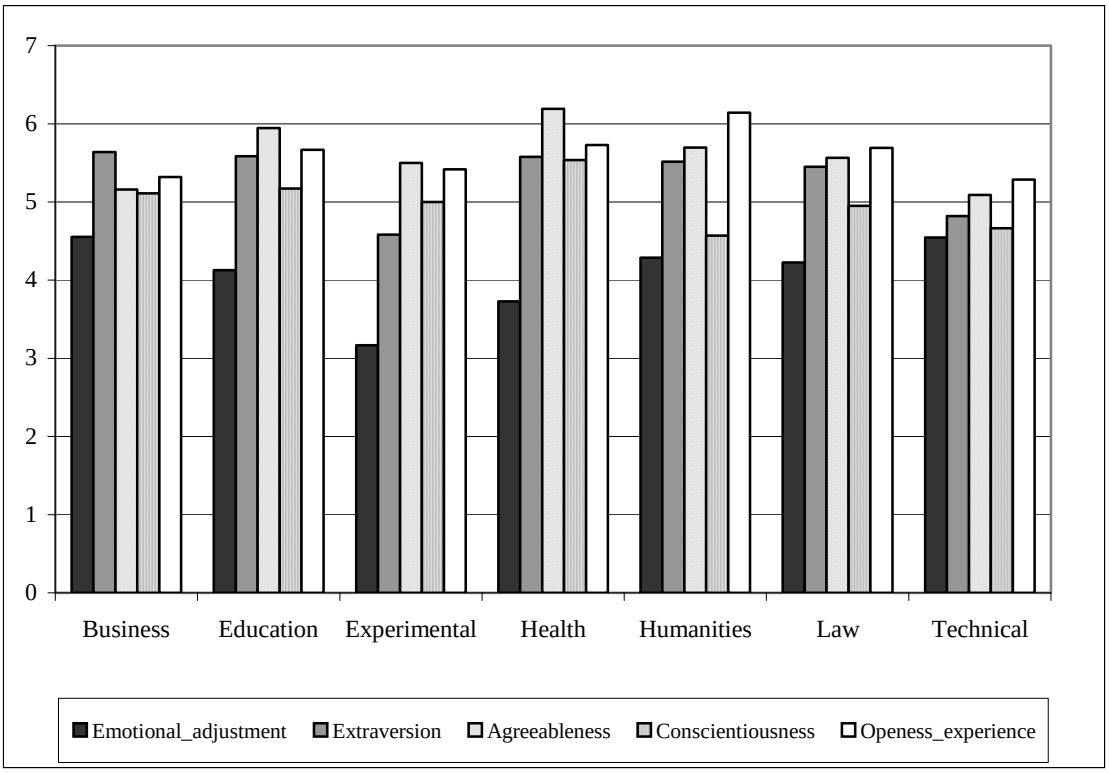

Figure 24: PT mean values in sample by domain

With regards to traits which present statistically significant differences (table 26), the Technical domain presents significantly lower values than the Business and Education domains for the trait of *Extraversion*. Taking into account that *Extraversion* is a trait that implies the capacity of relation with others, it can be stated that students who

belong to the Technical domain tend to develop their activities interacting with others notably less than students who belong to the Education and Business domains.

On the other hand, the statistically significant differences in the sample between the Education domain and the Business domain in the trait of *Agreeableness* reveal that the personality of Education students is defined by the relationship with others in terms of kindness and empathy (very close to the professional development in educational settings) whereas students who belong to the Business domain establish their relationships with others in more neutral and aseptic terms (less affective implication) than Educational ones.

Trait	Domain (I)	Domain(J)	Mean Difference (I-J
Extraversion	Business	Technical	0.81985(*)
	Education	Technical	0.76700(*)
Agreeableness	Education	Business	0.78864(*)
	Education	Technical	0.85724(*)

** Significant at the 0.05 level.*

Table 26: Statistically significant differences on *Extraversion* and *Agreeableness* between domains

In order to analyze the PT by **type of study**, *1 Factor ANOVA* analysis was applied. The results are interpreted by the *Tukey post-hoc test* because the *Levene* test shows no different variances in the sample. Unless some significant differences are found between studies regarding *Emotional adjustment* trait (*Economy* in comparison to *Medicine, Pedagogy, Chemistry* and *TTIE)*, this data is not relevant to give response to our research questions; However, we present a figure (figure 25) to illustrate the different values in terms of description.

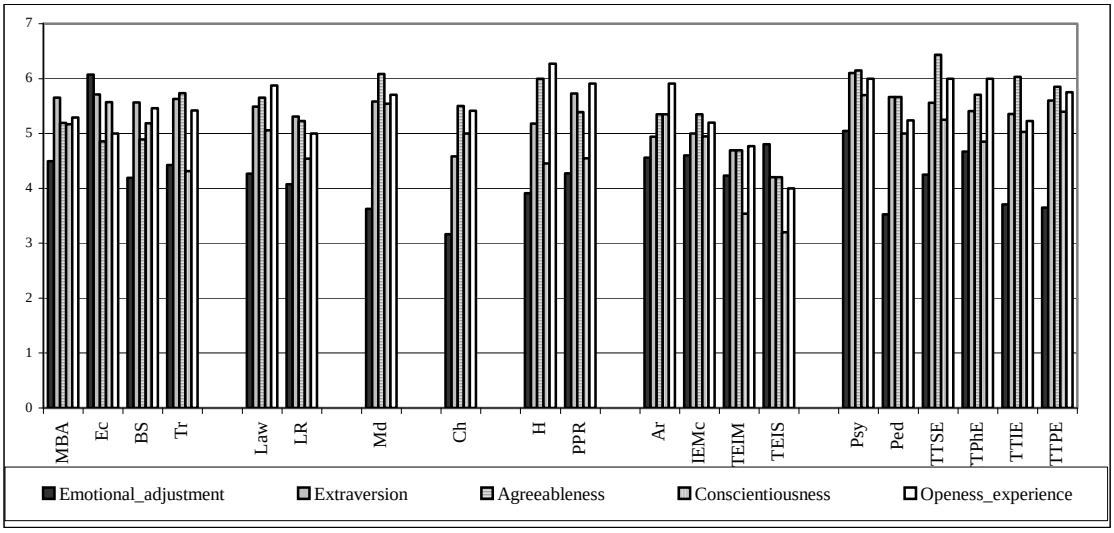

Figure 25: PT mean values in sample by type of study

Question 1.2: Learning patterns (LP) results

The reference data is: N=699, 414 females (59%) and 285 males (41%)

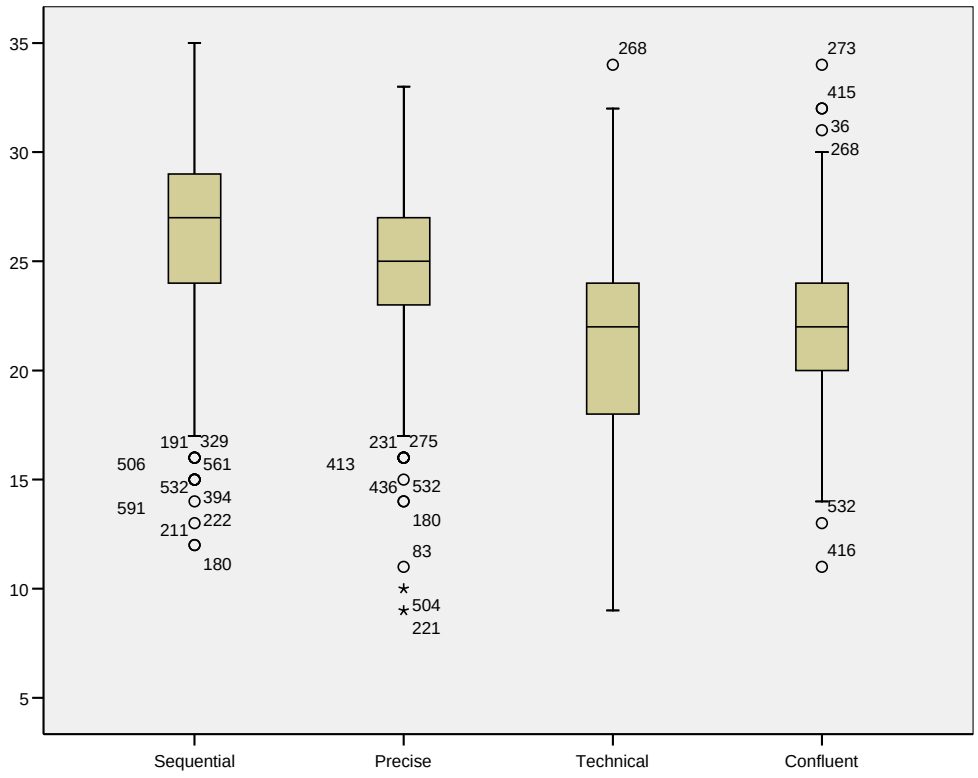

Figure 26: Distribution of LP in the sample

The distribution of learning patterns in the sample shows a negative asymmetry (the most extreme values are below the mean) for the Technical pattern. The other three patterns present symmetry around the median, but if the extreme and atypical values are observed, they show negative asymmetry.

The ILM model and the patterns concept have to be considered when describing this data; nobody has a unique learning pattern. Each person projects a profile that participates of the four patterns. The difference between persons is the dominance of or tendency to use certain patterns. This argument means that LCI has its own methodology of interpretation. The different patterns are expressed in terms of

avoidance (values up to 17), *use if it is needed* (values between 18 and 25) or *preferential use* (values over 25).

The combination of patterns makes complete sense when an individual approach is followed. However, when dealing with a group some tendencies or general characteristics can be observed as well.

However, these data cannot be compared regarding standardized values in population; we have no reference terms to compare, therefore the analyses have to be done as a description of a given sample.

Taking this sample as a whole, the URV freshmen (cohort 2006-07) tend to make predominant use of the Sequential and Precise patterns and they use the Confluent and Technical patterns if they are needed. The sample subjects show a tendency to learn following an established plan and developing tasks step by step. They like to search for information by asking questions to develop actions.

	Sequential	Precise	Technical	Confluent
Mean	26,3	25,0	21,4	22,0
Median	27,0	25,0	22,0	22,0
Mode	27,0	25,0	22,0	22,0
Std. Deviation	4,1	3,4	4,7	3,1
Minimum	12,0	9,0	9,0	11,0
Maximum	35,0	33,0	34,0	34,0

Table 27: Descriptive statistics in the LP sample

Currently, LCI is being widely used mostly in the USA. It is interesting to give some elements of comparison in order to contrast the results of this research. The study developed in Cumberland County College in the last three freshman cohorts shows the following mean results: sequential=26.6; precise=22.5; technical=23.7 and confluent= 21. These results confirm the recurrent tendency to score high in the sequential pattern;

this sequential pattern is linked to development in scholarly settings in which the students' performances depend mainly on the teacher instructions.

Analysis of LP in the sample by gender, domain and type of study

In the same terms as in the PT data, several analyses are developed in order to analyse the LP sample in relation to the disaggregation criteria defined by gender, domain and type of study. The methods used for these analyses are MANOVA, comparison of means for independent samples and 1 factor ANOVA.

This MANOVA analysis is defined by the following design:

The dependent variables are: *Sequential, Precise, Technical, Confluent* and as independent variables: *gender, domain* and *type of study*, taking in account the interactions between independent variables. The variables are expressed as follows:

*Intercept+gender_code+Study_code+domain_code+gender_code*Study_code+gender_code * domain_code+Study_code * domain_code+gender_code * Study_code * domain_code*

We apply the *Box test* as a preliminary test in order to verify one of the required assumptions in the *MANOVA* analysis. This assumption is related to the equality of variances- covariance matrices.

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Sequential	1,566	52	646	,008
Precise	1,568	52	646	,008
Technical	,936	52	646	,604
Confluent	,987	52	646	,503

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+gender_code+Study_code+domain_code+gender_code * Study_code+gender_code * domain_code+Study_code * domain_code+gender_code * Study_code * domain_code

Table 28: Levene's Test of Equality of Error Variances in MANOVA analysis of LP

The result of the *Box test* (equality of variance-covariance matrices) is as follows: M=559.631; F=1.264; df1=370;df2=17486.65; Sig.<0.0005. This means that significant differences are observed in the covariance matrices. In other words the variables have different variances.

The Tamhane (T2) test is applied in case of no assume the variances in samples. This was followed by the between-subjects effects test, which yielded the following results: statistically significant differences in the values for the variables *Sequential* (F=13.348;p<0.0005) and *Technical* (F=8.667;p=0.003) on *gender* and statistically significant differences (F=2.038;p=0.004) in values for the variable *Technical* on *type of study.* On the basis of these results the following statements can be made about the sample:

Women present a statistically significant higher tendency to sequential reasoning than men. Women show an attitude which is more oriented towards managing their learning in an organized and categorized manner. Women have a greater need than men for feeling that things are organized. They have a greater need to establish priorities and to break tasks down into steps.

Men show a statistically significant greater ability with technical issues than women, that is to say that men show a greater tendency to develop actions that imply thinking in terms of concretion and relevance, acting from real world experiences, and feel themselves self-sufficient enough for solving problems without the need to share information with others.

Applying *comparison of means for independent samples,* the data shows that there is a significant gender difference in *sequential, technical* and *confluent* learning patterns.

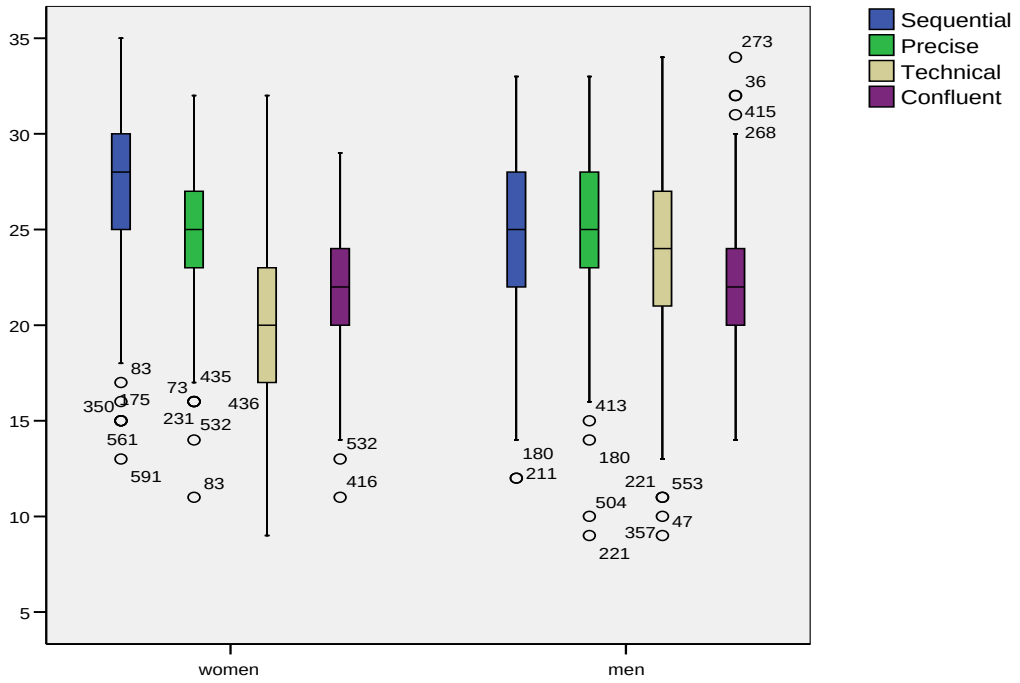

Figure 27: Distribution of LP in sample by gender

Attending to this more sensitive statistical analysis, the results show that the Confluent pattern presents a slight difference between genders. Men show higher values than women in managing learning processes based on thinking that explore unconventional approaches. Men have more of a tendency to take risks than women, being ready to fail and start again. They feel comfortable improvising and are open to new ideas.

							STANDARDISED EFFECT SIZE						
LEARNING PATTERNS	**WOMEN**			**MEN**			Effect Size	Bias corrected (Hedges)	Standard Error of E.S. estimate	Confidence Interval for Effect Size		Effect Size based on control gp SD	Percent change
	mean	n	SD	mean	n	SD				lower	upper		
Sequential	27,21	414	3,760	24,97	285	4,165	0,57	**0,57**	0,08	0,41	0,72	0,54	-8
Precise	24,98	414	3,264	25,02	285	3,694	-0,01	**-0,01**	0,08	-0,16	0,14	-0,01	0
Technical	19,88	414	4,378	23,54	285	4,331	-0,84	**-0,84**	0,08	-1,00	-0,68	-0,85	18
Confluent	21,73	414	3,047	22,46	285	3,141	-0,24	**-0,24**	0,08	-0,39	-0,08	-0,23	3

P= 0,05

Table 29: Effect sizes of LP means comparison regarding gender

Observing the effect size and percent changes (see table 29), the pattern *Technical* presents large effect and medium change between groups. Therefore, this value support that men have significant higher levels in *Technical* than women. On the other hand, it can be observed that *Sequential* pattern has a medium effect but a small percent change, so women present significant higher values than men but the magnitude of the difference is not so big as in the case of *Technical* pattern.

To analyze the different domains and the corresponding learning patterns, the *1 Factor ANOVA* analysis is applied. The results are interpreted by the *Tukey post-hoc test* because the *Levene* test shows no different variances in the sample. Figure 28 shows the LP mean values.

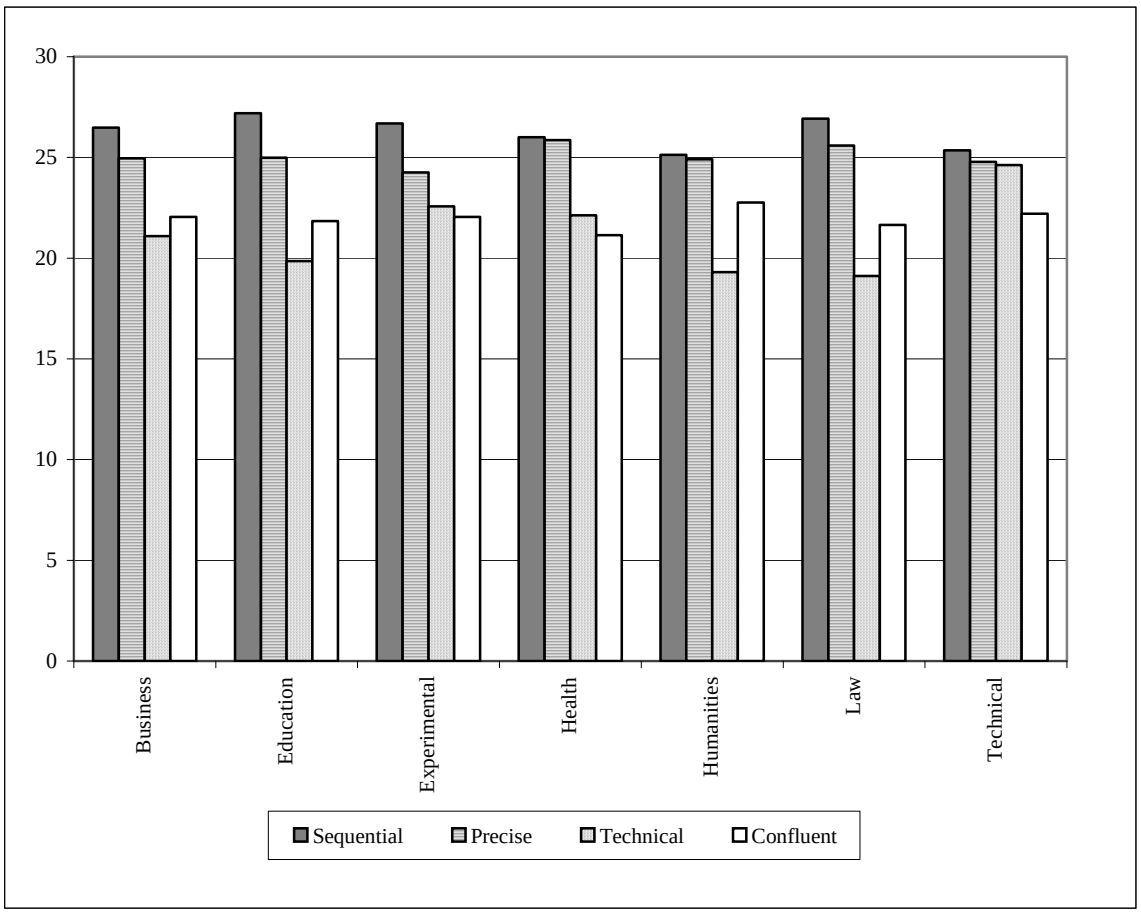

Figure 28: LP mean values in the sample by domain

The patterns which present statistically significant differences (table 30) in the ANOVA analysis are *Sequential* and *Technical*.

The students from the Educational domain score higher values than the rest of the students in the use of the Sequential pattern and a statistically significant higher value in relation to students from the *Technical* and *Humanities* domains.

With regard to the statistical differences in the *Technical* pattern, the students from the *Technical* domain present higher values than the others, especially those from the *Humanities* and *Education* domains. The *Health* and *Experimental* domains also show high values in the *Technical* pattern.

Pattern	Domain (I)	Domain (J)	Mean Difference (I-J)
Sequential	Education	Technical	1,845(*)
	Humanities	Education	-2,069(*)
Technical	Business	Law	1,980(*)
	Business	Technical	-3,535(*)
	Education	Technical	-4,772(*)
	Experimental	Law	3,466(*)
	Health	Humanities	2,815(*)
	Health	Law	3,020(*)
	Humanities	Technical	-5,309(*)
	Law	Technical	-5,514(*)

** Significant at the .05 level.*

Table 30: Statistically significant differences on patterns Sequential and Technical between domains

In order to analyze the LP by **type of study, the** *1 Factor ANOVA* analysis is applied. The results are interpreted by the *Tukey post-hoc test* because the *Levene* test shows no different variances in the sample. The results show that the *Sequential* (between the studies *TEIS* and Pedagogy) and *Technical* patterns show significant differences in terms of type of study.

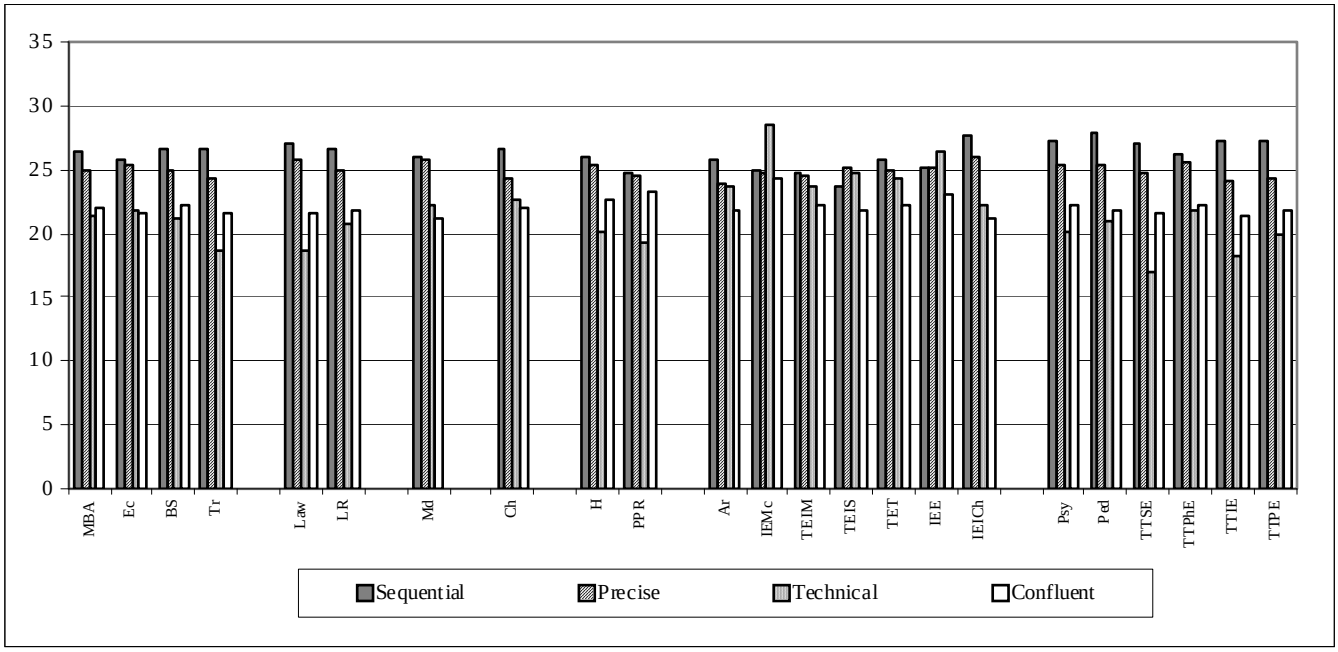

Figure 29: LP mean values in sample by type of study

As can be seen in table 31, the *Technical* pattern shows many significant differences. The *Technical* pattern shows notably higher values in studies in the *Technical* domain compared to studies in the Educational domain, and especially the Humanities domain.

The differences by *types of study* reflect that most technical studies have notably different values compared to the rest of the studies. This seems to be coherent with the intuitive thinking learning approach of student who is involved in technical branch studies.

Pattern	Study (I)	Study (J)	Mean Difference (I-J)	Pattern	Study (I)	Study (J)	Mean Difference (I-J)
Technical	MBA	Law	2,746(*)	Technical	PPR	IEMc	-9,257(*)
		IEMc	-7,312(*)			TET	-4,892(*)
		TEIS	-3,422(*)			TEIS	-5,367(*)
		TTSE	4,320(*)			IEE	-7,092(*)
		TTIE	3,050(*)				
		IEE	-5,147(*)		Ec	IEMc	-6,846(*)
	Law	Ar	-5,085(*)		HA	IEMc	-10,432(*)
		IEMc	-10,057(*)			IEE	-8,267(*)
		TET	-5,692(*)		Tr	IEMc	-9,882(*)
		TEIM	-5,159(*)			TEIS	-5,992(*)
		TEIS	-6,167(*)			IEE	-7,717(*)
		IEE	-7,892(*)				
					IEMc	BS	7,422(*)
						TTSE	11,632(*)
	Ar	Psy	3,632(*)			TTPhE	6,793(*)
		PPR	4,284(*)			TTIE	10,361(*)
		Tr	4,909(*)			TTPE	8,762(*)
		IEMc	-4,972(*)			LR	7,832(*)
		TTSE	6,659(*)			IEICh	6,478(*)
		TTIE	5,389(*)		TET	TTSE	7,267(*)
	Md	IEMc	-6,498(*)			TTIE	5,996(*)
		TTSE	5,133(*)		BS	IEE	-5,257(*)
		TTIE	3,863(*)		TEIM	TTSE	6,733(*)
	Psy	IEMc	-8,605(*)			TTIE	5,463(*)
		TEIS	-4,715(*)		TEIS	TTSE	7,742(*)
		IEE	-6,440(*)			TTIE	6,472(*)
						TTPE	4,872(*)
	Ch	IEMc	-6,053(*)		TTSE	TTPhE	-4,839(*)
		TTSE	5,579(*)			IEE	-9,467(*)
	H	IEMc	-8,532(*)				
		IEE	-6,367(*)		TTIE	IEE	-8,196(*)
	Peda	IEMc	-7,770(*)				
		TEIS	-3,881(*)		TTPE	IEE	-6,597(*)
		IEE	-5,606(*)		LR	IEE	-5,667(*)
	CS	IEMc	-8,060(*)				
	HS	IEMc	-12,632(*)				
		TEIS	-8,742(*)				
		IEE	-10,467(*)				

** Significant at the0 .05 level.*

Table 31: Significant differences between studies compared to the Technical pattern

Question 1.3: Results of specific LCI profiles: *strong-willed* and *bridge*.

In order to go to greater depth into the exploration of the students, it is interesting to search the place where the specific profile persons (defined as “strong-willed” and “bridge”) are located in the sample.

The first step consists of identifying the number of “strong-willed” and “bridge” persons in the sample. As can be seen in table 32, “strong willed” amount to 10.6 % of the students in the sample and “bridge” account for 6.3 % of students in the sample.

Nevertheless, knowing these figures does not allow us to identify the specific characteristics of the students. With regard to the *Strong-willed* profile, to say that a certain person has a *Strong-willed* profile does not give much information. It is necessary to know the tendency of the dominant character. The *Strong-willed* profiles were disaggregated depending on the pattern that showed the lowest value.
The *Bridge* and *Strong-willed* profiles are the most widespread in the sample. It is interesting to observe the studies that contain more individuals with these profiles.

profiles	*n*	*%*
bridge	44	6,3
strong-willed_avoid sequential	6	0,9
strong-willed_avoid precise	5	0,7
strong-willed_avoid technical	19	2,7
strong-willed_avoid confluent	44	6,3
others	581	83,0
total	*699*	*99,9*

Table 32: Amount of special profiles students

Table 32 shows that *Strong-willed* profiles who avoid confluent are predominant (together with those who avoid technical); the other two strong-willed profiles account for less than 2% of the sample. These results add support to the idea that in the educational setting it is more frequent to be dominant by avoiding patterns characterized

by creativity or improvisation than by avoiding patterns that promote organization or the amount of information.

With regard to the *Strong-willed_avoid confluent* pattern, the distribution (table 31) shows that TEIS (13.6 %) Medicine (13.6%) and Architecture (13.6 %) contain the majority of these persons in comparison with the percentages in the sample.

On the other hand, the *Bridge* profile reaches 6.3 % in the sample. The results (table 33) show that BMA (25%), TTPhE (11.4%) and Architecture (9.1%) contain the majority of bridge individuals compared to the sample percentage. In other words these studies have the majority of persons who are characterized by facilitating interpersonal relationships, resolution of conflicts and working group tasks.

profiles	*study*	*n*	*%*	*% in sample*
bridge	BAM	11	25,0	14,3
	Ar	4	9,1	6,3
	Med	1	2,3	4,3
	Psy	1	2,3	5,3
	Ch	1	2,3	2,7
	His	1	2,3	1,4
	CS	1	2,3	1
	PPR	1	2,3	5,7
	Ec	2	4,5	2
	BS	4	9,1	6,2
	TET	2	4,5	2,1
	TTPhE	5	11,4	4,4
	TTIE	3	6,8	5,3
	TTPE	2	4,5	3,3
	LR	2	4,5	2,1
	IEE	1	2,3	2,1
	IEIE	1	2,3	1,1
	IEICh	1	2,3	1,9
	Total	*44*	*100,0*	
strong-willed_avoid confluent	BAM	4	9,1	14,3
	Law	2	4,5	6,7
	Ar	6	13,6	6,3
	Med	6	13,6	4,3
	Ch	2	4,5	2,7
	Ped	1	2,3	5,2
	PPR	1	2,3	5,7
	Ec	1	2,3	2
	IEM	2	4,5	2,7
	BS	4	9,1	6,2
	TEIM	2	4,5	2,1
	TEIS	6	13,6	4,4
	TTPhE	2	4,5	4,4
	IEE	2	4,5	2,1
	IEIE	3	6,8	1,1
	Total	*44*	*100,0*	

Table 33: Special profiles (bridge and strong-willed_avoid confluent) in studies

Q.2 Academic performance in the sample

QUESTION 2

How is the Academic Performance (AQ and 1stQ) described in the sample?

This general question can be concreted in specific goals such as:

- To describe AQ and 1stQ by gender, type of study and domain (a, b, c, d, e)
- To know if there are differences between AQ and 1stQ by gender, domain and type of study (f)

Before starting the analysis it is necessary to expose several considerations:

- The *numerus clausus* in the URV affects the different analysis of the AQ variable.

- Both AQ and 1stQ values show a normal distribution. This condition has been verified by means of the *Kolmogorov-Smirnov test*.

- The 1stQ can present biases related to the possible different levels of difficulty between subjects in the studies. The process developed in order to minimize this possible bias is the following:
  Step 1: each mark is transformed into typified values
  Step 2: the mean of the typified values is calculated for each student in order to get the relative position of each student with regard to the mean of each study.
  Step 3: the mean and the standard deviation of the variable "mean grade" of the 1st course in the study is calculated.
  Step 4: as the interesting thing is to compare the means in absolute values of the students who are examined in all subjects in the 1st course, the typified values of these students are transformed into absolute values. This transformation is carried out by using the mean and the standard deviation of the mean grade.

Following, this process the new values are compared with the original values. This comparison reveals that there are no significant differences between these two types of values. Therefore, both values can be used indistinctly in the subsequent analysis.

After these preliminary considerations the following statistical approaches are used in order to respond to the main question: *Comparison of two means from independent samples, 1 Factor ANOVA* and comparison of the *Quartile 3rd* in the sample.

Results

The reference data is: N=2,104; 1,296 female (61.6%) , 808 male (38.4%)

a) Description of AQ and 1stQ by *gender*

The difference of means in AQ and 1stQ by gender can be seen in figure 30.

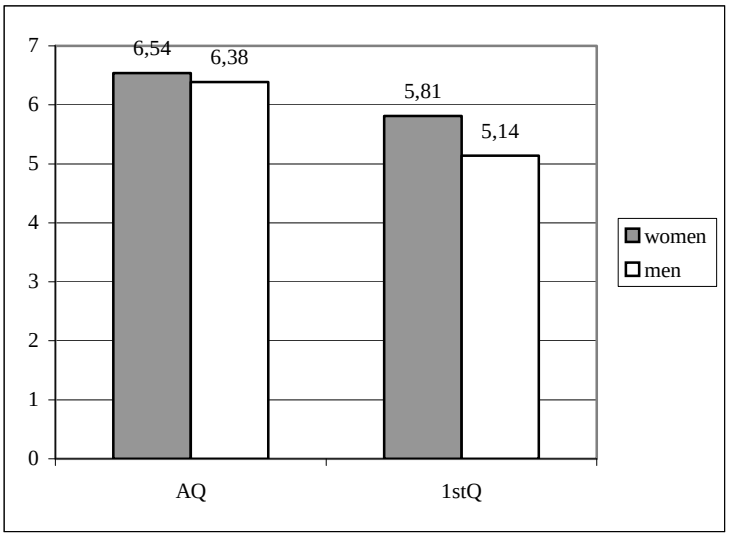

Figure 30: AQ and 1stQ by gender

A *Comparison of two means from independent samples* is applied in order to verify whether a significant difference between men and woman exists with regard to *AQ* and *1st Q* (separately).

The case of non-equal variances (by *Levene test*) is taken and both variables AQ and 1stQ show significant differences (0.002<0.05) between gender in the sample.

The data shows that women have significantly better *access qualification* (*AQ*) than men (Mean Difference = 0.15672) and women have a significantly better *1st semester qualification (1stQ)* than men (Mean Difference = 0.67097). However, observing the effect size and change percentage (see table 34), only 1st Qualification present medium values calculating the magnitude of the difference between women and men. That is to say, women get more clearly higher qualification than men in the case of 1st Qualification.

							STANDARDISED EFFECT SIZE						
AP (AQ_1stQ)	WOMEN			MEN			Effect Size	Bias corrected (Hedges)	Standard Error of E.S. estimate	Confidence Interval for Effect Size		Effect Size based on control gp SD	Percent change
	mean	n	SD	mean	n	SD				lower	upper		
Acces Qualification (AQ)	6,541	1296	1,174	6,384	808	1,073	0,14	**0,14**	0,04	0,05	0,23	0,15	-2
1st Qualification (1stQ)	5,809	1296	1,587	5,138	808	1,756	0,41	**0,41**	0,05	0,32	0,49	0,38	-12

P= 0,05

Table 34: Effect sizes of Academic Performance means comparison regarding gender

b) Description of AQ by *type of study*

Considering that the *numerus clausus* grade is different for each type of study, only 5-marked studies are compared (see table 35). These studies belong to the following domains[20]: Business, Humanities, Law and Technical.

[20] The studies *Publicity and Public Relations* and *Architecture* are excluded from analysis because their *numerus clausus* are very different to 5)

The reference data in this specific case is N=1,131; women=549 (48.5%) men=582 (51.5%).

The mean data for AQ is described in the figure 31.

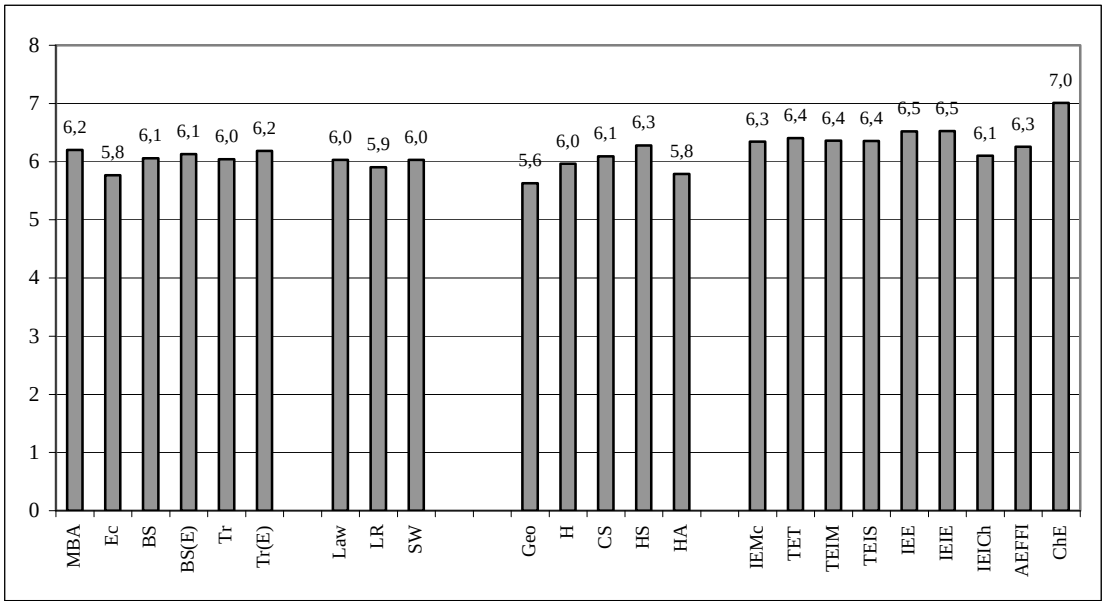

Figure 31: AQ mean grades by type of study

1 Factor ANOVA analysis is applied and the results are interpreted by *post-hoc Tukey* analysis because the *Levene* test shows the same variances in the sample.

(I) Study	(J) Study	Mean Difference (I-J)
ChE	BMA	,81079(*)
	Law	,98107(*)
	G	2,11138(*)
	H	1,04771(*)
	Ec	1,24525(*)
	HA	1,22138(*)
	To	,97229(*)
	Bu	,95461(*)
	LR	1,10715(*)
	ST	,98057(*)

** Significant at the 0.05 level.*

Table 35: Significant Statisticaly differences between studies

Table 36 shows a significant positive difference between *Chemical Engineering* and several studies. This difference is higher with regard to *Humanity* studies than with *Law* and *Business* studies.

To provide information on all the studies in *AQ*, the *3rd Quartile* statistic is shown, in order to know the range of marks for the top 25 % of students in each study.

Domain	Study	Acron	Quartil 3rd(AQ)	Numerus clausus
Business	Business Administration and Management	BAM	6,68	5,00
	Economy	Ec	6,54	5,00
	Business Sciences	BS	6,67	5,00
	Business Sciences (E)	BS(E)	6,80	5,00
	Tourism	Tr	6,42	5,02
	Tourism (E)	Tr(E)	6,69	5,00
Law	Law	Law	6,66	5,00
	Labour Relations	LR	6,45	5,00
	Social Work	SW	6,93	5,17
Health	Medicine	Md	8,07	7,83
	Human Nutrition and Dietetics	HND	6,47	5,49
	Nursing	N	7,53	6,08
	Nursing (E)	N(E)	7,14	5,78
Experimental	Chemistry	Ch	7,34	5,00
	Biotechnology	Btch	8,46	7,70
Humanities	History	H	6,64	5,00
	Geography	Geo	5,85	5,00
	Catalan studies	CS	6,18	5,00
	Hispanic studies	HS	7,22	5,00
	Publicity and Public Relations	PPR	7,32	6,36
	History of Art	HA	6,57	5,00
Technical	Architecture	Ar	7,48	6,92
	Industrial Engineering: Mechanics	IEMc	7,11	5,22
	Telecommunications Engineering: Telematics	TET	7,06	5,00
	Technical Engineering: Information Management	TEIM	6,70	5,00
	Technical Engineering: Information Systems	TEIS	6,59	5,00
	Industrial Engineering: Electricity	IEE	7,05	5,30
	Industrial Engineering: Industrial Electronics	IEIE	7,11	5,00
	Industrial Engineering: Industrial Chemistry	IEICh	6,46	5,00
	Agricultural Engineering: Farming and Food Industries	AEFFI	6,98	5,00
	Chemical Engineering	ChE	7,95	5,00
Education	Psychology	Psy	6,74	5,83
	Pedagogy	Ped	6,00	5,53

	Teacher Training: Special Education	TTSE	7,86	6,12
	Teacher Training: Physical Education	TTPhE	7,59	6,24
	Teacher Training: Infant Education	TTIE	8,28	6,74
	Teacher Training: Primary Education	TTPE	7,84	6,29
	Teacher Training: Musical Education	TTME	7,24	5,94
	Teacher Training: Foreign Language	TTFL	7,48	6,22
	Social Education	SE	8,07	5,88

Table 36: 3rd Quartile statistics (AQ) regarding "numerus clausus" marks

As can be seen in table 36, the studies with 25% of students with the highest values are *Medicine, Biotechnology, Teacher Training: Infant Education, Social Education and Chemical Engineering.* The first three studies are clearly associated with *numerus clausus* but not so the last two studies, especially *Chemical Engineering*, whose 75th percentile of AQ is 7.95, almost 3 points more than the access requirement mark. Another study in which this gap is big is *Chemistry* (2.3 points).

In general terms it can be observed that the students who belong to the Technical domain present high grades in AQ in both cases (AQ mark and 3rd Quartile mark).

c) Description of 1stQ by *type of study*

1 Factor ANOVA analysis is applied and the results are interpreted by *post-hoc Games-Howell* analysis because the *Levene* test shows different variances in the sample.

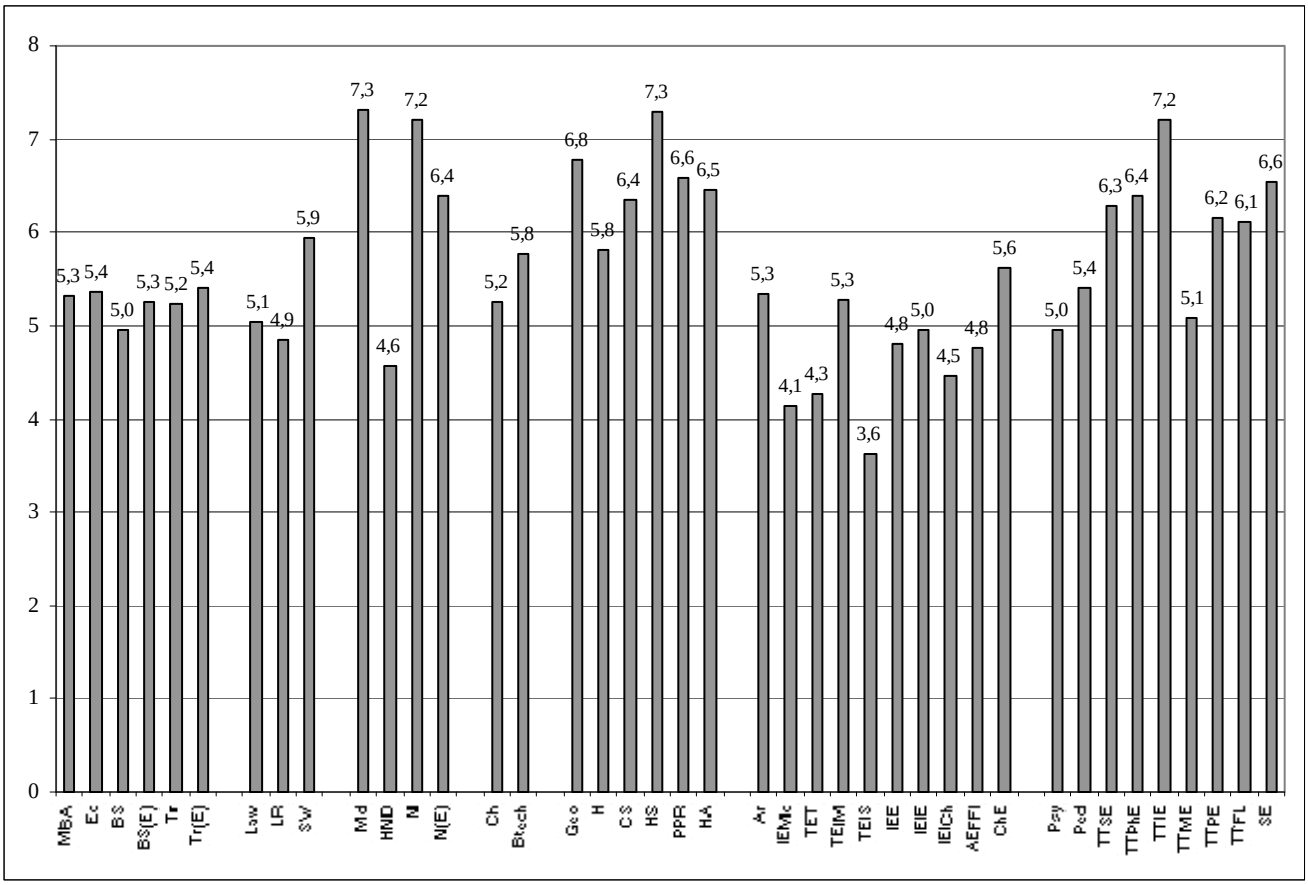

Figure 32: 1st Q mean grades in each study

When the 1st Q data is analyzed by the type of study, many significant differences can be observed. In order to simplify the information, the results are analyzed by grouping studies by domains and drawing attention to the most noteworthy data.

The *Business* domain studies show values standing in the interval between 5.0 and 5.5.

The *Law* domain studies show scores of less than 5.0, except *Social Work* (5.9).

The *Health* domain shows a high level of 1stQ, *Medicine* and *Nursing* show values greater than 7.2. However, the *Human Nutrition and Dietetics* show a very low score, descending to 4.6.

Chemistry and *Biotechnology* (*Experimental* domain) show scores within the interval 5.0-6.0.

Studies from the *Humanities* domain show high scores, with all of them clearly above 6.0, except *History* which scores 5.8.

The *Technical* domain studies show the lowest scores in the 1stQ. The only study above 5.5 is *Chemical Engineering* (5.6). On the other hand, 6 out of 10 studies in this domain present values of less than 5.0, with some even less than 4.0 (*Technical Engineering Information Systems= 3.6*).

With regard to *Educational* domain studies, all Teacher Training studies present values above 6.00, except *Teacher Training: Musical Education,* which presents a lower value (=5.1); this value is similar to that of the other long cycle study in this domain (*Psychology*=5.0 and *Pedagogy*=5.4)

In general terms, the studies above 7.0 are *Medicine* (7.3), *Hispanic Studies*[21] (7.3) *Nursing* (7.2) and *Teacher Training: Infant Education* (7.2). On the other hand, the studies that present scores of less than 5.0 are *Labour Relations* (4.9), *Agricultural Engineering: Farming and Food industries* (4.8), *Industrial Engineering: Electricity* (4.8), *Human Nutrition and Dietetics* (4.6), *Industrial Engineering: Industrial Chemistry* (4.5), *Telecommunications Engineering: Telematics* (4.3), *Industrial Engineering: Mechanics* (4.1), and *Technical Engineering: Information Systems* (3.6)

To provide information on all the studies in the *1stQ*, the 3rd *Quartile* statistic is given in order to know the range of marks of the top 25 % of students in each study.

As can be seen in the table 37, some studies that belong to Health and Humanities score very high levels in the 3rd Quartile. The high grades in Health studies (especially Medicine) could be related to the high *numerus clausus* requirement; in other words these students are also objectively good students in compulsory education. On the other hand, the high scores of Humanities studies can be related to the low number of

[21] It should be noted that *Hispanic Studies* has an n=7

students. This low ratio can facilitate the development of an educational process which improves the students' academic performance.

Domain	Study	Acron	Quartile 3rd(1stQ)	Numerus clausus
Business	Business Administration and Management	BAM	6,60	5
	Economy	Ec	6,22	5
	Business Sciences	BS	5,88	5
	Business Sciences (E)	BS(E)	5,92	5
	Tourism	Tr	6,44	5,02
	Tourism (E)	Tr(E)	6,84	5
Law	Law	Law	5,94	5
	Labour Relations	LR	6,15	5
	Social Work	SW	6,76	5,17
Health	Medicine	Md	8,07	7,83
	Human Nutrition and Dietetics	HND	5,40	5,49
	Nursing	N	7,73	6,08
	Nursing (E)	N(E)	6,88	5,78
Experimental	Chemistry	Ch	6,31	5
	Biotechnology	Btch	6,91	7,70
Humanities	History	H	6,50	5
	Geography	Geo	7,75	5
	Catalan studied	CS	7,75	5
	Hispanic studies	HS	9,00	5
	Publicity and Public Relations	PPR	7,00	6,36
	History of Art	HA	6,91	5
Technical	Architecture	Ar	6,09	6,92
	Industrial Engineering: Mechanics	IEMc	5,48	5,22
	Telecommunications Engineering: Telematics	TET	5,64	5
	Technical Engineering: Information Management	TEIM	6,80	5
	Technical Engineering: Information Systems	TEIS	4,15	5
	Industrial Engineering: Electricity	IEE	5,88	5,30
	Industrial Engineering: Industrial Electronics	IEIE	6,18	5
	Industrial Engineering: Industrial Chemistry	IEICh	5,70	5
	Agricultural Engineering: Farming and Food industries	AEFFI	5,56	5
	Chemical Engineering	ChE	6,74	5
Education	Psychology	Psy	6,50	5,83
	Pedagogy	Ped	6,57	5,53
	Teacher Training: Special Education	TTSE	6,95	6,12
	Teacher Training: Physical Education	TTPhE	7,27	6,24
	Teacher Training: Infant Education	TTIE	7,69	6,74
	Teacher Training: Primary Education	TTPE	6,70	6,29
	Teacher Training: Musical Education	TTME	6,10	5,94
	Teacher Training: Foreign Language	TTFL	6,73	6,22
	Social Education	SE	7,17	5,88

Table 37: 3rd Quartile statistics (1stQ) regarding "numerus clausus" marks

In contrast, the lowest grades are shown by the students from the Technical domain, especially Technical Engineering: Information Systems, whose 3rd Quartile grade (4.15) contrasts with the other information systems study (Technical Engineering: Information Management), where students score the highest 3rd Quartile grade (6.80) in the Technical domain.

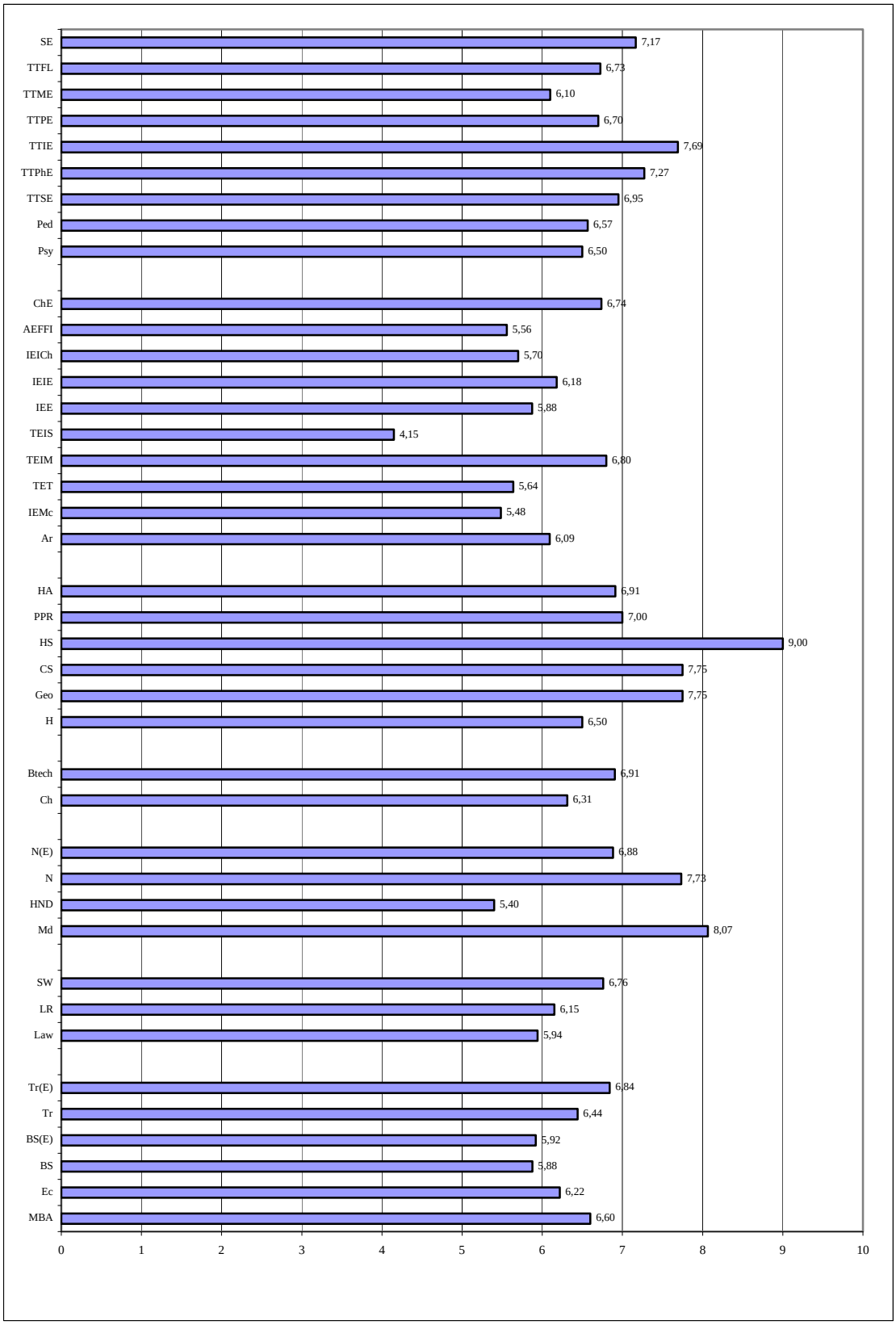

Figure 33: 3rd quartile in 1stQ by type of study

d) Description of AQ by *domain*

In the same line of AQ analysis, the domains containing 5-marked (*numerus clausus* grades) studies are considered. *One factor Anova* analysis of these studies is applied to test their internal homogeneity. This is verified if the studies that integrate each domain do not show significant differences. Taking this into account, the *Business, Law, Humanities* and *Technical* domains[22] are found to be homogeneous domains, and can therefore be compared.

After verification *One factor Anova* is applied to the four domains cited above. The results are interpreted by *post-hoc Tukey* analysis because the *Levene* test shows the same variances as in the sample.

(I) Domain	(J) Domain	Mean Difference (I-J)
Technical	Business	,33789(*)
	Humanities	,52358(*)
	Law	,43692(*)

** Significant at the0 .05 level.*

Table 38: Significant statistically differences for AQ among domains

As can be seen in the graph, the *Technical* domain presents significant and positive differences with regard to *Business, Humanities* and *Law.*

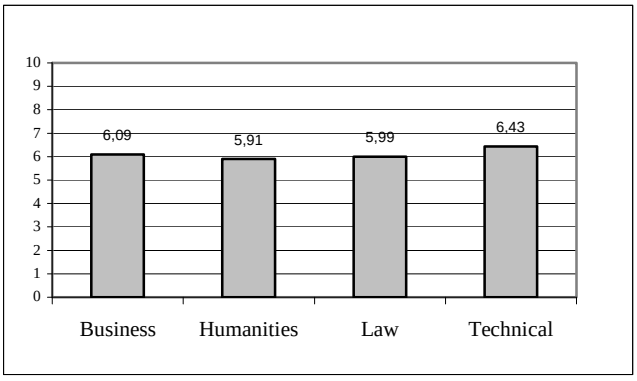

Figure 34: Mean values for AQ by domains

[22] The *Publicity and Public Relation and Architecture* studies are excluded from the analysis.

e) Description of 1stQ by *domain*

One factor Anova analysis of 1stQ was carried out on all the studies to test their internal homogeneity. The studies that integrate each domain are checked for significant differences and the *Business, Experimental* and *Humanities* domains are found to be homogeneous domains.

Following this verification *One factor Anova* is applied to the four domains cited above. The results are interpreted by *post-hoc Games-Howell* analysis because the *Levene* test shows the same variances as in the sample.

(I) Domain	(J) Domain	Mean Difference (I-J)
Business	Humanities	-1,24259(*)
Experimental	Humanities	-,94967(*)

Table 39: Significant Statistically differences for 1stQ among domains

As can be seen in the graph, the *Humanities* domain shows significant and positive differences with regard to the *Experimental* and *Business* domains.

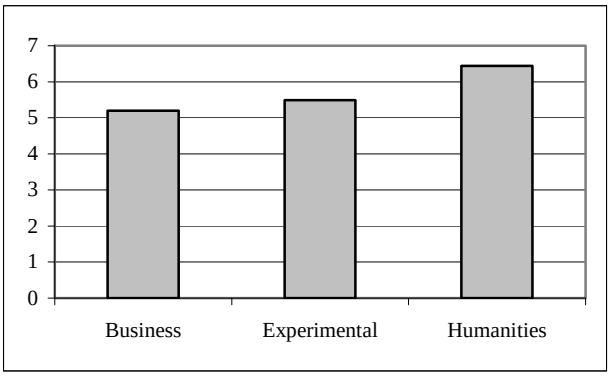

Figure 35: Mean values for 1stQ by domains

f) Comparison between AQ and 1stQ with regard to gender, type of study and domain

It has to be taken into account that the variable *AQ* has a range of 5-10 and *1stQ* has a range of 0-10. This consideration implies that it is not possible to compare both variables. *AQ* has higher values because the mean is calculated without values of less than 5.

However, the extent of the difference across gender, domain and type of study can be compared. Hence a *comparison of two means for paired samples* is applied in order to obtain only the difference of means. Following that there is a descriptive analysis of these differences across gender, domain and study.

By gender

A *comparison of two means for paired samples* is applied in order to verify whether there are significant differences between *AQ* and *1stQ* with regard to *gender*.

Both men and women have lower grades when they go from High School to HE, nevertheless men's grades suffer a bigger decrease than women's. That is, men's academic performance worsen more than women's when they go from High School to university.

	dif_means
gender	*AQ*1stQ*
woman	0,732
man	1,246

Table 40: Significant differences between *AQ* and *1stQ* with regard to *gender*

By study

Taking the mean differences between AQ and 1stQ by *type of study,* the following can be observed:

study	*dif_means AQ*1stQ*
Biotechnology	2,50
Enginyeria Tècnica Industrial especialitat en Elec	2,04
Telecommunications Engineering: Telematics	1,89
Architecture	1,86
Chemical Engineering	1,75
Industrial Engineering: Mechanics	1,73
Agricultural Engineering: Farming and Food Industries	1,68
Human Nutrition and Dietetics	1,57
Psychology	1,49
Teacher Training: Musical Education	1,48
Industrial Engineering: Electricity	1,43
Industrial Engineering: Industrial Chemistry	1,42
Chemistry	1,30
Business Sciences	1,19
Labour Relations	1,09
Teacher Training: Foreign Language	1,05
Law	1,04
Teacher Training: Primary Education	0,98
Business Administration and Management	0,97
Business Sciences (Ebre land)	0,95
Tourism	0,71
Teacher Training: Special Education	0,64
Technical Engineering: Information Management	0,60
Publicity and Public Relations	0,51
Teacher Training: Physical Education	0,49
Economy	0,45
Pedagogy	0,40
Technical Engineering: Information Systems	0,37
Medicine	0,36
Teacher Training: Infant Education	0,34
Tourism (Ebre land)	0,26
History	0,20
Social Work	0,13
Social Education	0,12
Nursing (Ebre land)	-0,11
Catalan studies	-0,26
Nursing	-0,35
History of Art	-0,67
Hispanic studies	-1,01
Geography	-1,58

Table 41 : Mean differences between AQ and 1stQ by *type of study*

Domain	Study	Acronym	3rd Quartile (AQ)	3rd Quartile (1stQ)	Differences
Business	Business Administration and Management	MBA	6,68	6,6	-0,08
	Economy	Ec	6,54	6,22	-0,32
	Business Sciences	BS	6,67	5,88	-0,79
	Business Sciences (E)	BS(E)	6,8	5,92	-0,88
	Tourism	Tr	6,42	6,44	0,03
	Tourism (E)	Tr(E)	6,69	6,84	0,15
Law	Law	Law	6,66	5,94	-0,72
	Labour Relations	LR	6,45	6,15	-0,3
	Social Work	SW	6,93	6,76	-0,17
Health	Medicine	Md	8,07	8,07	0
	Human Nutrition and Dietetics	HND	6,47	5,4	-1,07
	Nursing	N	7,53	7,73	0,21
	Nursing (E)	N(E)	7,14	6,88	-0,26
Experimental	Chemistry	Ch	7,34	6,31	-1,03
	Biotechnology	Btch	8,46	6,91	-1,55
Humanities	History	H	6,64	6,5	-0,14
	Geography	Geo	5,85	7,75	1,91
	Catalan studies	CS	6,18	7,75	1,58
	Hispanic studies	HS	7,22	9	1,78
	Publicity and Public Relations	PPR	7,32	7	-0,32
	History of Art	HA	6,57	6,91	0,34
Technical	Architecture	Ar	7,48	6,09	-1,39
	Industrial Engineering: Mechanics	IEMc	7,11	5,48	-1,63
	Telecommunications Engineering: Telematics	TET	7,06	5,64	-1,42
	Technical Engineering: Information Management	TEIM	6,7	6,8	0,1
	Technical Engineering: Information Systems	TEIS	6,59	4,15	-2,44
	Industrial Engineering: Electricity	IEE	7,05	5,88	-1,17
	Industrial Engineering: Industrial Electronics	IEIE	7,11	6,18	-0,93
	Industrial Engineering: Industrial Chemistry	IEICh	6,46	5,7	-0,76
	Agricultural Engineering: Farming and Food	AEFFI	6,98	5,56	-1,42
	Chemical Engineering	ChE	7,95	6,74	-1,21
Education	Psychology	Psy	6,74	6,5	-0,24
	Pedagogy	Ped	6	6,57	0,57
	Teacher Training: Special Education	TTSE	7,86	6,95	-0,91
	Teacher Training: Physical Education	TTPhE	7,59	7,27	-0,32
	Teacher Training: Infant Education	TTIE	8,28	7,69	-0,59
	Teacher Training: Primary Education	TTPE	7,84	6,7	-1,14
	Teacher Training: Musical Education	TTME	7,24	6,1	-1,14
	Teacher Training: Foreign Language	TTFL	7,48	6,73	-0,75
	Social Education	SE	8,07	7,17	-0,9

Table 42: Differences between the AQ and the 1stQ in terms of 3rd Quartile grades

In general terms, the Technical and Experimental studies lie at the top of the ranking. In the first twelve studies in the table 41 there are 7 technical studies and 3 experimental studies.

The last five studies in the table 41 present a positive difference in *1stQ* with regard to *AQ*. These six studies belong to the *Humanities (3)* domain and the *Health* domain (*Nursing*).

Analyzing the differences between the AQ and the 1stQ in terms of 3rd Quartil grades, the tendency to decrease from AQ to 1stQ grades can be observed.

This analysis reflects (see table 42) the same tendency observed in previous analysis. The Technical and Experimental studies obtain performances which are clearly worse in 1stQ than AQ. The Educational studies show worse scores in 1stQ, but to a slight degree. On the other hand, the Humanities studies show clearly better scores in 1stQ than in AQ, except in History and Publicity and Public Relations.

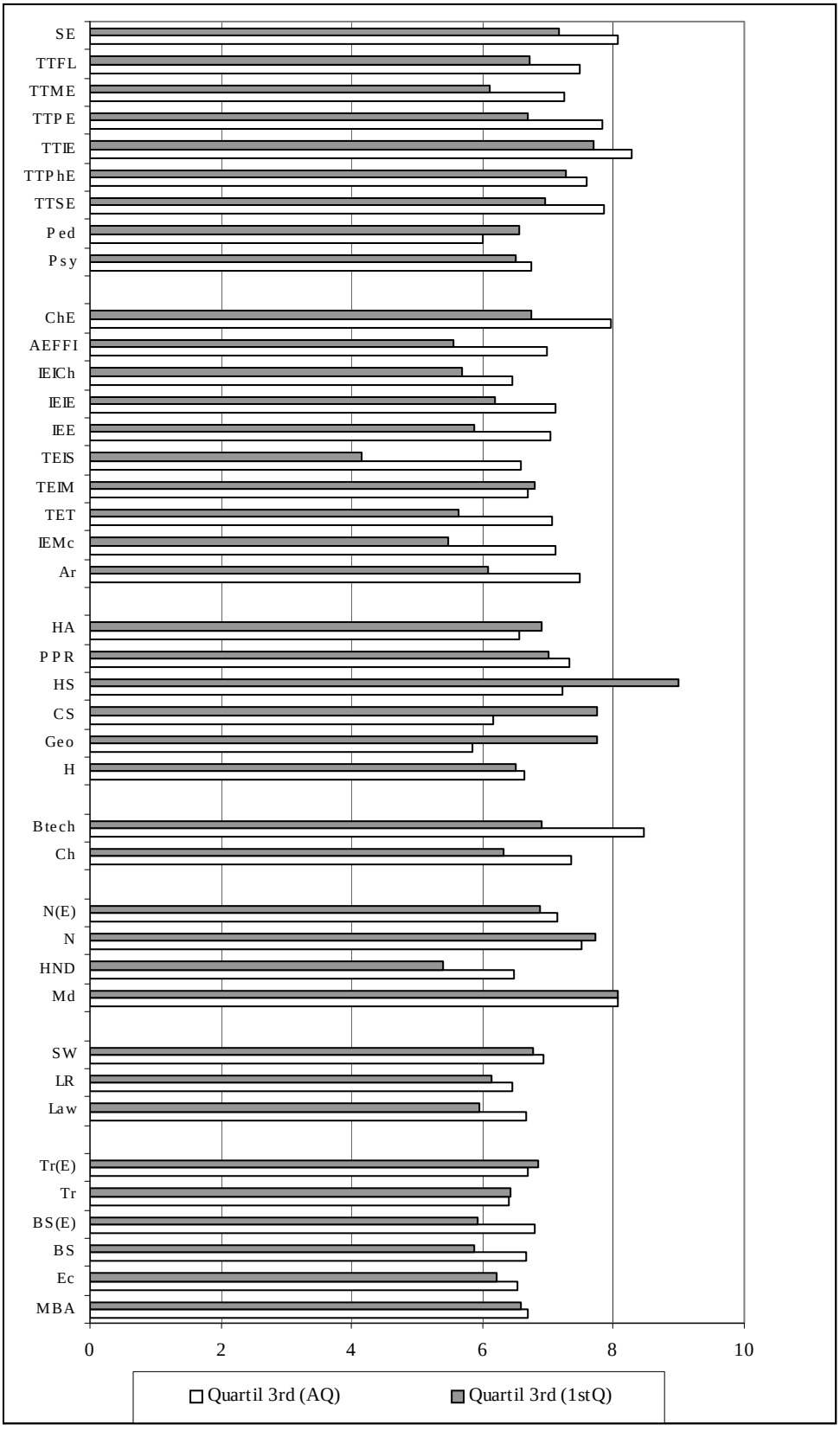

Figure 36: Mean values for AQ and the 1stQ in terms of 3rd Quartil grades

By domain

Taking the mean differences between AQ and 1stQ by *domain,* the following data is obtained:

domain	*dif_means AQ*1stQ*
Experimental	1,93
Technical	1,14
Law	0,78
Business	0,74
Education	0,67
Healthy	0,48
Humanities	0,13

Table 43: Mean differences between AQ and 1stQ by *domain*

The results show that *Experimental* is the domain with the greatest difference in contrast with *Humanities* with the lowest.

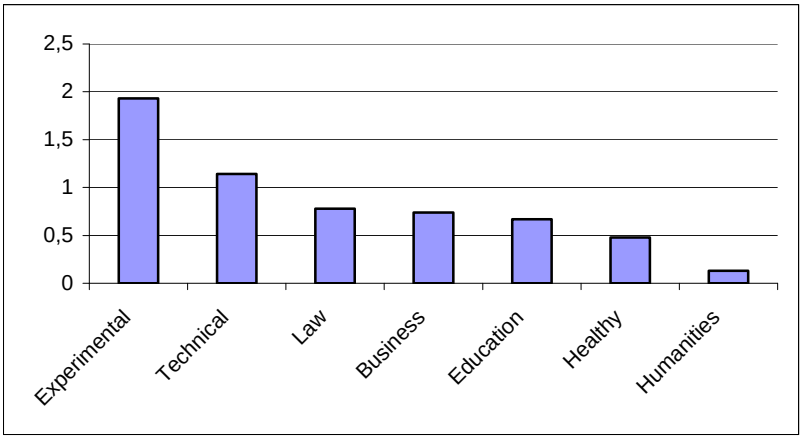

Figure 37: Differences between AQ and 1stQ in domains

Q.3 Differences between best and worst students with regard to PT and LP

QUESTION 3
Are there differences between the best and worst 1stQ students (10%) with regard to personality traits (PT) and learning patterns (LP) in the sample?

The objective of this question is to analyze the possible differences between the 10% best-scoring 1stQ students and the 10% worst-scoring 1stQ students with regard to their personality traits (a) and learning patterns (b). The method of analysis used is the *comparison of two means for independent samples*.

In order to complete the description of AP related to PT and LP, an additional analysis is carried out by observing the AP of individuals who present the special LP profiles.

a) Personality traits of 10% best and 10% worst students

The sample reference data is: n=106 and the distribution according to gender is described in table 44.

PT	% best (n=53)	% worst (n=53)
women	75,5	54,7
men	24,5	45,3

Table 44: Description on sample (PT-best and worst students) by gender

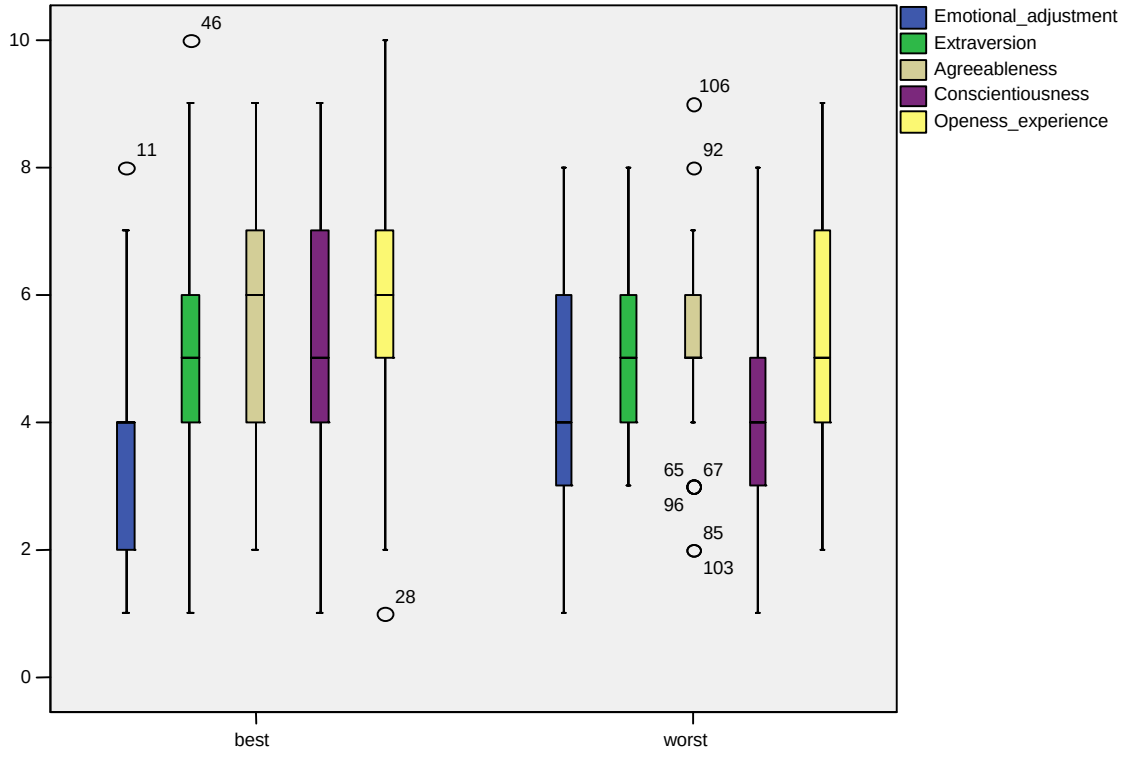

Figure 38: Distribution of PT-best and worst students by gender

A *comparison of two means for independent samples* is applied and the results show significant differences between samples in C*onscientiousness* and *Agreeableness.*

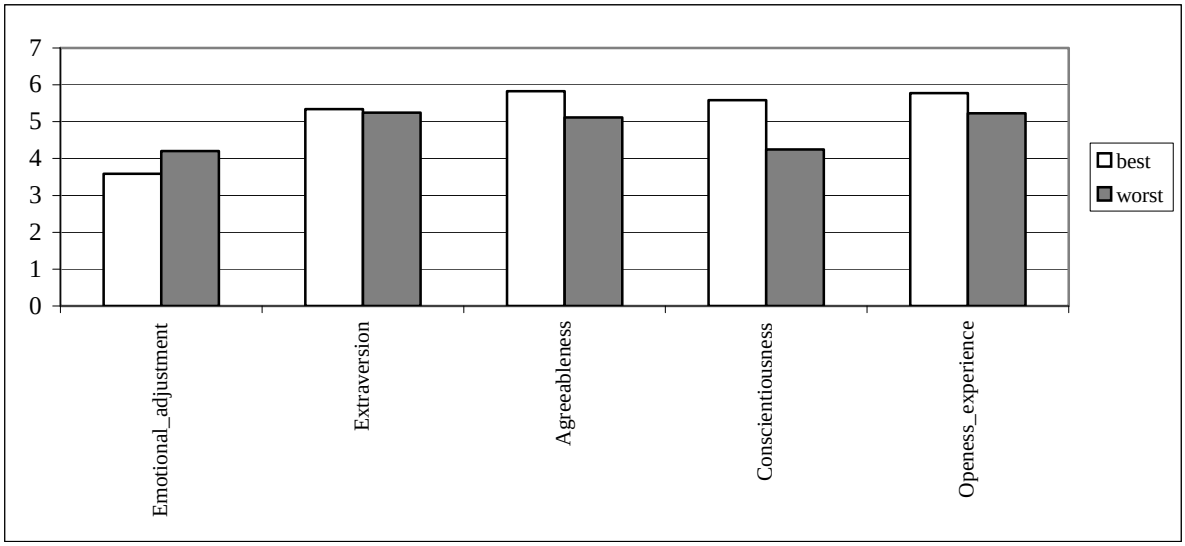

Figure 39: Differences for PT between best and worst students

							STANDARDISED EFFECT SIZE						
PERSONALITY TRAITS	**BEST STUDENTS**			**WORST STUDENTS**			Effect Size	Bias corrected (Hedges)	Standard Error of E.S. estimate	Confidence Interval for Effect Size		Effect Size based on control gp SD	Percent change
	mean	n	SD	mean	n	SD				lower	upper		
Emotional adjustment	3,58	53	1,73	4,21	53	2,04	-0,33	**-0,33**	0,20	-0,71	0,06	-0,30	17
Extraversion	5,34	53	1,72	5,25	53	1,31	0,06	**0,06**	0,19	-0,32	0,44	0,07	-2
Agreeableness	5,83	53	1,84	5,11	53	1,35	0,44	**0,44**	0,20	0,06	0,83	0,53	-12
Conscientiousness	5,58	53	2,04	4,25	53	1,82	0,69	**0,69**	0,20	0,30	1,08	0,74	-24
Openess_experience	5,77	53	1,93	5,23	53	2,00	0,28	**0,28**	0,20	-0,11	0,66	0,27	-9

p= 0,05

Table 45: Effect sizes comparing best/worst students regarding their PT

The best students show greater values in *Agreeableness*, *Openness to Experience* and specially in *Conscientiousness;* these best students presents lower values than the worst students in *Emotional Adjustment.*.

Observing the table 45, we can see that the effect values presented by *Conscientiousness* present medium values in the magnitude of the difference between the worst and the best students.

The fact that the best students score low in *Emotional adjustment* can be caused by specific aspects of the T/L process related to methodology or assessment methods; this fact could also be a consequence of the large number of women in the best students sample (over 75%).

b) Learning Patterns of 10% best and 10% worst students

The sample reference data is: n=139 and the distribution according to gender is described in table 46.

LP	% best (n=70)	% worst (n=69)
women	71,4	40,6
men	28,6	59,4

Table 46: Description on sample (LP-best and worst students) by gender

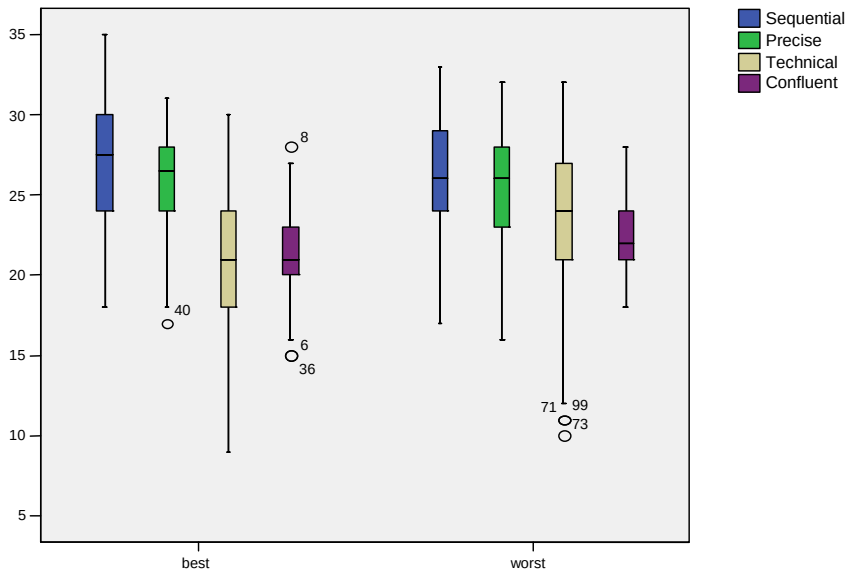

Figure 40: Distribution of LP-best and worst students by gender

A *comparison of two means for independent samples* is applied and the results show significant differences between samples in the *Technical* and *Confluent* patterns.

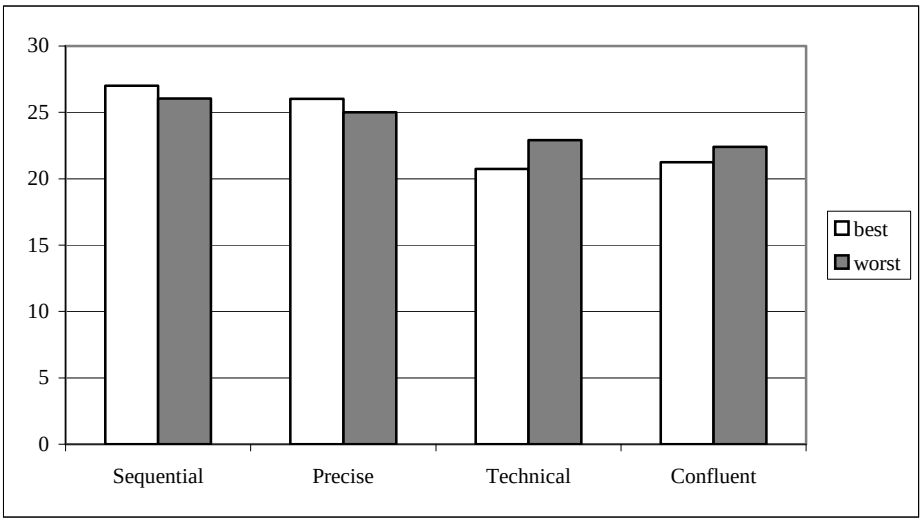

Figure 41: Differences for LP between best and worst students

Similarly to PT, effect sizes of the comparison between best/worst students regarding LP were calculated (see Table 47).

							STANDARDISED EFFECT SIZE						
LEARNING PATTERNS	**BEST STUDENTS**			**WORST STUDENTS**			Effect Size	Bias corrected (Hedges)	Standard Error of E.S. estimate	Confidence Interval for Effect Size		Effect Size based on control gp SD	Percent change
	mean	n	SD	mean	n	SD				lower	upper		
Sequential	27,00	70	4,00	26,04	69	3,74	0,25	**0,25**	0,17	-0,09	0,58	0,26	-4
Precise	26,01	70	3,07	25,01	69	3,80	0,29	**0,29**	0,17	-0,05	0,62	0,26	-4
Technical	20,73	70	5,02	22,90	69	5,17	-0,43	**-0,42**	0,17	-0,76	-0,09	-0,42	10
Confluent	21,24	70	2,92	22,41	69	2,63	-0,42	**-0,42**	0,17	-0,75	-0,08	-0,44	5

p= 0,05

Table 47: Effect sizes comparing best/worst students regarding their LP

The best students show slightly higher values in *Sequential* and *Precise,* but significantly lower values than the worst students in *Technical and Confluent.*

This fact supports the idea that the best students in the current educational model are those who tend to organize, accumulate information and reproduce it in certain assessment methods. It is a model that depends mainly on the teachers' instructions. This model seems to be less adequate for students who feel more comfortable using less autonomous learning and exploring new ideas by thinking or by acting.

c) AP in special Learning Patterns profiles

To describe the different AP presented by the special patterns profiles, the sample AQ and 1stQ data is shown in table 48.

Although the description is a superficial one, some observations can be made. Firstly, there are few individuals with the *Strong-willed_avoid precise* profile (n=5), and these present the lowest scores in both AQ and 1^{st}Q (note the high SD=2.004)

The individuals with the *Strong-willed_avoid sequential* profile are also few in number (n=6) but their 1^{st}Q scores are the highest in other special *Strong-willed* profiles. However, these individuals have low scores in AQ.

The individuals with the *Strong-willed_avoid confluent* profile are the most numerous (n=44) and their scores in AQ and 1^{st}Q show an opposite tendency in comparison to the *Strong-willed_avoid sequential* profile. Hence, these individuals are numerous and they get the highest scores in AQ but not in 1^{st}Q.

There are 19 individuals with a *Strong-willed_avoid technical* profileand their AP scores occupy the second place of the four special profiles defined.

Finally, the *Bridge* profile individuals show acceptable but unremarkable scores in comparison to the rest of the profiles.

profiles		*AQ*	*1stQ*
bridge	N	44	44
	Mean	6,52	5,66
	Median	6,31	5,85
	Mode	6,30	1,97
	Std. Deviation	0,97	1,48
strong-willed_avoid sequential	N	6	6
	Mean	6,37	5,80
	Median	6,57	5,77
	Mode	5,05	5,03
	Std. Deviation	0,72	0,54
strong-willed_avoid precise	N	5	5
	Mean	5,75	4,15
	Median	5,47	3,80
	Mode	5,37	1,50
	Std. Deviation	0,58	2,00
strong-willed_avoid technical	N	19	19
	Mean	6,54	5,64
	Median	6,63	6,25
	Mode	6,63	2,50
	Std. Deviation	0,95	1,64
strong-willed_avoid confluent	N	44	44
	Mean	6,80	5,31
	Median	6,73	5,20
	Mode	5,41	4,34
	Std. Deviation	0,99	1,92

Table 48: Different AP (AQ and 1stQ) presented by the special patterns profiles

The most striking results are the different positions of *Strong-willed_avoid sequential* and *Strong-willed_avoid confluent* depending on AQ or 1stQ. If AQ were to be defined as qualification in terms of compulsory education and 1stQ as qualification in HE, this result could be seen as small evidence for different expectations at university and pre-university level.

In any sense, university studies begin to demand tasks in which confluent characteristics have a more important weight. Despite its limitations this analysis can be useful for orientating more complex additional ones.

Q.4 Causal relationship between variables

QUESTION 4
What is the relationship between first year students' personality traits, learning patterns, prior academic performance and academic performance at the end of first semester in university?

The objectives of this question can be described as finding out the causal or dependent relationships between the variables defined and, furthermore, to analyze the nature of the *learning patterns* variable with regard to the *personality traits* variable in a theoretical continuum within the learning process.

Path analysis is used to respond to this question. *Path* is a method of multivariate data analysis which belongs to the family of Structural Equation Models (SEM), characterized by analyzing the causality relationships between latent variables (hidden / not observable) and observable variables.

Path analysis is a powerful method that allows us to analyze several dependency relationships between observable variables that are presented simultaneously. The latent variables analyzed in our work (PT and LP) have been considered as observable variables and we used the mean of their item values respectively.

This decision was taken after applying the validity and reliability test and /or contrasting the values with prior studies using this kind of scale (see section 3.2.1).

Results

The reference data is: N=510; 324 women (63.53%) , 186 men (36.47%)

Correlation matrix

First of all a correlation analysis was carried out. The correlation matrix (figure 42) is analyzed independently and provides support in order to approach relationships between the variable and to adjust the causal model in the path.

Correlation Matrix in the Path Model

	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender	1											
2. AQ_tip	-,112(*)	1										
3. 1stQ_tip	-0,024	,390(**)	1									
4. Sequential	-,282(**)	0,025	0,007	1								
5. Precise	0,01	0,073	0,085	,373(**)	1							
6. Technical	,334(**)	-,092(*)	0,001	0,046	,205(**)	1						
7. Confluent	,103(*)	-0,082	-,088(*)	0,012	,256(**)	,361(**)	1					
8. Emotional_adjustment	,175(**)	-,091(*)	-0,016	-,090(*)	0,072	,150(**)	,101(*)	1				
9. Extraversion	-,101(*)	-0,015	-0,074	,137(**)	,219(**)	-0,024	,266(**)	,114(**)	1			
10. Agreeableness	-,165(**)	,137(**)	0,005	,215(**)	,199(**)	-0,085	0,054	0,045	,421(**)	1		
11. Conscientiousness	-,178(**)	,160(**)	,138(**)	,656(**)	,387(**)	,108(*)	0,067	0,084	,155(**)	,332(**)	1	
12. Openness_experience	-,095(*)	0,08	0,006	,158(**)	,416(**)	,094(*)	,269(**)	0,038	,504(**)	,455(**)	,287(**)	1

** p < 0,05* *** p < 0,01*

Figure 42: Correlation matrix in the path model

The quantity of data means that many significant differences can be observed in the correlation matrix. By means of summary several comments can be made:

The highest correlation coefficient is shown by the combination of *conscientiousness* and *sequential*.

Another important correlation is between *Openness_experience – Extraversion – Agreeableness.* This correlation seems to indicate a natural cluster around a certain

similarity. This similar component could be observed in terms of intellectual openness and relational attitude.

The cluster contrasts with traditional thinking (Busato et al., 2000, p.1059) based on two blocks of traits: intellectual (*Conscientiousness*, *Openness to experience* and *Emotional adjustment*) and socialization (*Extraversion* and *Agreeableness*).

It is interesting to observe that all learning patterns are positively correlated. This can be interpreted in that none of the patterns defined are mutually exclusive. This data lends support to the idea that the learning pattern is the combination of all of them, without exclusions.

The definition of *Confluent* individuals as people who take risks and tend to relate to others can be supported by the correlation shown with the *Openness experience* and *Extraversion* traits.

Conscientiousness correlates positively with all patterns (especially *sequential)* except for the *confluent* pattern. This latter pattern could be related to AP. In fact, observing the AP data it can be seen that *confluent* is the only pattern that correlates negatively. In this sense, *precise* is the pattern that shows a higher level of positive correlation (although not significant so) between them.

Consistent with the literature (Furnham & Chamorro-Premuzic, 2004; Chamorro-Premuzic & Furnham, 2003; Chamorro-Premuzic, 2006; Busato et al. 2000; Bauer & Liang, 2003; Wagerman & Funder, 2007), the personality trait that shows a positive significant correlation with AP (AQ and 1stQ) is *Conscientiousness.* It is interesting to observe the negative correlation of AP with *Emotional_adjustment* in the same line as in previous research (Chamorro-Premuzic, 2006). According to the literature (Mackenzie, 2004; Bauer & Liang, 2003), *Extraversion* has a negative correlation with AP.

With regard to gender, women are negatively correlated with *Emotional adjustment* and positively with the other traits, especially *Conscientiousness* and *Agreeableness.* As for

patterns, women correlate positively with *Sequential* and negatively with the technical pattern. Finally, the *Technical* pattern usually shows higher values in men than in women.

Correlation analysis could be used to analyze the possible overlap between the two variables PT and LP. Jackson & Lawty-Jones (1996) observed the overlap between personality traits (based on Eysenck model) and learning style (using Honey & Mumford LSQ questionnaire) analyzing the possible similarities between elements of both scales; their results were used to obtain conclusions related to educational implications. For instance, they could conclude that some of the elements of the PT dimensions had a biological basis and other that could be the result of a certain learning process.

These authors used all the elements that integrate each dimension of the scales considering this scales as one-dimensional scales. In our research, the questionnaire used to measure the personality traits was a reduced version. The method to reduce items in each trait was made choosing the definitive items after a correlated and factor analysis process. Therefore, we cannot correlate LP with the original sub-elements.

To observe the correlation between the overall scores of each scale could not be an adequate manner to analyze the overlap because, as Furnham (1992) states, this overall correlation may hide correlations the possibility that components of each scale may be unrelated to each other. So, the possible interpretations extracted from the correlation between overall scores could not be argued enough.

Path analysis

A recursive path analysis was carried out to analyze how personality traits (PT) influence learning patterns (LP) and how both influence access qualification (AQ) and the qualification after the 1st semester at university.

This kind of analysis requires the formulation of a previous model of causal relationship that has to be adjusted and confirmed (or rejected). This previous model is defined in terms of the following hypotheses:

H1. *Conscientiousness* has a positive influence on the *Sequential* and *Precise* learning patterns.
H2. *Conscientiousness* has a positive effect on *Academic performance.*
H3. *Extraversion* has a negative effect on the *Technical* learning pattern.
H4. The *Sequential* learning pattern has a positive effect on *Academic performance.*

In the model, PT scores were used as exogenous variables, LP values served as mediating and endogenous values and AQ scores and $1^{st}Q$[23] were used as endogenous variables.

exogenous variables	***mediating endogenous variables***	***endogenous variables***
Personality traits	*Learning patterns*	*GPA*
Emotional adjustment	Sequential (SEQ.MEAN)	Acces Qualification
Extraversion	Precise (PRE.MEAN)	1st Qualification
Agreeableneess	Technical (TEC.MEAN)	
Conscientiousness	Confluent (CON.MEAN)	
Openess to experience		

Table 49: Specification of variables in the path model

The configuration of this model has a double objective: firstly, to find out the dependent relationships between variables. The second objective is to verify if the study variables can be considered within a continuum that goes from presage – process – to product (Lizzio et al. , 2002). In the case of the current research, the LP are considered from an active and constructivist perspective, in which the combination of LP is the result of temporal interplay between personal and contextual influences. This idea is a reason with a theoretical base that can justify the use of the LP variable as a mediating endogenous variable.

[23] In the representation of path model, the acronym used are: AQ= *ZNOTAACC* and 1stQ= *ZMEDIAT*

This decision can affect some model fit index as well as the saturation conditions. However, we try to adjust the model so that we can get some conclusions with not too much forced model.

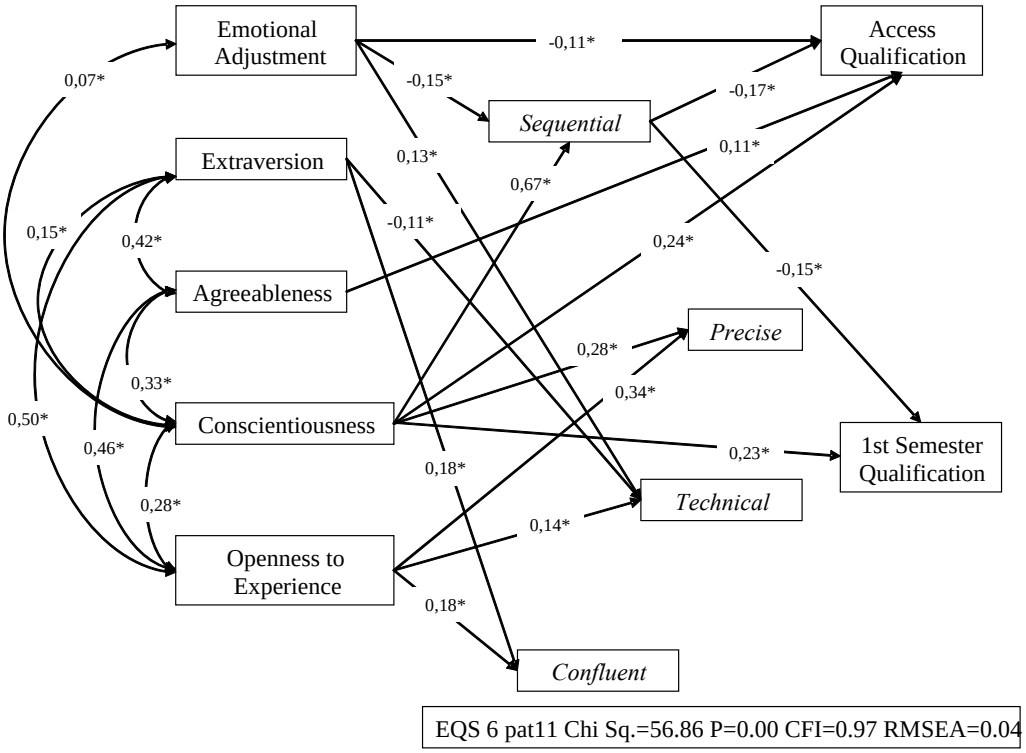

Figure 43: Path model

Therefore, various models were used to assess the overall fit of a model. Finally, after some approaches the path model indicated a close fit (RMSEA=0.04; CFI=0.97; Chi SQ=56.86; *df*=28).

These acceptable data allows us to support the possibility whereby learning patterns are the way of managing the T/L process as a result of a personal construction based on personality and other hidden variables. In other words, learning patterns lie in a later position in the continuum in comparison to personality traits.

Regarding the effects observed, *Conscientiousness* presents a direct effect with both Academic performance variables (*r*=0,24 and *r*=0,23) and indirect mediated by *Sequential* pattern (*r*=0,67). *Agreeableness* affect *Access Qualification* positively but in a low *r* index *(r=0,11). Emotional Adjustment* pattern affects directly in a negative

sense per with a low *r* index (*r*=-0,11). Summing up, after observing the path diagram, the trait *Conscientiousness* seems to be antecedent of Academica Performance considering total and direct effects.

Now, we observe the standardized values shown in the model to verify our hypotheses: The results support H1. The personality trait *Conscientiousness* positively influences the Learning Pattern *Sequential* (*r=0.67*) as well as the Learning Pattern *Precise*, although at a lower value (*r=0.28*); H2 is also supported by the results. The Personality Trait *Conscientiousness* positively affects Academic Performance with similar values in both Access Qualification (*r*=0.24) and 1st Qualification (*r*=0.23). These two values are the direct effects from *Conscientiousness* to AQ and 1st Q mediated by the pattern *Sequential.* The results partially support H3. *Extraversion* negatively influences the Learning Pattern *Technical* (*r= - 0.17*). The path model does not confirm hypothesis H4 in terms of values.

Q.5 Predictive capacity of variables regarding to 1st Semester performance at University

QUESTION 5

What is the predictive capacity of personal variables and prior academic performance with regard to 1st semester academic performance at university?

The objective of this question is to test if the qualification at the end of the 1st semester (1stQ) can be predicted by any of the variables that intervene in the investigation.

A *Multiple Regression analysis* was carried out. This kind of analysis is appropriate when one metric dependent variable is presumably related to two or more metric independent variables. Multiple regression is recommended for investigations that aim at predicting the magnitude of the dependent variable (Hair et al., 1998).

In our case, the dependent variable is *Zmedia_tip1Q (1stQ)* and the independent variables are *type of study*, *domain,* gender, *ZNotaacces_tip (AQ), Sequential (LP), Precise (LP), Technical (LP), Confluent (LP), Emotional_adjustment (PT), Extraversion (PT), Agreeableness (PT), Conscientiousness (PT) and Openness_experience (PT)*, with the Stepwise method (Criteria: Probability-of-F-to-enter <= 0.050, Probability-of-F-to-remove >= 0.100).

Results

The reference data is: N=510, 324 women (63.53%) , 186 men (36.47%)

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	45,078	1	45,078	91,118	,000[a]
	Residual	251,318	508	,495		
	Total	296,395	509			

a. Predictors: (Constant), AQ_tip

b. Dependent Variable: 1stQ_tip

Table 50: ANOVA analysis in the Multiple Regression Analysis

The estimated regression equations with independent variables are *type of study*, *domain,* gender, *ZNotaacces_tip (AQ), Sequential (LP), Precise (LP), Technical (LP), Confluent (LP), Emotional_adjustment (PT), Extraversion (PT), Agreeableness (PT), Conscientiousness (PT) and Openness_experience (PT)*, which explain a significant part of the variability of the *1stQ* variable (F=16.985; p<0.0005).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,390[a]	,152	,150	,70336

a. Predictors: (Constant), AQ_tip

Table 51: Model summary in the Multiple Regression analysis (AQ)

The estimated regression model equation explains 15% (r^2=0.152) of the variability of the *1stQ* variable

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,078	,032		2,453	,015
	AQ_tip	,386	,040	,390	9,546	,000

a. Dependent Variable: 1stQ_tip

Table 52: Coefficients in the equation in the Multiple Regression analysis

The regression equation that quantifies the prognosis value of the 1stQ is as follows:

Zmedia_tip1Q = 0,78 + 0,386 AQ_tip

The variables *domain_code, gender, Sequential, Precise, Technical, Confluent, Emotional_adjustment, Extraversion, Agreeableness, Conscientiousness, Openness_experience* make no statistically significant contribution to the regression equation.

Excluded Variables[b]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	domain_code	-,007[a]	-,159	,874	-,007	,991
	gender	,020[a]	,498	,619	,022	,987
	Sequential	-,002[a]	-,060	,953	-,003	,999
	Precise	,057[a]	1,403	,161	,062	,995
	Technical	,038[a]	,917	,360	,041	,992
	Confluent	-,057[a]	-1,386	,166	-,061	,993
	Emotional_adjustment	,019[a]	,473	,636	,021	,992
	Extraversion	-,068[a]	-1,676	,094	-,074	1,000
	Agreeableness	-,050[a]	-1,202	,230	-,053	,981
	Conscientiousness	,078[a]	1,891	,059	,084	,974
	Openness_experience	-,025[a]	-,607	,544	-,027	,994

a. Predictors in the Model: (Constant), AQ_tip

b. Dependent Variable: 1stQ_tip

Table 53: Summary data in the Multiple Regression analysis

The variable *AQ* (Access qualification) makes a statistically significant contribution ($t=9.546; p<0.0005$). Consistent with the literature (Busato et al. 2000), this work confirms the predictive capacity of the 1st semester qualification with regard to later performance at university.

3.2.3 General interpretation

Throughout the previous sections a lot of data and results have been presented from different kinds of analysis.

These results can be observed on the surface in terms of description. This way of viewing results can be effective in order to offer a map of tendencies with regard to the variables studied in the investigation.

However, several statistically significant results are offered in this section. These results are exposed separately and, therefore, several considerations about personality traits, learning patterns and academic performance are presented.

This interpretation constitutes a basic element to justify the further conclusions of the current investigation.

Personality Traits and Learning Patterns

The general interpretation of these variables requires remembering two theoretical considerations already dealt with in the theoretical approach. These ideas are related to the nature of both the PT and LP variables.

Firstly, the personality traits are considered as factors which predispose towards learning. PT could explain what people are like. In other words, PT reflects part of the essence of the person and tends to be consistent throughout life.

On the other hand, learning patterns are elements that determine the management of the T/L process. LP explain the way people learn. These ways of learning are understood as a personal construction derived from formal and informal learning contexts. The use of certain patterns is the result of a construction based on the experience of interaction with context, others and oneself.

These two first considerations can be supported by the fitness of the model in the path analysis. The path analysis proposes a model with a continuum that goes from personality traits to academic performance mediated by a learning patterns variable. This model allocates the learning patterns as mediated variables that moderate and model the action in terms of learning. These LP are in charge of managing the learning situations.

Regarding PT, correlation analysis reveals that the five traits can be grouped in two blocks. A first block is characterized by the openness and relational components composed of *Openness to experience*, *Extraversion* and *Agreeableness*. The second block is formed by the traits of *Conscientiousness* and *Emotional adjustment*, which can be characterized theoretically by their individual component, although these traits are not correlated.

Attending to the LP variable, and as in the case of PT, two separate blocks can be observed. Correlation analysis reveals a positive correlation between patterns sequential-precise and patterns technical-confluent. Analyzing this fact from an educational viewpoint, it is possible to design a continuum that goes from the patterns that are allocated close to the teacher's proposal (sequential and precise) to those patterns allocated close to the autonomous action of the learner (technical and confluent). In other words, there is a continuum that goes from dependence to autonomy in the T/L process terms.

In general terms, the sample results show that the students who get better academic performance when they start university present higher levels in *Sequential* and *Precise* patterns than those who get wore academic performance. At the same time, the students who get wore academic performance present higher values than better ones in *Technical* and *Confluent* patterns. Taking into account that learning patterns are the result of a construction, this results could be interpreted stating that freshmen, in the compulsory educational system, have constructed learning patterns that tend to be closer to the

dependence side of the T/L process and that they tend to develop actions based on abundant and exhaustive information

The analysis for causality relationships between PT and LP confirms that the *Conscientiousness* trait is an antecedent of academic performance (AP) in terms of exam marks (both AQ and 1stQ) and that it positively affects the sequential and precise patterns. But the data does not confirm that any of the patterns are an antecedent of AP. This could indicate that the learner can be efficient in any kind of pattern, that is that PT and LP form part of a continuum but can act separately.

If the PT and LP are analyzed according to gender, domain or type of study, some considerations can be extracted.

Regarding gender, *Emotional adjustment* is the only pattern whose scores are higher in men than women. The role adopted by females, as a cultural statement, can condition the general scores in that point. Low scores in *Emotional adjustment* can be result of the need for women to develop better performances than men in order to reach the same goal or status.

In any case, *Emotional adjustment* is a trait that can be compensated by high levels in the *Conscientiousness* trait in order to face up to performance situations. In fact, women present significant higher values than men in *Conscientiousness* trait being this trait which shows the highest differences in scores between both genders. The rest of the traits have a relational component and women show slight higher values than men; this fact can be interpreted in terms of adaptability to context, tasks and persons; in other words, a positive predisposition to develop activities by interacting with others.

The occurrence of significant gender differences in PT and LP calls for the need to be extremely rigorous when interpreting the data at a different level of aggregation. In this sense, taking into account the most conservative statistical analysis used in this work, the only factor that reveals significant differences is the Technical learning pattern distributed by type of study.

Finally, if the domains are observed with regard to their PT and LP, it can be stated that each domain has a profile (in both variables) that is very close to the intuitive perception that people have of it. For instance, most people agree that Health professionals should be persons ready to spend time with others in a humanistic way. The results here confirm this intuitive perception; in fact, in general terms, each domain contains persons whose traits and patterns coincide with society's expectations.

Academic Performance

The first thing to point out is that to estimate academic performance in terms of access qualification marks and first semester qualification marks is an option that allows us to work with a lot of data that is accessible and manageable in quantitative terms. Therefore, many qualitative aspects could escape analysis because assessment is an essentially complex and multidimensional process.

Starting with acceptance of these previous conditions, this investigation's different analyses show, in general terms, that PT and LP are not suitable variables for predicting academic performance. As was presumed, only the access qualification variable shows the capacity to predict academic performance in the 1st semester at university. It is supposed that many other different variables affect academic performance in Higher Education.

In general terms, AP has been analyzed taking into account the possible biases and trying to minimize their effects. These problems have occurred mainly in AQ and in the comparability between variables in different samples. Once these sources of error have been controlled, it is possible to make some statements about the behaviour of AP (AQ and 1stQ) across the different levels of aggregation in the samples, expounded mainly in terms of description.

The first consideration is related to gender. The results show that women have a better AP than men in both AQ and 1stQ variables. According to the general interpretation, it

can be put forward that women have a better adaptation to learning requirements defined by compulsory and higher education in the first semester.

If the analysis goes to the level of aggregation based on domain and type of study, the possible interpretation makes sense in terms of the individual description. That is, the knowledge of AP evolution in each group can facilitate the task of understanding the nature and dynamics of each group. Nevertheless, at institutional level it is interesting to mention data that can identify trends and group performances.

Regarding AQ, the general interpretation is avoided by taking into account the possible bias caused by the *numerus clausus* mark. On the other hand, in terms of 1^{st}Q, it can be stated that the Humanities domain and some studies linked to the Health domain present significantly better values than the other domains. This data contrasts with the low scores showed by the Technical studies.

When the analysis is focused on the evolution of domains from AQ to 1^{st}Q the data shows that freshmen who belong to the Business, Law, Experimental, Education and Technical domains obtain worse results when at university; while students of the Health domain remain in the same place and Humanities freshmen are the only ones who improve when assessed in the university context.

Once the three variables are analyzed jointly, a relevant idea in educational terms emerges: the analysis carried out in research question 3 reveals that the progression of student in the educational system is linked to the development of a learning process in which technical and confluent patterns are not predominant.

Summarizing, this interpretation responses to the different analysis made in each research question. Other way to present the results of the questions is organizing in terms of findings divided in three dimensions: findings about methodology of analysis, findings about the students and findings about educative system.

Methodology of analysis

- PT and LP are stable enough variables in the T/L process
- PT and LP are not adequate variables to predict the AP in terms of exam marks
- The students can succeed in any kind of combinations of PT and/or LP
- Access qualification is a good predictor of AP in HE
- The combination of PT and LP can constitute a robust model of analysis to define students

Students

- FYS have a positive attitude towards learning activities that promote mental openness and interpersonal relationships
- Students who start university are very close to their vocational preferences
- FYS have constructed LP that tend to be closer to the dependent side of the T/L process
- Women present better AP than men
- Students who belong to the scientific areas of Humanities and Health present better AP than the rest, especially than Technical students
- Almost all domains present worse AP at the university level, except Health (which stays the same) and Humanities (where AP improves)
- AP is specially low in the Technical and Experimental domains, nevertheless these students have a high AP before university

Educative System

- Educational systems (Compulsory education and HE) do not promote active learning environments
- Educational and evaluation systems do not take into consideration the diversity of students
- The system tends to penalize students who are oriented towards performing in a confluent way

4. CONCLUSIONS

This section of conclusions is organized in four subsections: the main conclusions, the educational implications, a specific proposal to URV and further research lines to develop from the conclusions arising from this work.

Main conclusions

Although conclusions can incorporate personal beliefs, an attempt has been made to relate the ideas supported by the data and the theoretical assumptions. On the other hand, it would also be convenient to expose ideas that could be usefully applied.

Therefore, the conclusions are based on the available data but are expressed in terms of their transfer to educational reality. The main conclusions can be summarized as follows.

1. Students who arrive at university have an open attitude in relational and intellectual terms. This fact is supported by sociological reports about the youth population, which state that they are ready to learn in such a way; even the specific URV studies report that learners present positive expectations about university. However, current students have constructed learning patterns based mainly on teacher consigns and far removed from processes based on active and autonomous learning.

2. First-year students are oriented to managing their learning process in directive terms. Observing the learning patterns constructed by learners, it could be stated that the educational system does not promote active learning environments where the students could investigate, discover, simulate, try, etc. The educational system should be the propitious setting in which the learning conditions are created, allowing strategies and resources that contain transfer power and innocuous effects in terms of professional development. Learning environments using didactic strategies such as error, conversation, debate and so on as promoters of effective learning should be promoted.

3. The two variables, PT and LP, dealt with in this work do not have a relevant capacity to predict academic performance.

4. The combination of PT and LP variables can conform a robust model in order to describe students (and people in general) in terms of tendency to sociability, intellectual curiosity and *Conscientiousness*.

5. At the moment to analyse PT and mainly LP from an educationlal perspective, a dichotomy can be observed between traits and patterns closer to the teacher-instructions-assessment-educational setting and others that depend on the learner- activity-personal vocation-professional setting.

6. The students who belong to the Experimental and especially the Technical domains have high grades in compulsory education but they score the lowest grades when they perform in the university context. This fact reinforces the idea of associating difficulty with the quality of teaching.

7. Taking the AP in terms of exam marks (whatever the standardization process) in order to find out the learners' evolution can present problems if those learners do not start from the same starting point. If the HE system applies the *numerus clausus* method to enter university, the learner starting point tends to be different between studies. Using the estimation of a high percentile (over 75%) as a descriptive statistic is very useful in order to compare groups and AP evolution during the university stage, even when beginning from different starting points.

Educational implications

Subsequent to the above considerations in the general interpretation and conclusions, some ideas in terms of education can be proposed. Most of these proposals are provided on the basis that knowing about learners is relevant to promoting an adequate T/L process.

According to this assumption, organizing a process of investigation into the factors of predisposition towards learning (PT) and learning management factors (LP) of students entering university can be useful from an individual and group perspective.

The analysis of learning patterns allows us to describe students in terms of autonomy and dependence on the teacher's proposal. This information can be useful in order to plan an efficient set of activities oriented to the student's assets. In the same line, LCI can be very useful as a tool of personalization to compose working groups attending to the strengths and weaknesses of each one of their members.

Summing up, to know students in PT and LP terms can give support to different stages of the T/L process at university. This support can be concreted in terms of design, T/L development and the decision-making process. On the other hand, an adequate combination of the variables dealt with in this research can be used in the design of the mechanisms to follow up and verify the quality of the T/L process in HE institutions from the student's perspective.

This information can be used at different levels of aggregation.

- At University level, all the information can facilitate the description of current students. The description can be used in order to contrast the youth population in general and the response given by the educational system.
- At study level, this analysis can be very useful in study plan design processes , curricula and general formation programmes in terms of transversal

competences. This information can facilitate understanding of the entering students and the profiling of graduate students who have to deal with professional development in the labour market.

- At classroom level, the information, especially which related to PT and LP, can help teachers to promote learning activities adapted to the student profile as well as the curricular requirements.
- At individual level, if the student is aware of what he is like and how he learns, he could be ready to face the different learning situation. In the educational system, this individual level can be related to the *tutoring process* in two possible directions:
- It is a self-awareness process that can facilitate management of one's own learning process as well as interaction with others.
- To guide in the decision-making process.

Both directions can be dealt with at different times in HE.

- In the first courses. The information given to undergraduates can be used to help with the new routines and new ways of learning required by the university setting compared to compulsory education. On the other hand, most curricula defined in the new EEES consider the first course as the moment for acquiring general competences to allow interchange between studies in the same domain. Hence it is a first crucial moment for organizing one's own pathway.
- This tutoring process, which helps students to make decisions, can also be useful to recently graduated students. It can help students to choose the next steps: either going on to a postgraduate programme (research or professional orientation) or entering the labour market.

In any case, all these educational implications can be summarized in one specific requirement: the need for high quality in the formation of teachers. To accept, as the EEES requires, that the student is the centre of the T/L process means that the effectiveness of the process depends on the quality of the teachers.

A new paradigm centered on the student means that teachers have a crucial role. The formation of teachers who are able to assume this responsibility is one, and maybe the first basic requirement for this process to be successful. This fact constitutes a big challenge for the Spanish educational system.

A specific proposal for the Rovira & Virgili University

The previously mentioned educational implications could be taken as abstract ideas that are difficult to concrete in university performances. For this reason a specific proposal is presented.

This proposal aims at providing concrete ideas from the results obtained in the investigation. Therefore, it is a practical process with specific content and objectives that can be transferred to other institutions. This possible application in other universities has to be based on the adaptation and knowledge of its specific characteristics and context.

The specific context of the URV is characterized, at this moment, by being immersed in the process of reformation of its study plans in order to satisfy the requirements of the EEES process. This is a propitious phase for introducing elements that could improve the quality of the T/L process as well as facilitate the process of quality assurance.

The achievement of the proposal can collaborate notably in documenting the system of indicators and evidence required by the standard organisms in charge of developing the quality assurance.

This process consists of the development of specific actions in order to achieve the following objectives:

a) to give additional and relevant information to collaborate in the definition of the academic-professional profile of each study.
b) to adjust the didactic proposal and assessment methods to the requirements of graduates and the characteristics of students.
c) to check the level of fitness of this adjustment process.
d) to facilitate elements to help students to be more effective in their learning process.

e) to offer elements to help teachers to deliver and develop didactic proposals adapted to study requirements while taking into account student characteristics

The actions to develop are organized in terms of definition, checking and T/L development

Definition actions:

1. To analyze institutional documentation related to the catalogue of the general learning methodologies and assessment methods. The institution should complement the definition of each methodology and assessment methods in terms of the recommended learning patterns.
2. To analyze the personality traits and learning patterns of entering students. This information can be used as additional information in order to define the academic-professional profile of each study. This specific information can be especially useful for defining the transversal competences of graduates. This analysis should be completed with the analysis of the 20% best and worst AQ students (as the analysis carried out in research question 4).
3. Each study should determine the ideal learning patterns profile according to the defined graduate profile. It could be convenient to make this definition in each academic course if they have a specific orientation.
4. In each study, by means of the resulting document from action 1, to determine the adequate formative activities oriented to the development of the graduate profile defined. This action should be developed in each academic course.

Checking actions:

5. To pass the LCI and E-value test to freshmen of the current academic course.
6. In each study, to analyze the learning pattern profile of the 20% best and worst students in each academic course. To contrast the results obtained with the ideal profile defined in action 3.
7. In each study, to analyze the learning pattern profile of the 20% best and worst students at the end of the study, and to contrast these results with the analysis carried out in action 3.

T/L development actions :

8. To report the PT and LP results to the students individually in order to:

- Enable them to manage their own learning process supported by the tutor in the development of specific actions oriented to solving the eventual problems.
- facilitate the decision-making process in the definition of the curricular pathway and the later transition to postgraduate programs or the labour market

9. To give the students' PT and LP results to the teachers individually. This information could be used by teachers in mainly two directions:

- group one: proposing formative activities in terms of relational/individual and more/less directive terms
- individual one: helping the teacher to compose working groups according to the specific and individual learning patterns.

	Action	*Objective*	*Context of application*	*Moment*	*Agents*
	Action 1	a	Institution Design of study plans	Design of study plans	Technical services
Definition	Action 2	b	Study Design of study plans	FYS welcome week (last year)	Technical services Study board Teachers
	Action 3	b	Study	Design of study plans	Technical services Study board Teachers
	Action 4	b	Study	Design of study plans	Technical services Study board Teachers
Checking	Action 5	c	Study Academic course	Welcome week (current year)	Technical services Students
	Action 6	c	Study Academic course	End of each course	Technical services Study board Teachers
	Action 6	c	Study Academic course	End of study	Technical services Study board Teachers
T/L development	Action 7	d	Tutoring process	Beginning	Tutors Students
	Action 8	e	Didactic proposal	Beginning	Teachers

Table 54: Educative proposal for the URV

Further research lines

In general terms, the two variables, PT and LP, can be very useful in order to understand the learning process that occurs in each individual. These aspects constitute sufficiently stable and durable factors in order to help in the design of effective T/L environments. PT and LP can be considered as features that stand independently enough from the situation and, therefore, they are factors that can facilitate the learning process in terms of transfer to different learning situations and professional development.

Considering this statement, some ideas can be extracted in terms of research that could be developed in the future:

- To develop similar research using different indicators to estimate AP as a dependent variable. There is a set of different indicators for measuring academic performance that could give relevant information, mainly in methodological and assessment aspects.

- To analyze other internal factors in order to complete the freshmen profile and give more complete and relevant information. This research has used the LCI as a tool for analyzing learning patterns. In this case, the learning patterns have been analyzed according to personality traits and academic performance. It could be useful to develop research in relation to other variables.

- To test the efficiency of the implementation of the tutoring process considering the information obtained in this investigation. This tutoring process is one of the main tools for developing a learning process centered on the student.

- To develop longitudinal studies to analyze the evolution of LP and AP (dependent variables) taking methodological aspects as independent variables.

These lines can be structured in two directions:

Researching variables

- To analyze other variables that can predict AP
- To analyze other manifestations of AP in order to be contrasted with other independent variables
- To verify the stability of LP across the stage in university
- To develop qualitative approaches to deepen into the main topics

From the proposal

- To make comparative analysis among HE institutions
- To make longitudinal and transversal analysis to verify the goodness of the suggested actions in the proposal
- To analyze the impact of the different educational and assessment proposals in the new EHEA model

5. LITERATURE

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ANNEXES

ANNEX 1: LEARNING CONNECTIONS INVENTORY (LCI)

LET ME LEARN®

INVENTARIO DE CONEXIONES DE APRENDIZAJE

Formulario para Adultos

Christine A. Johnston; Gary R. Dainton

Tres partes configuran el Inventario de Conexiones de Aprendizaje.

- En la Parte I hay que responder a 28 afirmaciones seleccionando las respuestas de acuerdo con cinco posibilidades.
- En la Parte II hay que responder a tres preguntas.
- Puede comenzar por cualquiera de las dos partes.
- Después de completar las Partes I y II, complete la Parte III.

Parte I

Instrucciones

A continuación encontrará 28 afirmaciones, cada una seguida de cinco frases: "Nunca", "Casi nunca", "A veces", "Casi siempre" y "Siempre". Lea detenidamente cada una de las afirmaciones y haga un cículo alrededor de la frase que mejor describe su método de aprendizaje.

Ejemplos

A. Escucho con atención las direcciones que me dan.

Nunca Casi nunca A veces Casi siempre Siempre

B. Me gusta demostrar lo que sé en conversaciones "de tú a tú".

Nunca Casi nunca A veces Casi siempre Siempre

Palabras de ánimo. Tómese el tiempo necesario y piense sus respuestas detenidamente. No hay respuestas correctas o equivocadas, pero si que hay respuestas que se aproximan más a su manera de ser que otras. El hecho de seleccionar respuestas de cada una de las categorías propuestas nos da una descripción más precisa de su proceso específico de aprendizaje.

Escoger las respuestas no siempre es fácil. A menudo, cuando una persona sev decide por una respuesta, elige la opción "A veces" por compromiso. En lugar de hacer esto, lo animamos a cambiar la frase o añadir matices, con la finalidad de que

escoja la respueta que mejor lo describe. Escriba todos los cambios que le parezcan oportunos. Lo más importante es que disfrute, se relaje y se divierta aprendiendo más sobre sí mismo.

Preguntas

1. Prefiero proyectos donde se utilicen o apliquen herramientas mecánicas/técnicas y equipamiento.

Nunca Casi nunca A vecesCasi siempre Siempre

2. Para sentirme cómodo con la tarea, necesito entender perfectamente las expectativas antes de comenzar a trabajar.

Nunca Casi nunca A veces Casi siempre Siempre

3. Se me hace pesado tener que esperar pacientemente a que alguien finalice sus explicaciones o instrucciones.

Nunca Casi nunca A veces Casi siempre Siempre

4. Antes de comenzar cualquier tarea, hago preguntas específicas y leo tanta información como me sea posible.

Nunca Casi nunca A veces Casi siempre Siempre

5. Me resulta incómodo que me den una segunda tarea antes de haber acabado la primera.

Nunca Casi nunca A veces Casi siempre Siempre

6. Prefiero trabajar de manera autónoma sin la supervisión o dirección de otros.

Nunca Casi nunca A veces Casi siempre Siempre

7. Me siento orgulloso/a de poder dar respuestas correctas y fundamentadas a las preguntas.

Nunca Casi nunca A veces Casi siempre Siempre

8. No me gusta hacer mi trabajo sólo de una forma, especialmente cuando tengo una idea mejor que me gustaría probar.

Nunca Casi nunca A veces Casi siempre Siempre

9. Siempre llevo un bolígrafo o lápiz por si he de tomar notas.

Nunca Casi nunca A veces Casi siempre Siempre

10. Limpio mi lugar de trabajo y pongo las cosas en su lugar tan pronto como acabo mi tarea.

Nunca Casi nunca A veces Casi siempre Siempre

11. Disfruto con el reto de reparar o construir alguna cosa.

Nunca Casi nunca A veces Casi siempre Siempre

12. Reacciono con rapidez a las preguntas sin pensar mis respuestas.

Nunca Casi nunca A veces Casi siempre Siempre

13. La gente dice que soy muy organizado/da.

Nunca Casi nunca A veces Casi siempre Siempre

14. Hago más preguntas que el resto de la gente por el simple hecho de que disfruto aprendiendo cosas.

Nunca Casi nunca A veces Casi siempre Siempre

15. Me gusta descubrir cómo funciona el equipamiento o la maquinaria.

Nunca Casi nunca A veces Casi siempre Siempre

16. Me gusta construir mi propia manera de hacer las cosas.

Nunca Casi nunca A veces Casi siempre Siempre

17. Prefiero hacer tareas de jardinero que leer o escribir una carta.

Nunca Casi nunca A veces Casi siempre Siempre

18. Necesito hacer listas y desarrollar un plan de trabajo antes de comenzar cualquier proyecto.

Nunca Casi nunca A veces Casi siempre Siempre

19. Tengo la necesidad instintiva de corregir a los otros cuando su información o sus respuestas no son del todo precisas.

Nunca Casi nunca A veces Casi siempre Siempre

20. Genero muchas ideas únicas y creativas.

Nunca Casi nunca A veces Casi siempre Siempre

21. Me siento mejor cuando tengo tiempo de revisar la casa antes de tener visitas.

Nunca Casi nunca A veces Casi siempre Siempre

22. Me gusta desmontar las cosas para saber cómo funcionan.

Nunca Casi nunca A veces Casi siempre Siempre

23. Mi aspiración es descubrir nuevos enfoques a la hora de trabajar por el placer de hacer las cosas de manera diferente.

Nunca Casi nunca A veces Casi siempre Siempre

24. Estoy interesado/da en tener información precisa sobre cualquier hobby que haga.

Nunca Casi nunca A veces Casi siempre Siempre

25. Busco para leer, artículos y manuales bien documentados y fundamentados.

Nunca Casi nunca A veces Casi siempre Siempre

26. Me gusta la sensación de manipular herramientas con mis manos.

Nunca Casi nunca A veces Casi siempre Siempre

27. Mi casa y mi lugar de trabajo están ordenados y organizados.

Nunca Casi nunca A veces Casi siempre Siempre

28. Estoy dispuesto/a a arriesgar con nuevas ideas, incluso sabiendo que pueden ser rechazadas.

Nunca Casi nunca A veces Casi siempre Siempre

PARTE II

Responda a las siguientes preguntas utilizando el espacio que le facilitamos. Escriba tanto como quiera hasta que la respuesta le parezca satisfactoria.

1. Qué es lo que le crea insatisfacción cuando le dan instrucciones?

2. Si pudiera escoger, cómo demostraria lo que ha aprendido durante su vida?

3. Qué hobby, deporte o interés sabe hacer bien? Cómo podría enseñar a otros a hacerlo?

Parte III:

HOJA DE PUNTUACIÓN

Puntúe las respuestas para las pregunta 1-28 utilizando 1 para “Nunca”, 2 para “Casi nunca”, 3 para”A veces”, 4 para “Casi siempre” y 5 para “Siempre”. Después transfiera la puntuación de cada respuesta al centro del círculo que corresponda. Sume los número y escriba el total en el espacio final de cada línea. Escriba el total de cada pauta en las casilla del final.

Procesamiento secuencial TOTAL

2		5		10		13		18		21		27		

Procesamiento preciso

4		7		9		14		19		24		25		

Procesamiento técnico

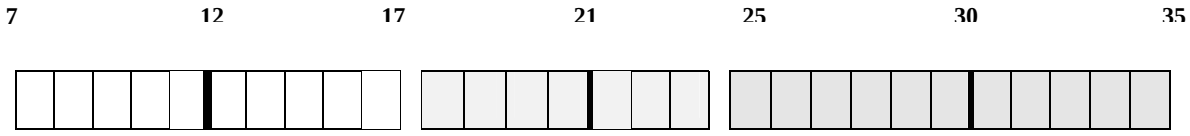
1		6		11		15		17		22		26		

Procesamiento de confluencia

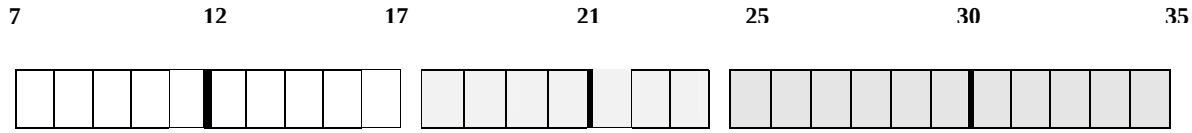
3		8		12		16		20		23		28		

SU COMBINACIÓN DE APRENDIZAJE

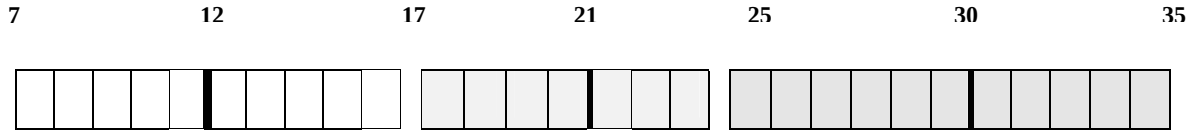
Procesamiento secuencial



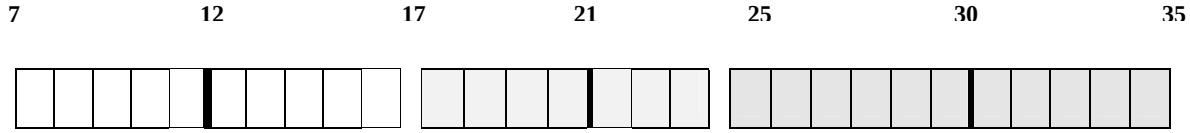
Procesamiento preciso



Procesamiento técnico



Procesamiento confluente



Evitar

Cuando lo necesita

En primer lugar

ANNEX 2: E-VALUE TEST (short version)

Strongly disagree	*Moderately disagree*	*Disagree*	*Agree*	*Moderately agree*	*Strongly agree*
1	***2***	***3***	***4***	***5***	***6***

	1	*2*	*3*	*4*	*5*	*6*
1. Mi estado de ánimo se caracteriza por la frecuencia de mis altibajos.						
2. Todavía me preocupan seriamente errores que cometí en el pasado.						
3. Me encanta mezclarme con la gente en las actividades sociales.						
4. En las situaciones sociales soy de los que rápidamente toman la iniciativa.						
5. Cuando estoy con un grupo de gente me gusta adoptar el papel de persona que se queda en segundo plano dejando que otros tomen la iniciativa.						
6. Creo que soy habilidoso en el trato con la gente.						
7. Lo mejor para moverse por el mundo es dar por sentado que los demás tienen mala fe.						
8. Me tomo mucho interés en ayudar a aquellos que más lo necesitan.						
9. Me gustan las actividades que demandan dotes de precisión y organización.						
10. No me importa perder tiempo en conseguir que mis cosas estén claramente organizadas.						
11. Me gustan las tareas que requieren ser minucioso y organizado para realizarlas bien.						
12. Creo que tengo una vida interior muy rica.						
13. Me encuentro a gusto descubriendo lugares que no conozco.						
14. Suelo debatir sobre todo tipo de asuntos con la gente que me rodea.						
15. Cuando me desanimo me cuesta recuperarme.						
16. Soy capaz de levantarme muy contento y, sin que suceda nada relevante, acostarme en un estado de profunda tristeza.						
17. A menudo siento que no valgo para nada.						
18. Formar parte de un grupo de personas es una sensación maravillosa.						
19. Normalmente no me siento retraído cuando estoy entre personas.						
20. Creo que soy una persona que tiene capacidad para entender a los demás.						

21. Tengo por costumbre no fiarme mucho de los demás.						
22. Consigo muy buenos resultados en todo lo que hago.						
23. Me gusta llevar una vida desordenada.						
24. Una buena obra de arte (música, pintura, etc.) puede llegar a emocionarme.						
25. Todo lo que supone una novedad me gusta por definición.						
26. Me encanta hablar con las personas acerca de su manera de ver y entender la vida.						
27. Me gusta explorar mis sentimientos personales y descubrirme a mí mismo.						
28. Soy de esas personas que finalizan aquello que han comenzado.						
29. Soy una persona muy trabajadora.						
30. Me gusta trabajar duro para conseguir aquello que me he propuesto.						
31. Sinceramente creo que la honestidad es la mejor norma a seguir en los diferentes aspectos de la vida.						
32. Entre competitividad y colaboración prefiero lo último.						
33. Estoy cómodo cuando a mi alrededor hay gente, ruido, animación, etc.						
34. Si una reunión social está decaída soy capaz de animarla.						
35. Si me presentaran a una persona y me dejaran a solas con ella, creo que sería yo el que tomaría la iniciativa para comenzar a conocerla.						
36. Pequeñas cosas o situaciones hacen que mi estado de ánimo varíe rápidamente.						
37. Si algo no va bien me desanimo con facilidad.						
38. Tengo un carácter sumamente cíclico (a veces contento, a veces triste).						
39. Me encanta tener gente a mi alrededor.						
40. Con los demás me gusta mostrarme franco y abierto.						
41. Para mí la franqueza es fundamental, no encuentro ninguna razón para mentir a los demás.						
42. No soy nada perfeccionista.						
43. Soy muy persistente, si fracaso en algo lo vuelvo a intentar hasta conseguirlo.						
44. Siempre veo la belleza de las cosas que me rodean.						
45. Trato de embarcarme en nuevos proyectos siempre que puedo.						

46. No tengo interés por aquellos asuntos que no conozco.						
47. Soy una persona estricta y me gusta que las cosas se realicen de la forma más adecuada posible.						
48. La verdad es que no tengo en mucha consideración el punto de vista de las personas que creo que son inferiores a mí.						
49. Suelo confiar en los demás y en sus buenas intenciones.						
50. Me gusta mucho salir y disfrutar de diferentes actividades.						
51. Mis amigos no tendrían problemas en catalogarme como una persona afectuosa y cordial.						
52. Creo que los que me conocen me clasificarían como una persona con mucha energía vital y mucho ánimo.						
53. A menudo me siento cansado e indiferente sin ninguna razón para ello.						
54. Muchas veces me siento solo y triste.						
55. Me siento una persona cálida y cercana a los demás.						
56. Soy una persona organizada.						
57. Me gusta imaginar y ensoñarme con cosas o situaciones que me parecen divertidas.						
58. Cuando escucho música me concentro vívidamente en las emociones que me produce.						
59. Me siento unas veces triste y otras alegre sin motivo.						
60. Suelo tener un estado de ánimo bastante estable						

Erklärung über die eigenständige Anfertigung der Arbeit

Ich erkläre, dass ich diese Arbeit ohne fremde Hilfe verfasst und mich anderer als der angegebenen Hilfsmittel nicht bedient habe und die den benutzten Werken wörtlich oder inhaltlich entnommenen Stellen als solche kenntlich gemacht habe.

Hamburg, 2008-07-15