Universidade do Minho

Escola de Engenharia

Diogo Manuel dos Santos Campos

Identification and assessment of behavioural competences in multidisciplinary teams within design projects

Dissertação de Mestrado
Mestrado Integrado em Engenharia e Gestão Industrial

Trabalho efectuado sob a orientação do
Professor Rui M. Lima
Professor João Miguel Fernandes

Outubro de 2012

É AUTORIZADA A REPRODUÇÃO INTEGRAL DESTA TESE/TRABALHO APENAS PARA EFEITOS DE INVESTIGAÇÃO, MEDIANTE DECLARAÇÃO ESCRITA DO INTERESSADO, QUE A TAL SE COMPROMETE;

Universidade do Minho, ___/___/_____

Assinatura: _____

Acknowledgments

Abstract

In the technological area, there is a tendency of higher complexity of products. It is essential to the industry to have professionals capable of creating innovative concepts and ideas. The demand for employees with different disciplinary and cultural backgrounds able to collaborate efficiently in multidisciplinary and multicultural contexts is increasingly higher. Universities and companies aware of this have created programmes to prepare students for this demanding setting. The Danish audio designer and manufacturer Bang & Olufsen created the Conceptual Design and Development of Innovative Products programme where students from seven European universities work in an industrial setting for three weeks on the company's headquarters in Struer, Denmark. The programme is characterized by an intensive schedule, team-oriented activities and problem-based learning methodology with a multidisciplinary and multicultural approach. It aims to provide students with a better understanding across different technical backgrounds while, at the same time, develop new products and concepts for the company. Currently, the programme does not provide means to evaluate the students' competences growth and evolution and, with this specific purpose a methodology was created and applied in the 2011 and 2012 edition of the programme abridging students from several editions to assess their perceptions regarding their competence development during the programme.

Index

Figures index

Tables index

Acronyms' list

B&O	Bang & Olufsen
CD-DIP	Conceptual Design and Development of Innovative Products
DeSeCo	Definition and Selection of key Competencies
ICB	IPMA Competence Baseline
IHA	Engineering College of Aarhus
IPMA	International Project Management Association
OECD	Organization for Economic Co-operation and Development
PBL	Problem Based Learning
PISA	Programme for International Student Assessment
PMCD	Project Manager Competency Development
PMI	Project Management Institute
USA	United States of America
UK	United Kingdom
VŠB	Technical University of Ostrava

1. Introduction

1.1 Problem context

In a globalised world, companies have a great need to improve their products and services to answer the market needs fully and successfully. Creative approaches to problems, out-of-the-box thinking and innovative ideas to satisfy clients are an ever increasing need. Within this global context there is, more than ever, a need for people who are not only hard/technically competent but also equipped with competences and skills that allow them to work with others outside of their technical fields. This need is transversal to all kinds of areas with the engineering field having a particular lack of certain profiles. Research suggests that there is a 'competency gap' between what the industry requires and the outcome of the students' learning regarding non-technical competences such as, for instance, the ability to work within multicultural and multidisciplinary environments (Nair, Patil, & Mertova, 2009).

This gap is the result of how education institutions build their courses structures. Most of them focus in fragmented disciplines and, as a consequence, students lack multidisciplinary competences indispensable in faster and more demanding multicultural and multidisciplinary contexts. Engineering graduates lack collaboration competences to work with professionals from different backgrounds because they don't have an understanding of significant design constraints of other disciplines besides their own (Larsen, et al., 2009).

There is extensive research alerting to this matter with awareness to this problematic rising in the last decade. Several works confirm that students have the perception that they do not develop their non-technical competences during their formal education. This is the case for the Australian study 'Engineering graduates' perception of how they were prepared for work in industry' (Martin, Maytham, Case, & Fraser, 2005) or the Portuguese report on competences used by computer engineers from *Instituto Superior Técnico* (Martins, et al., 2006). Martins et al. presented a study on soft skills of higher education graduates

through the graduates' and employers' perspective. It analyzes this subject by quantifying the perception of competences proficiency graduates have through questionnaires given to the graduates and their employers which, in general, substantiates this notion of students lacking certain non-technical competences (Cabral-Cardoso, Estevão, & Silva, 2006).

This kind of competences cannot be acquired solely through theoretical learning but mostly by experience. It is a kind of education that can be obtained by hands-on experimentation with development of projects and/or the process of finding solution to problems. These learning methodologies called Project-Based Learning or Problem-Based Learning (PBL) are characterized by a problem to be dealt with in a matter of a week or a few weeks. Project Based-Learning is characterized by the development of a small scale project to solve some problem during a large period of time (e.g. a semester) by a team of students. In the end of the project, some results, e.g. reports or prototypes, are to be delivered (Powell, 2004). This approach to education focused on hands-on learning is very important in a global context in great need of engineers who can successfully "synthesize solutions and not simply (...) analyse problems. It needs the engineers' ability to take a systems view at a range of scales, from devices and products through to the large-scale delivery of infrastructure services" (UNESCO, 2010).

1.2 Motivation and Objectives

When confronted with this shortage of qualified professionals, some companies created programmes to tackle this problem with the case of the electronics company Bang & Olufsen (B&O) being a paradigmatic one. B&O is a brand that strives to have cutting edge design and technology where the creativity and innovation skills of their employees are applied every day. The need for these competences is highly demanded within this company where they constantly look for new ideas and concepts created within the company and from outside parties. This need lead the company to invest in activities in local Danish schools, where they raise awareness to the field of engineering, and universities, where they conduct internship programmes and an international

summer school in collaboration with several European university-level institutions.

It is at this international summer school that B&O and the European universities strive to infuse students with competences needed to work in multicultural and multidisciplinary environments by providing the students with such an environment where they have the opportunity to develop them. At the time this study was made, no evaluation was being made to assess the students' competences development apart from a questionnaire where they assess the programme superficially. Such an evaluation has a purpose of identifying the competences students most develop during the programme and where the programme is failing to develop them.

It is the purpose of a study of this kind to identify areas where the CD-DIP programme can be improved regarding the students' competences acquisition without making significant changes to the programme's course.

Introducing instruments to directly assess the students' competences acquisition means making significant changes to the programme. This was never the purpose of this study so a compromise had to be made to achieve this study's purpose with the consent and consensus of all the parts involved on the programme. This compromise involves the creation of a series of instruments which give the opportunity for students to self-assess their competences acquisition which, in turn, generate evidence to support possible chances not only in this programme, but also other similar programmes and initiatives.

1.3 Dissertation structure

The present chapter is an introduction to the dissertation presenting the problematic of the dissertation and its respective motivation and objectives.

Chapter 2 presents the Study Context where the CD-DIP programme is described by characterizing its participants and describing the full duration of the programme.

The 3rd chapter is dedicated to Competence, its Definition and the List of Competences which are going to be assessed. Both the definition and the list

are accomplished through an exhaustive literature review to come up with the definition for competence and a thorough set of competences used on this dissertation.

The 4th chapter, Methodology, is dedicated to the research methods used in this dissertation. In this chapter, a brief presentation is made on the data gathering techniques along with their advantages and disadvantages.

Chapter 5, Selection of Project Management Competences, is a short chapter regarding the choice of the competences to assess and constrains that compelled a reduction on the number of competences to assess.

Chapter 6 is dedicated to Findings and Discussion where the results from the data gathering are presented and some comments are made.

Chapter 7 presents the Conclusions and future work. In this chapter, this dissertation ends by presenting some comments and conclusions about the study as well as suggestions for future work to be done regarding this thematic.

2 Study context

In order to prepare students for a multicultural, competitive industrial market, several European universities and an industrial company collaborated to create a summer school entitled 'Conceptual Design and Development of Innovative Products' (CD-DIP). The program takes place in the Danish city of Struer, in Bang & Olufsen's headquarters. In this chapter, the profile of the students selected to this programme is presented along with a description of said programme.

2.1 Participants

The program was initially created by the Engineering College of Aarhus (IHA). In its first edition, the participants were only students from IHA. In 2007 five other universities were invited to contribute to the program and, since 2010, a local secondary school, Struer Statsgymnasium, is also part of the B&O summer school. Each one of these institutions provides between four and six students and one or two teachers for the program while B&O offers its facilities and several experts to give guidance and technical support to the students on their activities.

Each education institution was responsible to select students from their respective student's body within certain criteria. These were the student's English language skills, technical skills, motivation to participate in a multidisciplinary project and the subject of their degree. Most of them were on their last year of studies or had one year left to finish from a broad area of expertise in a combination of B.Sc. and M.Sc. students (Hansen, 2012). Besides these various expertises, there are also students from the final year of the local secondary school, Struer's Statsgymnasium, with ages between seventeen and eighteen.

From the two editions studied it is possible to have an overview of the type of students chosen for this programme through the data presented in Table 1 and Table 2. The age average of the students is around 23, having different backgrounds ranging from engineering to basic science courses.

Table 1 - Data from the 2011 edition's students

Country	University	Students' course	Number of students	Nationality
Czech Republic	Tomás Bata University	Product and Industrial Design	5	Czech (5)
Czech Republic	VSB – Technical University of Ostrava	Electronics Engineering Computer Science	3 2	Czech (5)
Denmark	Engineering College of Aarhus – IHA	Electronics Engineering Computer Science Mechanical Engineering	1 2 2	Danish (4) Spanish (1)
Denmark	Struer Statsgymnasium	Science class	5	Danish (5)
The Netherlands	Hanze University Groningen	Human Technology	5	Dutch (5)
Poland	Cracow University of Technology	Mechanical Engineering Production Engineering	3 2	Polish (5)
Portugal	University of Minho	Industrial Engineering Computer Science Electronics Engineering	2 2 1	Portuguese (5)
United Kingdom	Newcastle University	Computer Science	5	British (4) Romanian (1)
Age average	22.59 years old (total) 23.43 years old (without high school students)			
Gender	7 female 29 male			

On the 2012 edition of the programme, the variety of participants from different nationalities increased from 9 to 11 as stated in Table 2. This edition also had the particularity of having one participant, a B&O intern, introduced by the company when normally the universities are responsible for choosing the programme's participants.

Table 2 - Data from the 2012 edition's students

Country	University	Students' course	Number of students	Nationality
Czech Republic	Tomás Bata University	Industrial Design	5	Slovak (2) Czech (3)
Czech Republic	VSB – Technical University of Ostrava	Computer Science	3	Czech (5) Slovak (1)
		Electronics Engineering	3	
Denmark	Engineering College of Aarhus – IHA	Computer Science	2	Danish (4)
		Electronics Engineering	1	
		Mechanical Engineering	1	
Denmark	Struer Statsgymnasium	Science class	2	Danish (1) Iranian (1)
The Netherlands	Hanze University Groningen	Human Technology	4	Dutch (4)
Poland	Cracow University of Technology	Industrial Engineering	3	Polish (5)
		Electronics Engineering	1	
		Mechanical Engineering	1	
Portugal	University of Minho	Industrial Engineering	1	Portuguese (4)
		Computer Science	3	
United Kingdom	Newcastle University	Computer Science	5	British (3) Greek (2)
-	B&O Intern	Industrial Design	1	French (1)
Age average	23 years old (total) 23.35 years old (without high school students)			
Gender	10 female 26 male			

The variety of competences and nationalities available at the programme is deliberate to achieve the objective of allowing the students to have a multidisciplinary and multicultural experience where they can develop their competences and grow their awareness to the need of competences in innovation, creativity and, above all, expertise working in multicultural and multidisciplinary environments.

To maximize the interdisciplinary nature of the programme, the students are divided in six teams by the teachers. While defining the composition of the

teams, the teachers aim to avoid students from the same educational institution and, at the same time, have the utmost number of different areas of expertise within the same team. This is not only meant to increase the multidisciplinary nature of the teams and the amount of individual contribution to the project.

2.2 Description of the B&O summer school programme

2.2.1 Week 1

The first week of the program is aimed at making the students comfortable with the process of idea generation through sessions of small exercises so that they can apply outside-the–box thinking. To support the flow of ideas of the students, they experience a series of sessions where a problem is presented through briefings. A persona is introduced, and the students are given a certain amount of time to come up with solutions (products) to the problem presented (satisfaction of that given persona). The idea generation is built through Post-it©-based exercises that incentivise cross-pollination of ideas between the students regarding the briefing given.

Afterwards, these product ideas are to be built in quick mock ups made of cardboard and plasticine to be presented to an audience composed of the students, teachers and B&O experts that help guide the summer school. Many teams opt to follow a presentation similar to the one of the personas where they present the problem, explain the steps they took to achieve that solution and, in the end, they present the product focusing on its characteristics.

This exercise is given on the first day of the programme to help them develop their capability of working in team and present to a large audience, build their team performance, and give them a 'crash-course' on the pace the following weeks will be like.

After this first intensive experience, the following days are filled with similar but longer exercises. To maximize interactivity between the students', individual's and teams' creativity, the teams are constantly rearranged. There isn't a fixed team throughout much of the week. The ideas created are also constantly reviewed and improved upon through other persons feedbacks. Each student

develops an idea individually and passes it on to their colleagues which build upon the idea. When everyone has made a contribution to everyone's ideas inside the team, these are switched with the other teams and the process repeats itself. When interrupted, the teams are paired and each team member has to present the idea at hand to the two teams while getting feedback from them. The ideas are later collected and exhibited on one of the common walls where every team can access them.

Near the end of the week when the final teams are formed, they are again presented a persona in a more detailed way. This persona is the final one that will guide them throughout the rest of the programme. Every characteristic of this persona is presented through videos and stories. It is given total freedom to the teams to pick ideas from those on exhibition or to come up with new ones. In the last day of the first week, the B&O professionals pick up the final ideas each team has to develop on the following weeks. These ideas are to be improved through regular feedback from the other teams, teachers and B&O professionals and also through new knowledge acquired on the lectures given throughout the duration of the programme.

2.2.2 Week 2

With the final idea selected, the teams start the second week by presenting them to several B&O experts. These experts give feedback in the following weeks regarding technical issues about the teams' products requirements and prototypes.

During this week, the teams work almost incessantly on their products and their technical characteristics, feasibility and ways of building it through rapid prototyping. For this, several tools are made available and lectures are given in several subjects. These lectures aim to familiarise the students with their colleagues' fields of studies and also on how to do rapid prototyping, define product requirements, possibilities and functionalities of the several tools available (Lego Mindstorm^{TM}, Arduino^{TM} boards, plasticine, office supplies, among others). Visits to several production facilities are also provided to the students during this week not only to familiarize them with the tools and means

available to them if they need particular expertise building their prototypes but also so they could learn the range of expertise available at B&O.

2.2.3 Week 3

During the third and final week, the teams take their concepts and prototypes even further in order to have it ready for the final presentations. The students have to prepare the final prototype, the presentations they are giving on the last day of the programme and several documents about their concept.

Two final presentations are made. The first one focused on the technical features is attended by several B&O stakeholders, experts and employees from different departments and the teachers. The second one is dedicated to the product's features and persona of the products and is attended by the B&O's CEO, several B&O stakeholders, various media, teachers and a variety of B&O employees.

These presentations mark the end of the programme with the students packing up and leaving at the end of the week.

3 Competence

In this chapter, a literature review is made regarding competence literature. A definition for 'competence' is created and respective ranges in which competences are categorized.

3.1 Concept of competence

The demand of today's societies on the individuals is such that they need a wide range of competences to cope and deal with everyday challenges. To correctly identify these competences, it is required to find first a correct and updated definition for competence or competency. There is a slight difference in meaning in these two words. 'Competence' usually refers to functional areas whereas 'competency' refers normally to behavioural areas (Hoffman, 1999) but used infrequently as shown by several authors cited by Deist & Winterton (2005). Due to this infrequent usage, and in the sake of a coherent form of presenting the concept, from now on 'competence' will be the term used.

The concept of competence has several meanings and purposes over the time, reflecting different points of view according to the area it was applied. Hoffman (1999) approached the subject through an industrial point of view and argued that competence had several different meanings for psychologists, management theorists, human resource managers, educationists and politicians. Nevertheless, Hoffman describes two models that encompass these different views. Competence is either an observable set of performances previously defined and described in written standards or a descriptive model where competence is defined by the "underlying attributes of a person" which, in turn, can be defined as the "standard or quality of the outcome of the person's performance" (Hoffman, 1999). This dichotomy was due to the approaches other authors had when studying the subject, some using an American approach and others, an English approach, all in an industrial context.

In the education field, in an international context, the main organization to the assessment of competences is the Organization for Economic Co-operation and

Development's (OECD) Programme for International Student Assessment (PISA). This programme aims to assess the acquirement of knowledge and skills of students near the end of their compulsory education (OECD). In this perspective competences are essential for full participation in society both in the domain of an individual's formal and life-long educations necessary for being a functional member of the society (OECD, 2005).

For this purpose, PISA created the Definition and Selection of Key Competencies (DeSeCo) Project which describes 'competence' as involving the ability to draw and mobilise psychosocial resources (behavioural and technical abilities included) in particular contexts. It resembles Hoffman's definitions where the observable performances define the competences the individual had.

In 2005, Deist & Winterton went further than Hoofman went in 1999. They analyzed several sources of competences, from human resources literature to management strategy literature from the 90's. They do not attempt to create a definition of competence but reach the same conclusions as Hoffman where he says various definitions are to be found on several literatures depending always on the context and country analysed. They confirm Hoffman's ideas of observable, defined set of competences.

All these authors reinstate the concept that competences can be determined, identified and somehow measured but these authors did not define any set of competences. However there is much literature that provides lists of competences always depending on the context of the subject such as the study by Cabral-Cardoso et al. (2006) and project management literature. Since, in the context of the CD-DIP programme, the project management area of knowledge is of extreme importance due to the positive impact project managers have on successful outcomes in projects (Muller & Turner, 2007) and is essential for the success of the work of students, project management competences should be developed during the programme.

On this subject, IPMA Competence Baseline (ICB), from the International Project Management Association (IPMA) and the Project Manager Competency Development (PMCD) Framework from the Project Management Institute (PMI), stand out as being critical sources of information. Both are internationally

recognized documents that define and evaluate "competence required for a project management certificate" (IPMA, 2006) and ensure a "rigorous methodology for the development, assessment and recognition of competence in individual project managers" (Project Management Institute, 2002).

Despite the different contexts in which the ICB and the PMCD and PISA are used, it is possible to find a common framework for the definition of competence. The ICB describes a competence as "a collection of knowledge, personal attitudes, skills and relevant experience needed to be successful in a certain function" (IPMA, 2006). This is a similar definition to the PISA's one "(…) knowledge and skills [involving] the ability to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context" (OECD, 2005) and PMCD's ones "(…) cluster of related knowledge, attitudes, skills, and other personal characteristics (…)" (Project Management Institute, 2002).

As it is possible to ascertain, there is not a definitive, exact and consensual definition for the concept of competence and respective ranges of competences. With that in mind, in the present work, the context is the major influence on how competence can be defined. Since this work studied a multicultural research and learning programme, with students from several European countries and having a multicultural aspect that stimulates multidisciplinary work team with every team having members from different technical backgrounds, an adapted definition of competence was used to take into account these factors and make it more useful for the purpose.

In this context, the used definition of competence was: *the ability to draw and mobilise a collection of personal resources (attitudes, skills, experience and knowledge of various kind) and apply them to meet certain contexts and demands necessary in one's personal and professional life.*

This definition does not accommodate all the different contexts where the concept of 'competence' is used but, due to the nature of this project, it fits the purpose. It is broad enough to encompass all the previous definitions without having to take into account definitions used in particular contexts outside the ones studied here.

3.2 Classification of competences

When it comes to ranges of competences, one aspect that stands out on the literature reviewed is that several authors build ranges of competences with affinities between them with the exception of Hoffman. Hoffman (1999) created his definition of competence but, unlike the other authors cited, doesn't try to define any set of competences.

In PISA's definition, competences are classified in three broad categories of competences: interactive use of tools, act autonomously and interact in heterogeneous groups (OECD, 2005).

Each of these categories includes a set of competences such as follows:

- *Using tools interactively:* Ability to use language, symbols and text interactively; ability to use knowledge and information interactively; ability to use technology interactively

- *Interacting in heterogeneous groups:* Ability to relate well to others; ability to cooperate; ability to manage and resolve conflicts,

- *Acting autonomously:* Ability to act within the big picture; ability to form and conduct life plans and personal projects; ability to assert rights, interests, limits and needs.

Deist & Winterton (2005) also confirm a three dimensional model similar to the one PISA describes. They present a typology of competence with three major competences: cognitive, functional and social. These have a correspondence with the PISA's ones as can be seen: the cognitive competence is described as involving cognitive, knowledge and understanding which corresponds to PISA's 'acting autonomously' category because of the ability to understand and act within contexts; the functional competence matches PISA's 'interactive use of tools' category due to it involving operational competences; and the social competence corresponds with PISA's 'interact in heterogeneous groups' because they both involve behavioural and attitudinal competences regarding abilities to cooperate and relate to others.

Both PISA and Deist & Winterton provide broad categories that match each other but fail to identify with precision which competences compose these

categories. In this regard, project management literature stands out as being one critical source of information. The ICB and the PMCD Framework both provide their own ranges of competences each with much more detailed sets of competences but, despite the similarities, it is necessary to reinforce that these sources are solely focused on the project management context unlike the other ones that are much broader in terms of context.

4 Methodology

In this chapter, the methodology to achieve the purpose of creating a series of instruments to allow the students to assess their perception on how their competences evolved during the programme, proposed objective from subchapter 1.2, is presented.

4.1 Documental analysis on project management

To create the instruments necessary for assessing the competences , it is first necessary to identify which competences to assess. In this regard, as stated previously on subchapter 3.1, project management literature stands out as a critical source of information due to its precision when it comes to identify ranges and subsequent sets of competences. In this regard, chapter 5 presents the documental analysis based on project management literature review made and set of competences used for the assessment.

4.2 Questionnaires

According to Martin et al., (2005) inquiries aren't the best method to evaluate the students' own perception on their competences. This conclusion came out of Martin et al.'s study due to their approach to the subject. Instead of using the usual method of data treatment of questionnaires, Martin et al. used semi-structured interviews that gave them the opportunity to look deeper into and explore the answers the volunteers gave, an opportunity that inquiries don't give. Since it's unfeasible to interview all the students participating in the CD-DIP programme, a compromise was made where both interviews and questionnaires are made to the students.

The questionnaires were the main tool to assess the students' development and their own perception of development. They were made on the first and last day of the programme.

For each competence, the students were asked three questions. They were asked to assess their own competences, the importance in having these

competences, i.e. the importance students' give in having these competences, and also the importance they think employers give to these competences. This allows for a better comparison between what they think are the employers expectations and the importance they give comparing to how they assess themselves.

The fact that two questionnaires are made, one at the beginning and one at the end of the three week programme, allows for a comparison between the students answers giving evidence regarding what kind of impact the programme has on the students' competences.

One questionnaire is also made to students from previous years where they assess what they think was their degree of competence acquisition a year after the programme. This questionnaire serves as a contrast to validate assumptions made regarding the comparison between the questionnaires made at the beginning and at the end of the programme.

The Likert scale is used in the questionnaires with a range between 1 and 6 where, on the questions about the importance given to competences, 1 was Extremely Unimportant and 6 Extremely important and on the self-assessment questions, 1 was Very poor and 6 Very good. The choice for an even number of choices was made to avoid a neutral choice that many students could choose from and, therefore, not reaching satisfactory conclusions.

Questions regarding personal information such as age, sex, nationality, university and field of studies are also made to identify the profile of the students who take part on this programme.

4.3 Interviews

As stated previously, by Martin et al. (2005), the use of interviews gives an opportunity to delve into the answers the students give. In this regard, the semi-structured form of interview stands out as the ideal form because the interviewer can direct the conversation to the themes and questions needed and the questions and themes can be introduced at the interviewer's discretion (Ghiglione & Matalon, 1993).

The criteria to choose the students to be interviewed are the results from the first questionnaire given to them. The students with the most extreme answers and that rated very high or very low on the questionnaire were selected for a short interview during the second week of the programme. Through this criterion, eight students were selected and interviewed during the programme.

The questions were of open answer and regarded mainly the answers given on the first questionnaire. These interviews were an opportunity to delve into the answers they gave and let the students justify and explain for themselves their answers.

Some quotes highlighting certain interpretations and conclusions from the data collected are included on the Discussion on chapter 6.

5 Selection of Project Management Competences

As stated previously on subchapter 4.1, it is essential to define a set of competences from which the students will assess their perception on competence acquisition during the programme. This chapter is dedicated to this matter presenting the set of competences used for this study.

Project managers have an impact on projects that contribute to successful outcomes (Muller & Turner, 2007). In this regard, since this programme has all the characteristics of a PBL program (with the exception of being a relatively short period of time), project management competences are necessary for this programme. This was stated during the literature review on subchapter 3.2 and, as such, project management literature such as the ICB and the PMCD Framework will be the main source of information regarding sets of competences to assess.

The PMCD Framework defines and divides its competences in three broad categories (Knowledge, Performance and Personal Competence) very similar to the ones discussed previously on subchapter 3.2 but the similarities end there. Each competence is composed of units of competence and these in turn are composed of competence clusters each with its own elements. This makes the PMCD Framework a very difficult framework to work with due its' extremely complexity nature when it comes to find a defined set of competences to use on the assessment.

The ICB, unlike the PMCD, has a simpler framework to work with. It breaks down the competences identified into competence ranges which match the PISA and Deist & Winterton's ones. This breaking down is made by having three major ranges of competences according to their nature: behavioural competences, technical competences and contextual competences.

The behavioural competences range is described as covering attitudes and skills matching PISA's 'interacting in heterogeneous groups' and Deist & Winterton's

social competence. The technical competences range match PISA's 'interactive use of tools' and Deist & Winterton's functional competence due to the three involving skills and specific knowledge. The contextual competences range match PISA's 'acting autonomously' and Deist & Winterton's cognitive competence.

Despite these similarities, it is necessary to reinforce that the ICB's ranges of competence are solely focused on the project management context unlike the other ones that are much broader in terms of context.

ICB's competence ranges encompass a total of 46 competences. The choice of range of competences for this study was made according to the project's aim in which was to evaluate the development of non-technical competences necessary for working in multicultural and multidisciplinary environments which falls under the behavioural competences. These are: leadership; engagement & motivation; self-control; assertiveness; relaxation; openness; creativity; results orientation; efficiency; consultation; negotiation; conflict & crisis; reliability; values appreciation; ethics.

It was considered that all these 15 competences couldn't be used due to several constrain. For each competence, there are 3 questions to be made which leads to each questionnaire having dozens of questions. Since the programme is of intensive nature, this limits the time students have for this study. People assign different meanings to the same competence if they are given just its name. In an effort to avoid misunderstandings, the questions made to the students use the competences' definition and not their names but some of these definitions are very similar between themselves. The solution found is to combine several competences regarding their affinity of meaning. For the sake of a clear results presentation and analysis, the competences names are used to identify them on this study. The competence ethics was discarded due to being a complex subject to study on its own.

The final list of competences presented to the students on the questionnaires was the following:

- *Leadership:* -to provide direction and motivate others in their roles/tasks;

- *Engagement & motivation and Results orientation:* -make others believe in the project, follow and focus on key objectives;

- *Self-control:* -to deal with pressure and stress within the team;

- *Assertiveness:* -to ability to communicate points of view clearly, efficiently and persuasively;

- *Relaxation:* -to take adequate actions whenever tension arise in the team;

- *Creativity:* -to generate/manage innovative ideas and different ways of thinking and acting;

- *Efficiency and Reliability:* -to deliver results as they were agreed with minimum use of time and other resources;

- *Openness, Consultation and Values appreciation:* -to listen, respect, understand and make others comfortable enough for them to express their ideas, points of view and opinions;

- *Negotiation and Conflict & crisis:* -to deal with conflicts, to settle disagreements and to mediate different interests within the team.

6 Findings and Discussion

The methodology created was applied during the 2011 and 2012's edition of the CD-DIP programme. The questionnaires were given to most of the students at the beginning and ending of the three weeks programme with the questionnaire for previous students being made during a larger period coinciding in part with the CD-DIP's period. In this chapter the results obtained from these questionnaires are presented in graphics showing the kind of answers the students gave. The results are separated by year of the programme with the different questionnaires having their own subchapter.

6.1 CD-DIP 2011 students' perceptions

Of all 41 students who took part on the 2011's edition of the programme, 36 answered the first questionnaire, available at Appendix I – CD-DIP Initial questionnaire, on the first day of the programme and only 25 answered the final questionnaire, available at Appendix II – CD-DIP Final questionnaire, over a period of several weeks after the programme's end.

In this subchapter the data collected during the 2011's edition is presented.

6.1.1 Programme's initial questionnaire

The data collected from the first questionnaire is presented in Table 3 where the mean and standard deviation from the 3 questions made to the students is available. The questions regarded the students' competences self-assessment, how important was for students possessing the competences and how much importance employers give to all 9 competences presented. The information is compiled in the table below and is referred to along this subchapter.

Table 3 – Means and standard deviations from 2011's first questionnaire

Competences	Students' competences self-assessment		Valorisation of importance for students possessing competences		Valorisation students give to importance for employers in having competences	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Leadership	4,167	0,845	4,583	0,937	4,667	0,894
Engagement & motivation Results orientation	4,389	0,903	4,639	1,018	4,944	1,040
Self-control	4,694	0,980	4,889	0,747	4,944	0,984
Assertiveness	4,389	0,994	4,833	0,775	4,972	1,028
Relaxation	4,333	0,828	4,722	0,815	4,861	0,990
Creativity	4,500	0,655	4,694	0,856	4,861	1,099
Efficiency Reliability	4,167	0,737	4,722	0,779	4,972	0,971
Openness Consultation Values appreciation	4,722	0,944	4,861	1,018	4,806	1,064
Negotiation Conflict & crisis	4,500	0,845	4,556	0,843	4,250	0,732

The mean and standard deviation by themselves don't provide certain details about how students answered the questionnaires. Details such as dispersion of results and which answers the students voted the most are best apprehended through visual data. On the diagram below the data for the question regarding the students' self-assessment (minimums, maximums, 1st quartiles, 3rd quartiles and medians) is displayed.
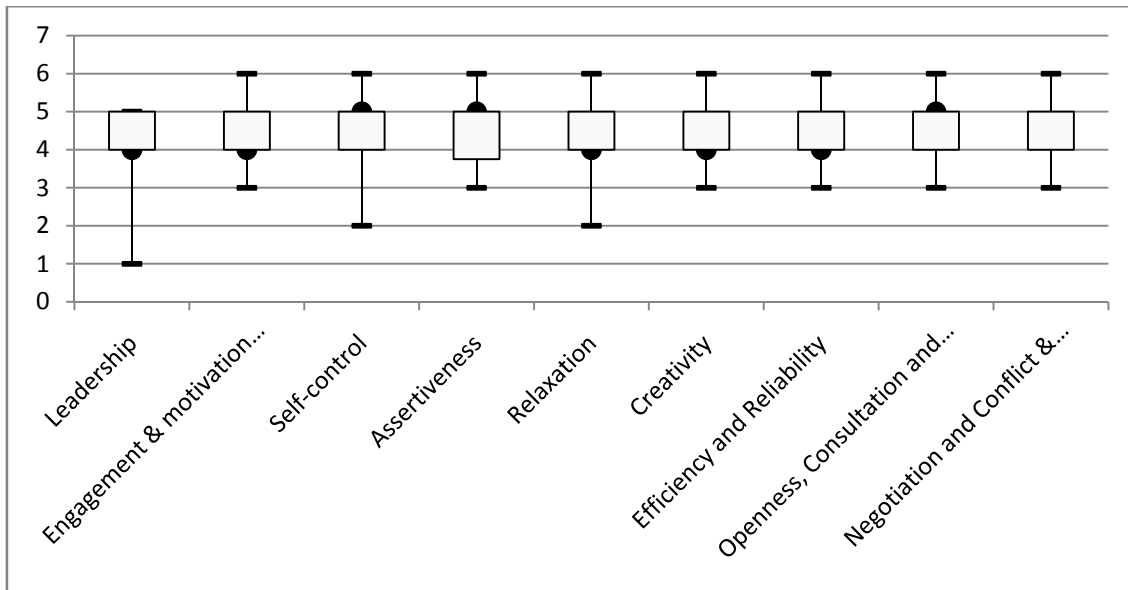
Regarding the students self-assessment on the first day of the programme, generally, the students assessed themselves with values ranging from Slightly poor (3) to Very good (6) with the exception for "Leadership", "Self-control" and "Relaxation". Regarding "Leadership", one student assessed himself with Very poor (1), another rated himself with Quite poor (2) at "Relaxation" and other two assessed themselves with Quite poor (2) regarding "Self-control". These answers contributed to the dispersion of values shown on the diagram above.

In the diagram, it is not very clear which competences students regarded as being their best. This distinction can be made through the answers' averages. "Openness, Consultation and Values appreciation" (4,722) was the highest ranked followed closely by "Self-control" (4,694), with "Creativity" and "Negotiation and Conflict & Crisis" in third place (4,500 each). Their worst competences, on their own point of view, were "Leadership" and "Efficiency and Reliability" (4,167 each).

If an analysis to the standard deviation is to be made, the answers that had a bigger dispersion of values are "Assertiveness" (0,994), followed by "Self-control" (0,980) and "Openness, Consultation and Values appreciation" (0,944) which can be perceived on the diagram above as having a larger 1st quartile than the other competences.

On the second question for each competence, it was asked the students to rate how much they thought certain competences are important to other students. For this, a scale was used ranging from Extremely unimportant (1) to Extremely important (6) with no neutral option. The results are presented visually on the diagram below and the means and standard deviations can be consulted in Table 3.
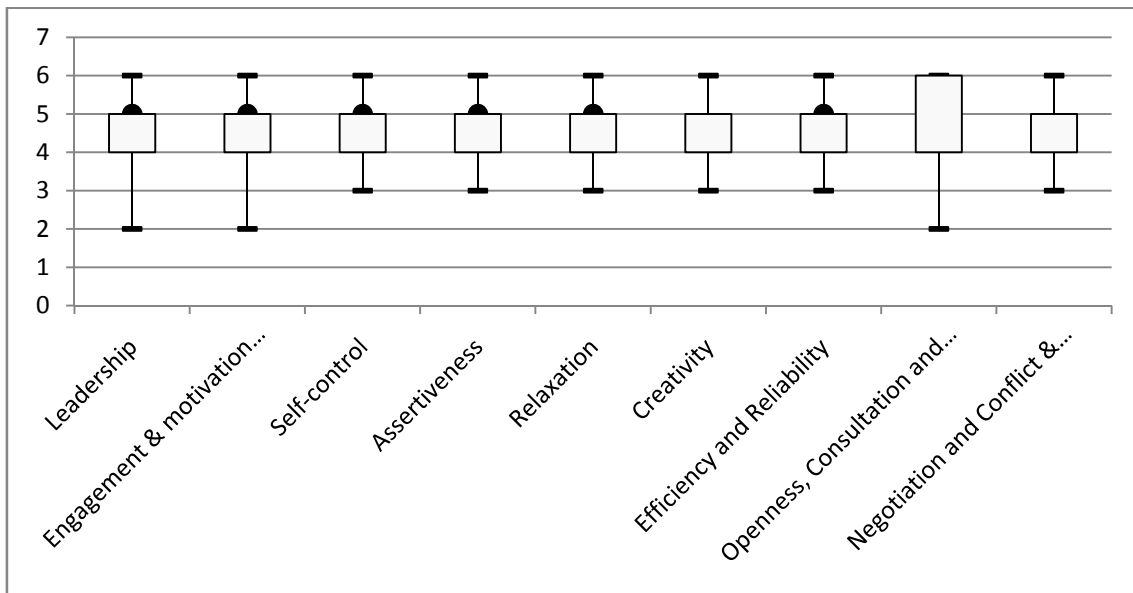
Generally, the students rated the importance with values ranging from Slightly unimportant (3) to Extremely important (6) with the exception for "Leadership", "Engagement & motivation and Results orientation" and "Openness and Consultation" where three students rated the importance with Quite unimportant (2). This resulted in these competences having a minimum lower than all the other competences.

It is not possible to verify on the diagram above which competences were or were not the most voted because the difference between them is very low. Nonetheless, through the averages it is possible to state that, when it comes to rate the importance students think other students should have, the students say the most important competences for them are "Self-control" (mean of 4,889), closely followed by "Assertiveness" (4,833) and "Openness, Consultation and Values appreciation" (4,861).

The ones they think aren't the most important competences are "Leadership" (4,583) and "Negotiation and Conflict & crisis" (4,556).

Regarding the standard deviation, two of the competences had the most and the same value of dispersion "Engagement & motivation and Results orientation" (1,018) and "Openness, Consultation and Values appreciation" (1,018).

The last question was related to rating the importance employers give to certain competences. The students were asked to rate how much importance they think employers give to certain competences in a range from Extremely unimportant (1) to Extremely important (6) with no neutral option. The results are not only available at Table 3 but also on the diagram below.
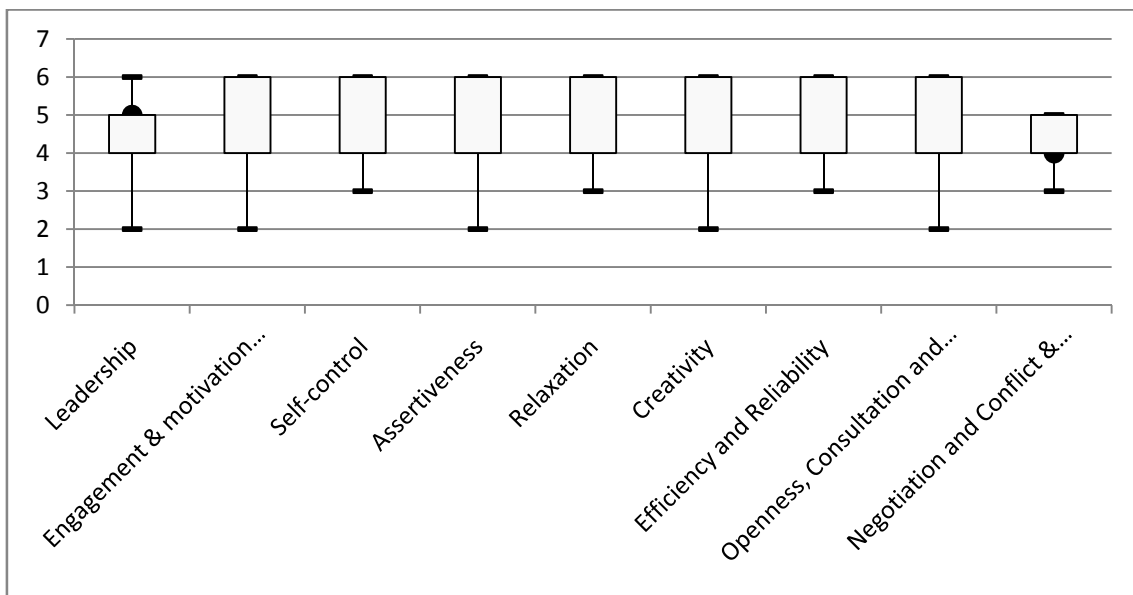
As was the case for the results from the second question, the diagram is not clear on which competences the students rated higher because the results for almost all competences are very similar but the mean provide this information. Regarding the importance that students think employees give to certain competences, they said "Assertiveness" (mean of 4,972), "Efficiency and Reliability" (4,972) and "Self-control" (4,944) are the most appreciated while "Negotiation and Conflict & Crisis" stood out as the competency with the lowest

score (4,250) with "Openness, Consultation and Values Appreciation" being the second one with the lowest score (4,806).

Analysing the standard deviation, the "Creativity" competency was the one with the most dispersion (1,099) followed by "Openness, Consultation and Values appreciation" (1,064).

In general, students assessed themselves as having significantly inferior competences than those needed for themselves and by an employer. The exception is the competency on "Negotiation and Conflict & crisis" which students found to be important to have but they think employers give a very low importance.

6.1.2 Programme's final questionnaire

On the last week of the programme, a few days before the final presentation, a second questionnaire was presented to the students. The results of the students' answers are presented below in Table 4 where the means and standard deviations from the 3 questions made for each competence are available with the exception of "Efficiency and Reliability" During the data collection, a problem occurred with the online questionnaire which prevented the results from this competence to be available. All the remaining information is compiled in the table below and is referred to along this subchapter.

Table 4 - Means and standard deviations from 2011's final questionnaire

Competences	Students' competences self-assessment		Valorisation of importance for students possessing competences		Valorisation students give to importance for employers in having competences	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Leadership	4,133	1,167	4,900	0,803	4,900	1,062
Engagement & motivation Results orientation	4,100	1,094	4,867	0,860	4,933	0,740
Self-control	3,767	1,406	5,000	0,788	5,000	0,830
Assertiveness	4,267	1,015	4,867	0,860	5,000	0,830
Relaxation	3,600	1,380	4,467	0,973	4,733	0,907
Creativity	4,500	1,333	4,700	1,055	5,033	0,928
Efficiency Reliability	-	-	-	-	-	-
Openness Consultation Values appreciation	4,033	1,159	4,900	0923	4,833	0,986
Negotiation Conflict & crisis	3,800	1,243	4,767	1,006	4,933	0,828

Since the information displayed in the table above doesn't provide details about the students' answers, the diagram below was created to provide the remaining data for the question regarding the students' self-assessment (minimums, maximums, 1st quartiles, 3rd quartiles and medians).
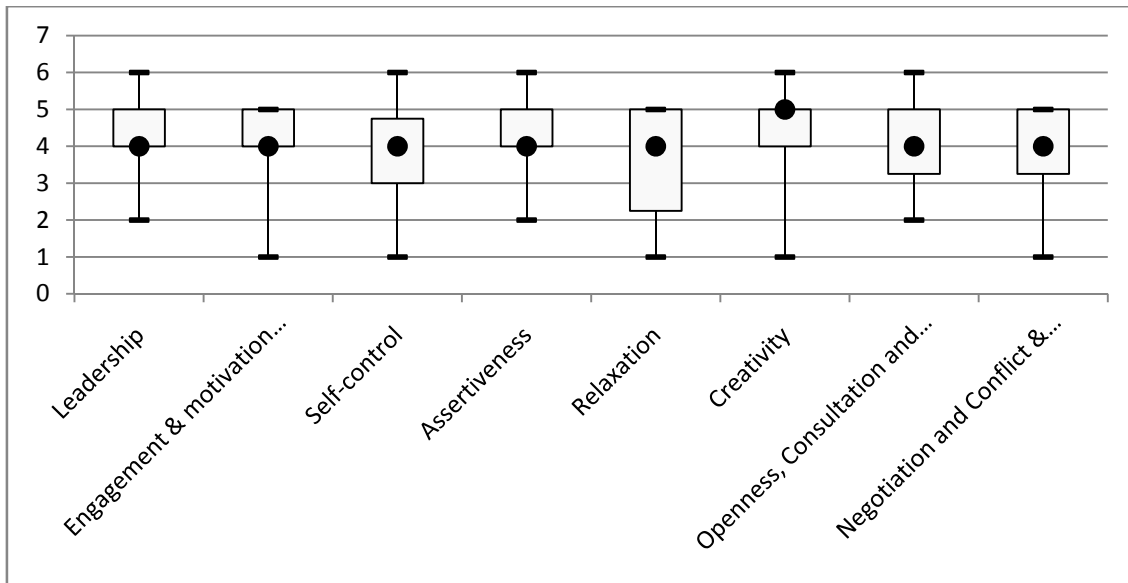
Regarding the students' self-assessment on the first day of the programme, the answers were way more varied than the first questionnaire. As is it possible to verify on the diagram above, the dispersion of values is significant.

Once again, not being clear which competences students regarded as being their best, it is necessary to withdraw this information from Table 4. "Creativity" (4,500), "Assertiveness" (4,267) and "Leadership" (4,133) were the top ranking of competences which students assessed has being their best while "Relaxation" (3,600), "Self-control" (3,767) and "Negotiation and Conflict & Crisis" (3,800) has being their worst.

If an analysis to the standard deviation is to be made, the answers that had a bigger dispersion of values are "Relaxation" (1,380) followed by "Self-control" (1,406) which can be perceived on the diagram above as having the largest 1st quartiles.

Regarding the questions where the students were asked to rate how much they thought certain competences are important to other students, the results are presented visually on the diagram below and the means and standard deviations can be consulted in Table 4.
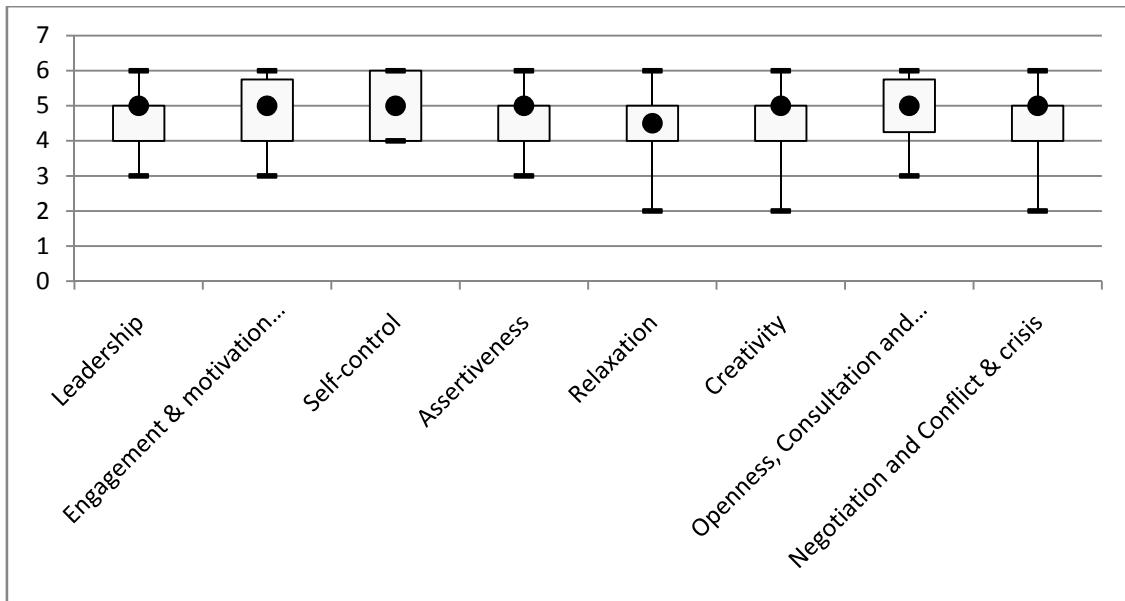
In these questions, the students were more consistent on their answers. As is it possible to verify, there isn't such a significant dispersion as in the diagram before this one.

Since almost all the medians have the same value, it is not possible to state which competences were voted the most. Drawing information from Table 4, it is possible to affirm that "Self-control" (with a mean of 5,000) was the most ranked followed by "Openness, Consultation and Values appreciation" (4,900) and "Leadership" (4,900).

The ones they think aren't the most important competences for students to have are "Creativity" (4,700), "Relaxation" (4,467) and "Negotiation and Conflict & crisis" (4,467).

Regarding the standard deviation two of the competences that had the most dispersion are "Creativity" (1,055) and "Negotiation and Conflict & crisis" (1,006).

The last question for each competence was related to rating the importance employers give to certain competences. The students were asked to rate how much importance they think employers give to certain competences with the results not only available at Table 4 but also on the diagram below.
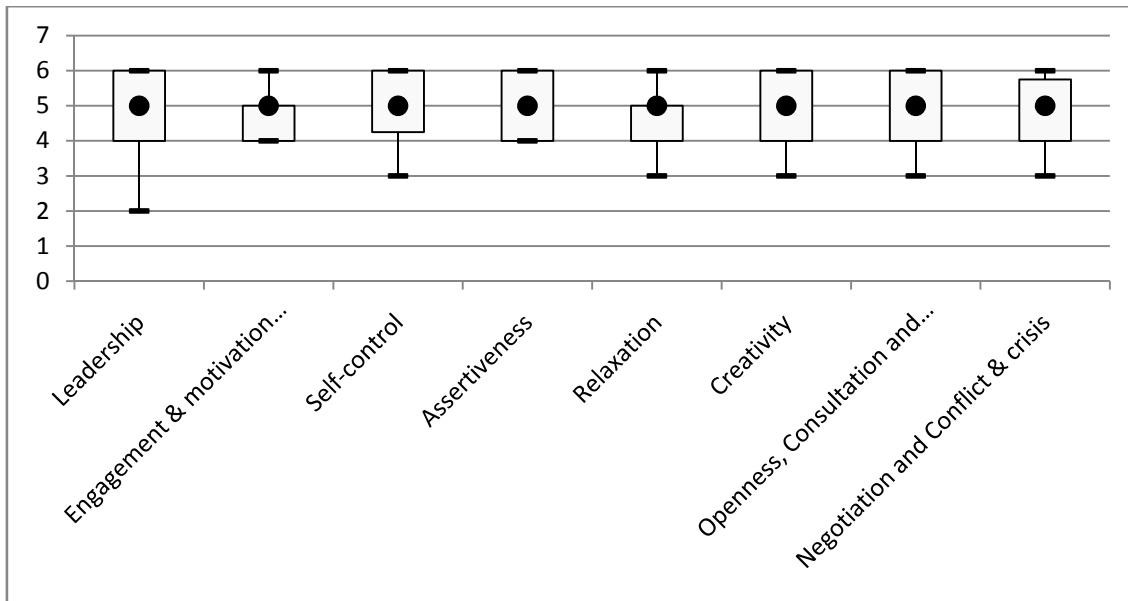
The diagram above doesn't follow the trend of the others. The results are easy to be interpreted mainly because the students' answers were very consistent. The difference between the highest and lowest ranked competences is almost insignificant. According to Table 4, "Creativity" (5,033), "Self-control" (5,000) and "Assertiveness" (5,000) were the highest ranked and "Relaxation" (4,733) and "Openness, Consultation and Values appreciation" (4,800) the lowest.

Regarding the standard deviation of the importance that students think employees give to certain competences, "Leadership" (1,062) and "Openness, Consultation and Values appreciation" (0,986) were the ones with the highest dispersion.

In general, once again, students assessed themselves as having inferior competences than those needed for themselves and those that an employer gives importance.

6.1.3 Comparing the initial and final questionnaire

The conclusions found on this and subsequent chapters regarding the comparison of the results between the first and last questionnaire of the 2011 edition on the CD-DIP programme are also analyzed in an article with the same

title as this dissertation by the same authors (Campos, Lima, & Fernandes, 2012). The conclusions are the same as the ones on the article mentioned.

The result analysis presented in this subchapter is made by comparing the questionnaires results from the first and last days of the programme, drawing conclusions from these results and confirming their interpretation with the interviews made to some of the students.

During the data analysis, there was a problem with the data collection that stood out as previously stated on subchapter 6.1.2. In the following charts where the data collected is presented, the "Efficiency and Reliability" competence is lacking the results from the final questionnaire because the questions for this competence weren't present at the final questionnaire which derailed the data collection.

On the diagram below, Figure 1, the data collected on the first and last questionnaire of the 2011 edition of the programme is presented showing side-by-side the averages of the answers the students gave.

Figure 1 - Comparison of the students' self-assessment from the 2011 edition
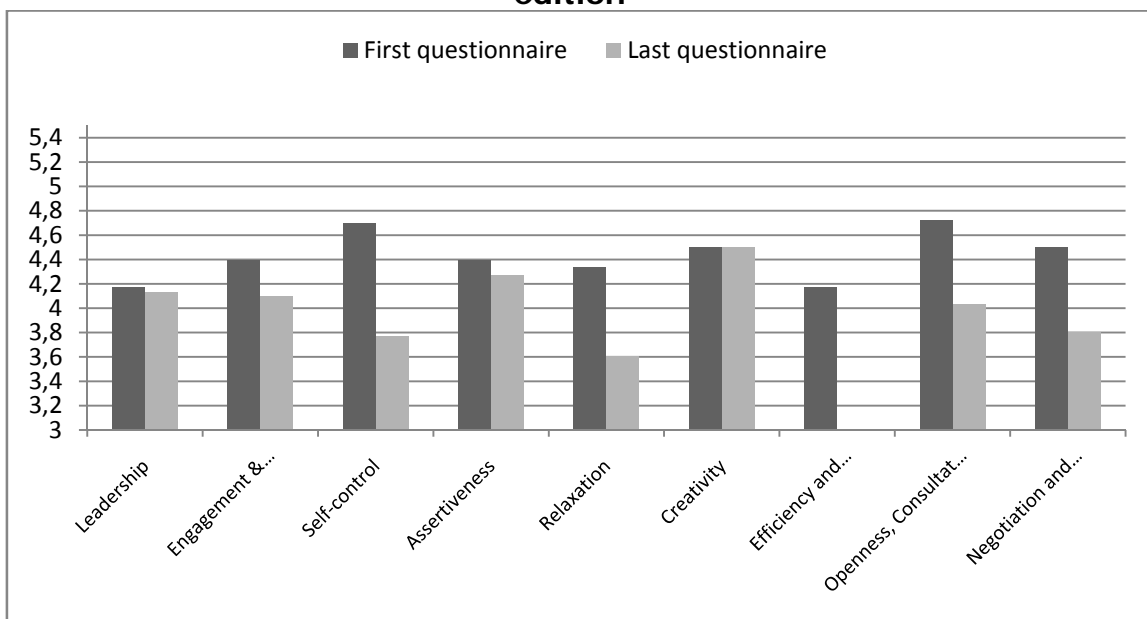
In Figure 1 the students' self-assessment is presented. Generally, the self-assessment showed that students' assessed themselves relatively low by comparison with the questions regarding the importance for them in having these competences and the importance they think employers give to these competences.

All competences decreased in the final questionnaire with the exception of "Creativity" which maintained its score on both questionnaires. These results could be explained by the programmes' intensive and demanding nature which the students never experienced before. This environment brought out their difficulties and made them realize they need to improve in all competences in general. One other possible explanation is that the programme made the students reverse their competence development but it is a highly unlikely possibility.

This trend doesn't apply to "Creativity" which the students rated with the same score on the first and last questionnaire. It may be the only competence where they haven't changed their opinion and, hence, their first perception is the correct one corroborated by the final questionnaire's results.

The results presented below on Figure 2 correspond to the questions made regarding how important is for the students in general to have these competences.

Figure 2 - Comparison of the perception on how important is for students to have the competences from the 2011 edition
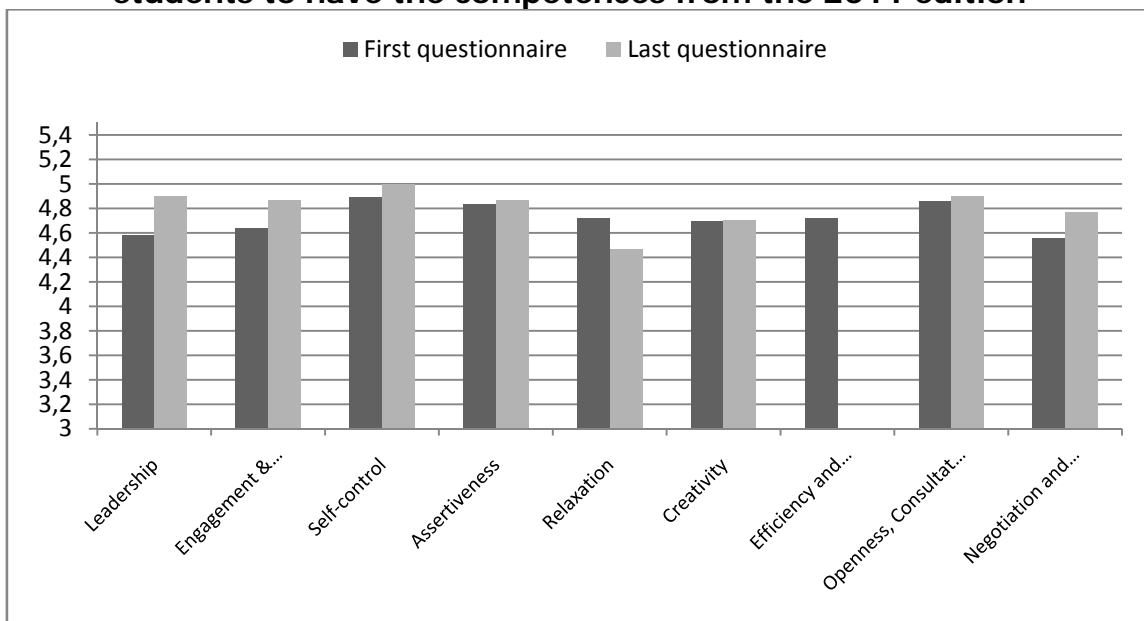
The results presented clash with the ones from Figure 1. The questions made on their perception about the importance for students in having these competences shows that they rate themselves lower comparing to what they think students should have. This means that, despite their positive perception on their own competences and that having these competences is important, they think they don't have these competences as developed as they should.

This conclusion is further enforced after analysing the results of the final questionnaire which shows a rise in the importance students give to these competences. "Relaxation" is the only competence that decreased but still maintains a higher score than the results from the self-assessment which reinforces this finding.

Nevertheless, "Creativity" continues to not have chances between the first and last questionnaire which, once again, means that their self-assessment may be a correct one.

On the diagram below, Figure 3, the results for the last questions on each competence are presented. The questions made were regarding the importance students think the employers give in students having these competences.

Figure 3 - Comparison of the importance employers give to the competences from the 2011 edition
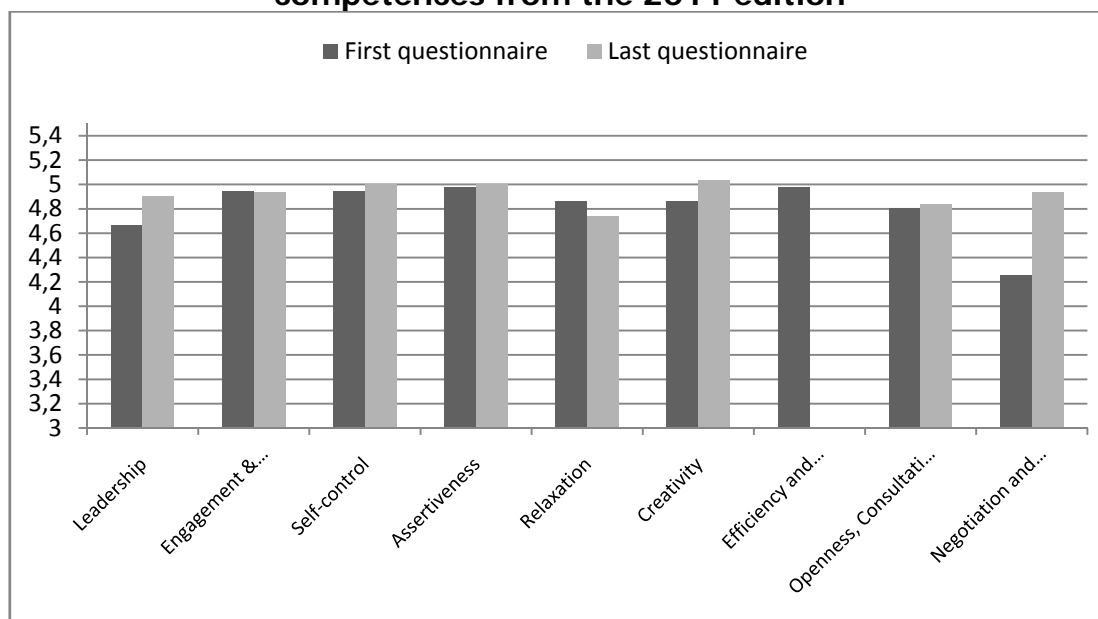
In general, the results presented on Figure 3 are the highest of the 3 different questions made for each competence with the "Negotiation and Conflict & Crisis" competence being the only case where the importance given is actually lower than the self-assessment. This means that, on their first questionnaire, the students thought they had this particular competence more developed than what they think is the employers demand. This was not the case on the final questionnaire where they inverted their answers stating that they were worse prepared than they first thought.

In general, the high results from this question show one trend which is that, despite the importance they give for students in having these competences and despite their positive self-assessment, they think they are not ready to meet the employers expectations. This conclusion is acknowledged by one of the students, interviewee S11-18, who says that this high score students gave can be explained by the high expectations that they think employers have when hiring.

These findings also contradict interviewee S11-15 who has a point of view opposed from the others and, despite valorising the acquisition of competences, think that employers don't give much importance to them.

In general, all competences maintain their slight rise trend with "Leadership" and "Negotiation and Conflict & crisis" having the highest rise on the final questionnaire with the exception of the "Relaxation" competence. These changes show that, for the students, employers give more importance to competences related to dealing with others than their employees inner attitudes such as the ones revealed by the "Relaxation" and "Openness, Consultation and Values appreciation competences".

Comparing these high results with the other questions made, it is obvious the students rated themselves lower than what they think employers expect from them. This may have several explanations which regard the need for different instruments of competence assessment or even a need for future chance on the programme.

6.2 CD-DIP 2012 students' perceptions

Of the 36 students who took part on the 2012's edition of the CD-DIP programme, all of them answered the first questionnaire on the first day of the programme but 4 didn't finish it. The data presented on the subchapters below is regarded to the 32 students who filled out the first questionnaire (available at Appendix I – CD-DIP Initial questionnaire) and the 25 students who answered all the questions from the final questionnaire (available at Appendix II – CD-DIP Final questionnaire).

6.2.1 Programme's initial questionnaire

The data collected from the first questionnaire of the 2012 edition is presented in the table below, Table 5 where the mean and standard deviation from the 3 questions made to the students is available. The 3 questions regarded the students' competences self-assessment, how important was for students possessing the competences and how much importance employers give to all 9

competences presented. The information is compiled in the table below and is referred to along this subchapter.

Table 5 - Means and standard deviations from 2012's first questionnaire

Competences	Students' competences self-assessment		Importance for students in possessing competences		Importance for employers in students possessing competences	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Leadership	4,313	0,738	4,625	0,907	5,063	0,878
Engagement & motivation Results orientation	4,375	0,871	4,656	0,787	5,063	0,878
Self-control	4,688	0,859	4,781	0,832	5,063	0,914
Assertiveness	4,281	0,991	4,969	0,861	5,313	0,821
Relaxation	4,156	0,884	4,719	0,813	5,000	0,950
Creativity	4,313	1,030	4,625	0,833	4,938	0,759
Efficiency Reliability	4,094	1,254	4,563	1,076	4,906	1,058
Openness Consultation Values appreciation	4,750	1,016	5,094	0,963	5,125	0,871
Negotiation Conflict & crisis	4,313	0,896	4,594	0,911	4,844	0,920

On the diagram below the data for the question regarding the students' self-assessment (minimums, maximums, 1st quartile, 3rd quartile and medians) is displayed. The average and standard deviation of the information provided below is available in the table above, Table 5.

The diagram below provides information on the self-assessment students made on the first questionnaire from 2012's edition of the CD-DIP programme.
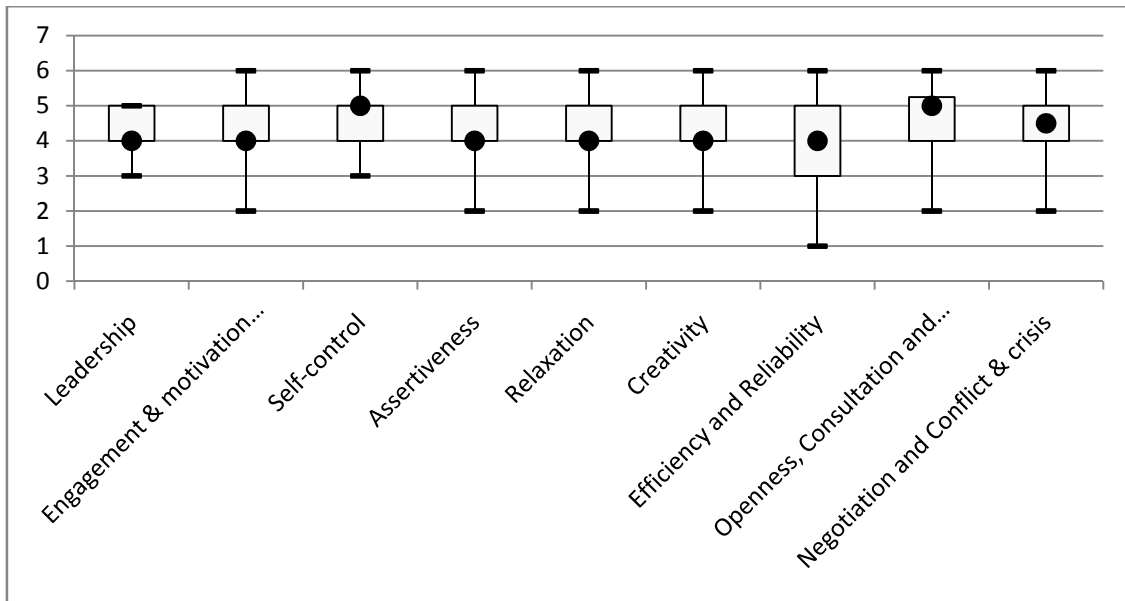
In the diagram it is possible to verify which competences are the highest ranked, information provided by the two highest 1st quartiles and also provided by the averages from Table 5. "Openness, Consultation and Values appreciation" (4,750) is the highest ranked followed by "Self-control" (4,688). Their worst competences, on the students' point of view, were "Relaxation" (4,156) and "Efficiency and Reliability" (4,094).

If an analysis to the standard deviation is to be made, the answers that had a bigger dispersion of values are "Efficiency and Reliability" (1,254) followed by "Creativity" (1,030). Of both of them, only "Efficiency and Reliability" can be perceived on the diagram above as having a high dispersion and low rating do to its large 1st quartile.

Regarding the questions of which competences they think are important to other students, the diagram below and Table 5 provide all the information.
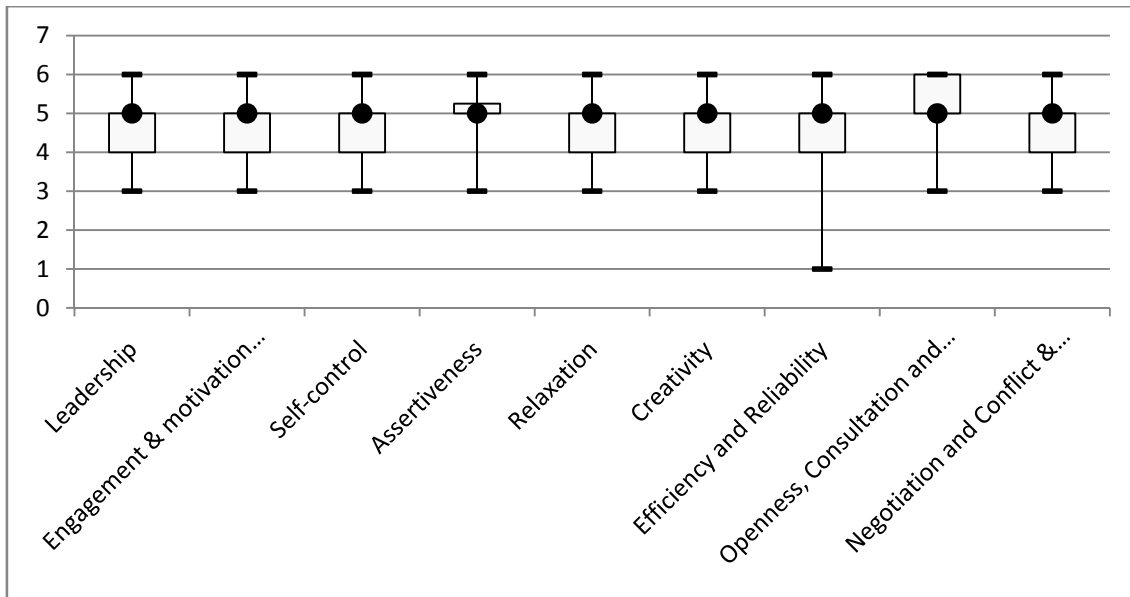
On the diagram above, it is impossible to verify which competences were the highest and lowest ranked relying solely on the information provided by the medians. As such, depending on the information provided by Table 5, "Openness, Consultation and Values appreciation" (5,094) and "Assertiveness" (4,969) are the ones with a high rank and "Negotiation and Conflict & crisis" (4,594) and "Efficiency and Reliability" (4,563) with the lowest.

Regarding the standard deviation, it isn't possible to confirm through the diagram which ones had the most deviation with the exception of "Efficiency and Reliability" (1,076) due to its minimum. The other one is, according to the information provided by Table 5, "Openness, Consultation and Values appreciation" (0,963)

The questions related to rating the importance employers give to certain competences are presented on the diagram below and also in Table 5.
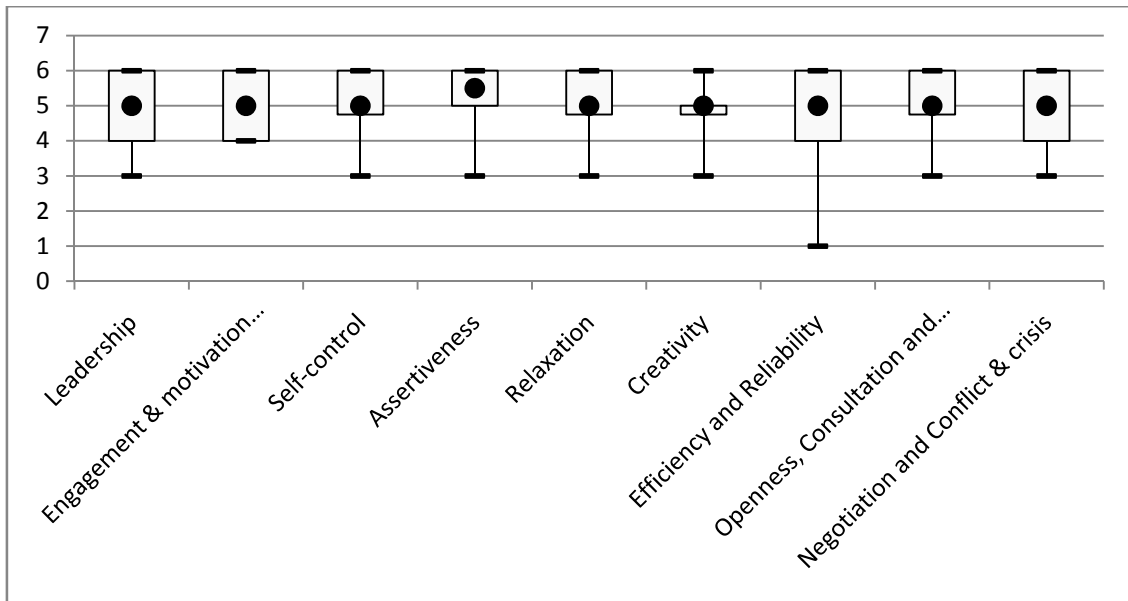
The data presented on the diagram above show that the competence "Assertiveness" (with a mean of 5,313) is the one with the highest rank. Truth is, according to the values presented in Table 5, "Openness, Consultation and Values Appreciation" (5,125) is closely behind.

Regarding the lowest ranked, the diagram is of no help. "Negotiation and Conflict & crisis" (4,844) and "Efficiency and Reliability" (4,906) are the lowest ranked according to the data accessible in Table 5.

Analysing the standard deviation, the "Efficiency and Reliability" competence was the one with the most dispersion (1,058) followed by "Relaxation" (0,950).

In 2012, in general, students assessed themselves as having significantly inferior competences than those needed for themselves and by an employer.

6.2.2 Programme's final questionnaire

On the last week of the programme, a second questionnaire was presented to the students and the data collected from it is presented below, in Table 6, on where the means and standard deviations from the 3 questions made for each competence are available.

Table 6 - Means and standard deviations from 2012's final questionnaire

Competences	Students' competences self-assessment		Importance for students in possessing competences		Importance for employers in students possessing competences	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Leadership	4,050	1,050	4,750	0,910	4,450	0,826
Engagement & motivation Results orientation	4,150	0,988	4,650	0,745	4,300	0,801
Self-control	4,000	1,170	4,850	0,745	4,700	0,865
Assertiveness	4,250	1,070	4,900	0,852	4,650	1,040
Relaxation	4,000	0,918	4,300	1,081	4,100	1,119
Creativity	5,000	1,026	4,900	0,788	5,050	0,945
Efficiency Reliability	4,250	1,020	4,650	0,933	4,850	0,875
Openness Consultation Values appreciation	4,300	1,081	4,650	1,226	4,600	1,095
Negotiation Conflict & crisis	4,100	1,210	4,350	1,182	4,300	1,031

The diagrams presented along this subchapter provide information the table doesn't regarding data dispersion.

The diagram immediately below was created to present data from the questions regarding the students' self-assessment (minimums, maximums, 1st quartile, 3rd quartile and medians).
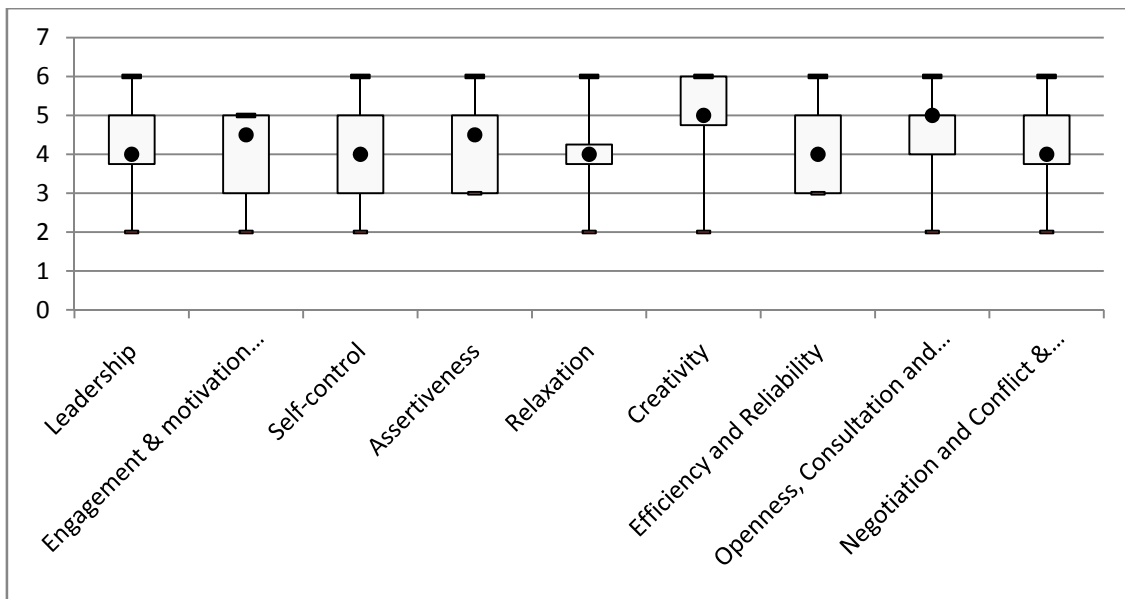
Regarding the students self-assessment on the first day of the programme, the answers were way more varied than those of the first questionnaire. As is it possible to verify on the diagram above, the dispersion of values is significant and it doesn't give much information on which are the highest and lowest ranking competences or even the ones with most data dispersion.

Once again, not being clear which competences students regarded as being their best, it is necessary to withdraw this information from Table 6. "Creativity" (5,000) and "Openness, Consultation and Values appreciation" (4,300) were the top ranking competences which students assessed has being their best while "Leadership" (4,050) and "Self-control" (4,000) has being their worst.

If an analysis to the standard deviation is to be made, the answers that had a bigger dispersion of values are "Negotiation and Conflict & crisis" (1,210) followed by "Self-control" (1,170).

The results from the questions asked on how much students think certain competences are important to other students are presented visually on the diagram below and the means and standard deviations can be consulted in Table 6.
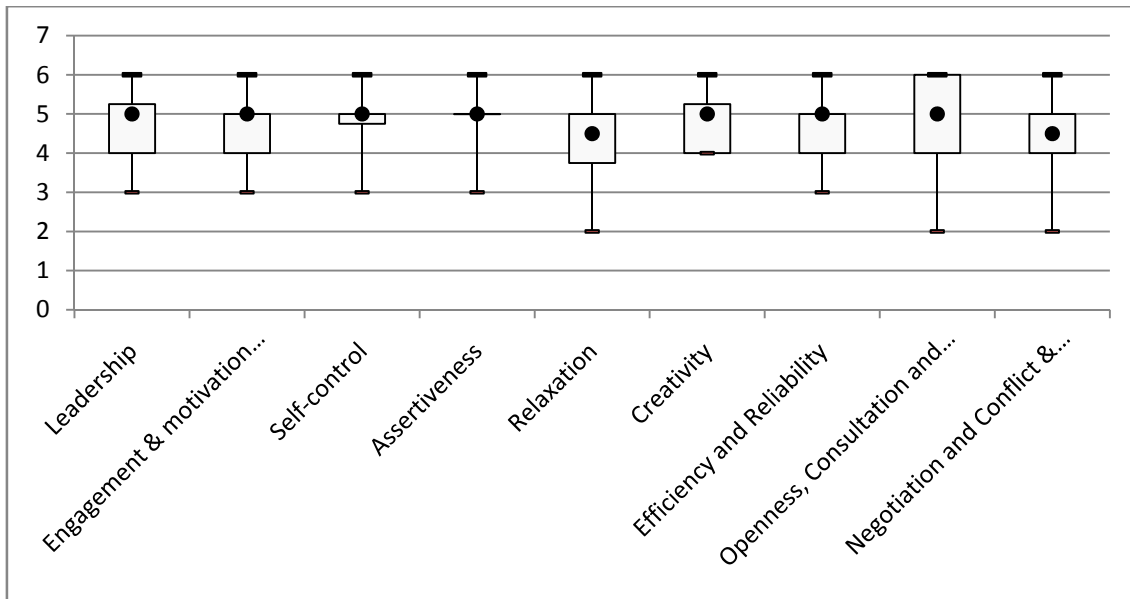
Since the information presented on the diagram above is of no use identifying which competences were or weren't the most ranked, it is necessary to draw this information from Table 6. Through the competences' averages, "Creativity" (4,900) and "Assertiveness" (4,900) are presented as being the highest ranked while "Relaxation" (4,300) and "Negotiation and Conflict & crisis" (4,350) are the opposite.

The data dispersion demonstrate "Openness, Consultation and Values appreciation" (1,226) and "Negotiation and Conflict & crisis" (1,182) as being the ones with the highest standard deviation.

The last question for each competence was rating the importance employers give to certain competences. The students were asked to rate how much importance they think employers give to certain competences with the results not only available at Table 6 but also on the diagram below.
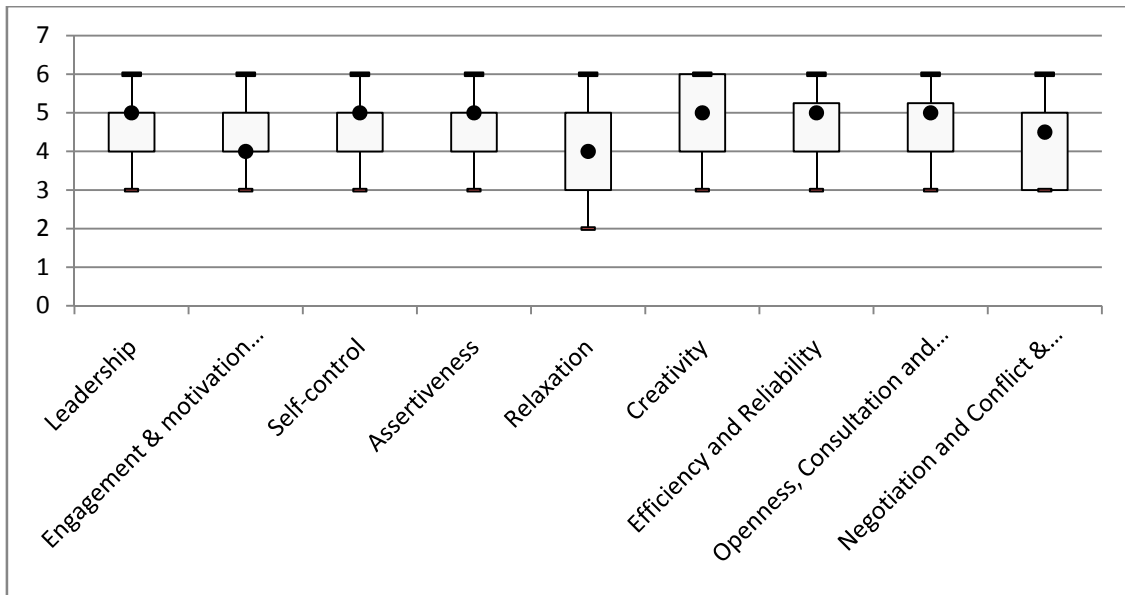
With the exception of "Creativity", the diagram above doesn't provide much information on the competences rank. According to the averages available at Table 6, "Creativity" (5,050) and "Efficiency and Reliability" (4,850) are the highest ranked and "Engagement & motivation and Results orientation" (4,300), "Negotiation and Conflict & crisis" (4,300) and "Relaxation" (1,119) are the lowest ranked.

Regarding the standard deviation of the importance that students think employees give to certain competences, "Relaxation" (1,119) and "Openness, Consultation and Values appreciation" (1,095) were the ones with the highest dispersion.

The "Creativity" competence has a similar score through all the 3 questions made about it, an aspect that makes this questionnaire results diverge from the one from 2011. Another aspect is that, in general, there isn't significant difference between the competences' self-assessment and the competences needed for students and wanted by employers in terms of values. A trend similar to the ones from the other questionnaires is not visible on this questionnaire in particular.

6.2.3Comparing the initial and final questionnaire

The result analysis presented in this subchapter is made by comparing the questionnaires results from the first and last days of the programme, drawing conclusions from these results. Unlike the previous comparison, in this edition interviews weren't made so there isn't any kind of confirmation of their interpretation through interviews.

On the diagram below, Figure 4, the data collected on the first and last questionnaire of the 2012 edition of the programme is presented showing side-by-side the averages of the answers the students gave.

Figure 4 - Comparison of the students' self-assessment from the 2012 edition
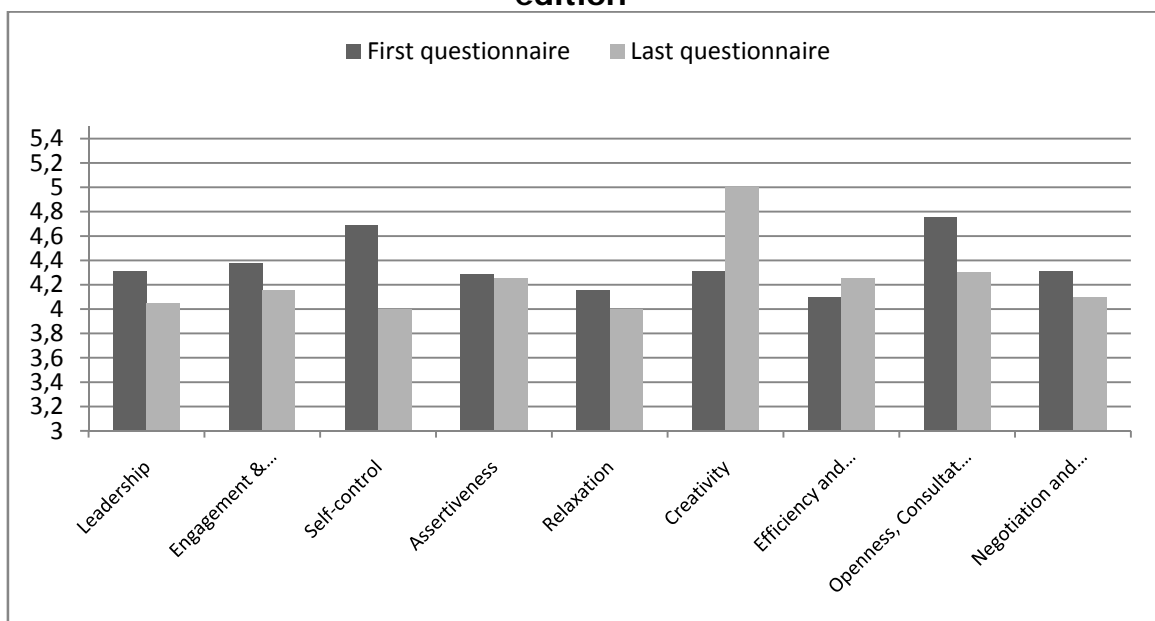
On the diagram above, the students' self-assessment is presented where, in general, all but two competences decreased in the final questionnaire. These competences were "Creativity", which had a high spike, and "Efficiency and Reliability". These results could be explained by the programmes' intensive and demanding nature which can reveal difficulties and lack of competences that the students weren't aware of previously. One other highly unlikely explanation is that the programme made the students reverse their competence development but it is a highly unlikely possibility.

The significant chance of perception regarding the "Creativity" competence may be explained also by the nature of the programme which demands that the students use their "Creativity" competence and, with that, they develop them..

The results presented below on Figure 5 correspond to the questions made regarding how important is for the students in general to have these competences.

Figure 5 - Comparison of the perception on how important is for students to have the competences from the 2012 edition
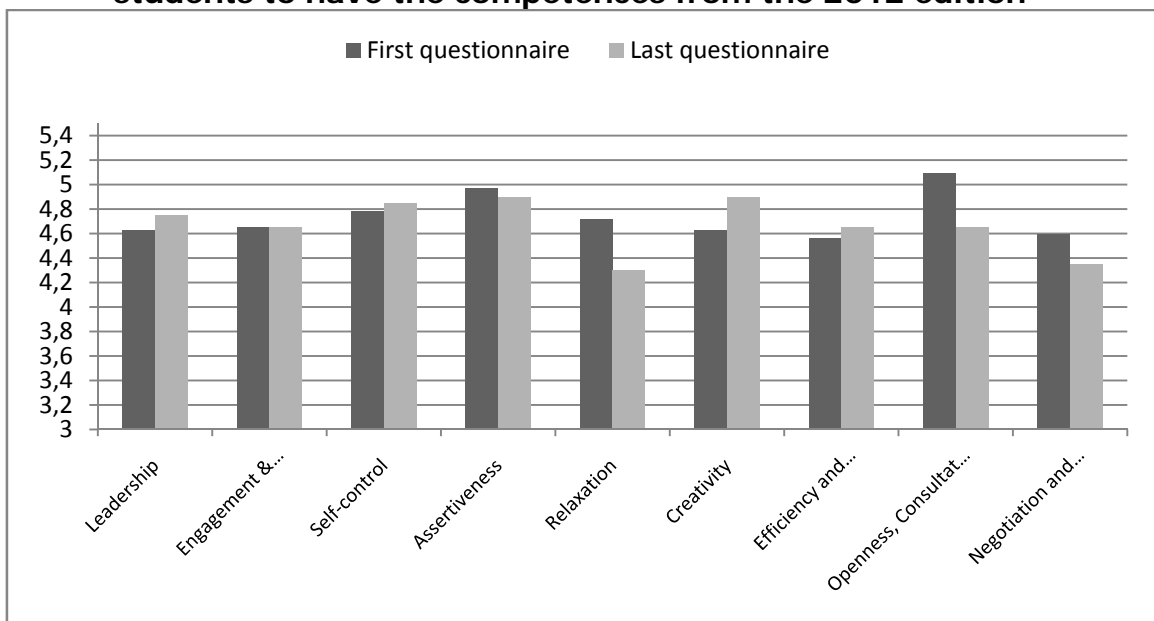
The results presented contrast with the ones from Figure 4 due to their higher results. The questions made on their perception about the importance for students in having these competences shows that they rate themselves significantly lower comparing to what they think students should have. This means that, despite their positive perception on their own competences and that having these competences is important, they think they don't have these competences as developed as they should.

The perception evolution is also noteworthy due to half of the competences going up on the last questionnaire and the other half go down. The only exception is the "Engagement & motivation and Results orientation" which maintains its average on both questionnaires.

The last diagram displayed below, Figure 6, presents the results for the last questions on each competence. The questions made were regarding the importance students think the employers give in students having these competences.

Figure 6 - Comparison of the importance employers give to the competences from the 2012 edition
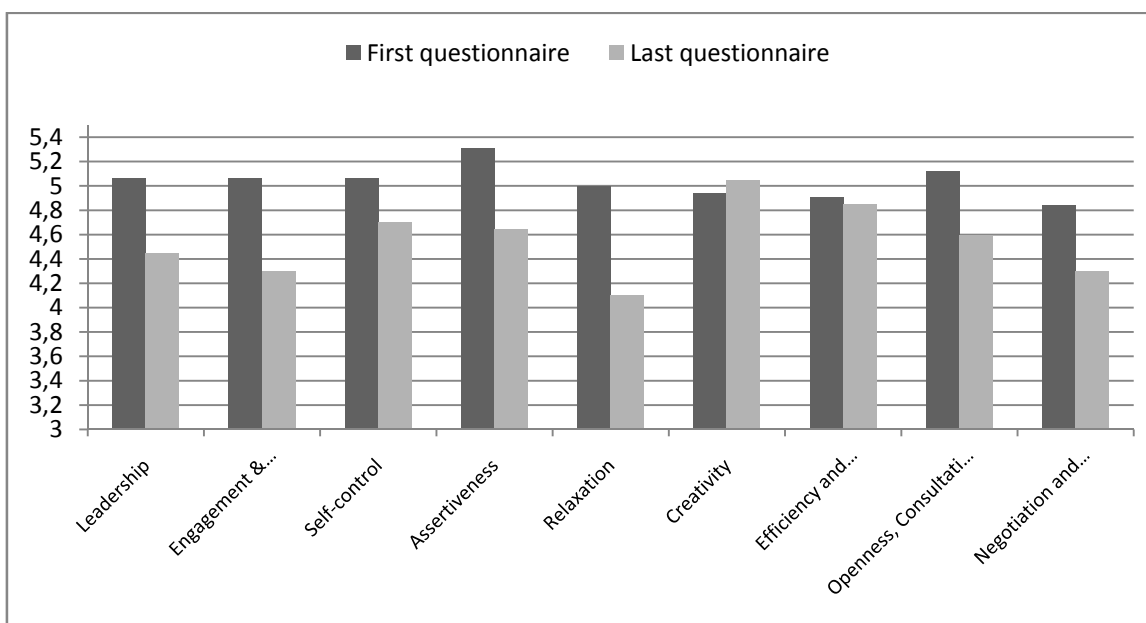
The results from this questionnaire contradict the conclusions drawn from Figure 3 from subchapter 6.2.3. While the 2011 answers stated that at the end of the programme, the students thought employers give more importance to all competences in general than what they previously considered. The students from 2012, opposed this vision as evidenced by the decline of importance given on all competences except "Creativity" which actually rose.

Despite this chance on these particular questions, the results presented and discussed on this subchapter are in line with the results described on subchapter 6.1.3 where the students rated themselves lower than the importance they give to the competences and the importance they think employers give to the competences. This means that, both in 2011 and 2012, they consider that they have their competences less developed than what they think students should have and what is the employers demand. This is an

indication that the programme has an impact on the students' perceptions regarding the competences studied. If this change is result of a new awareness regarding their competences, it is something that the questionnaires made to students from previous editions of the programme can or can't corroborate.

6.3 Post programme students' perceptions

The questionnaire available at Appendix III – Questionnaire for CD-DIP Former summer school students, was sent to students from previous editions of the CD-DIP programme. During the 2011's edition, one questionnaire was sent to students from the 2010 edition and a few students from 2009 and 2008 editions also answered it. The results are presented on subchapter 6.3.1.

At the 2012's edition, a questionnaire was sent to the students from the 2011's edition and its results are available at subchapter 6.3.2.

6.3.1 Questionnaire for previous year students (<2010)

A questionnaire was sent to students from the 2010's edition but also a few from 2009 and 2008 answered in a total of 18 students who filled out the questionnaire.

On this questionnaire, the former students were simply asked what impact the programme had on the competence listed in Table 7 on a rate from 1 (No improvement) to 6 (Strong improvement).

In the table below, Table 7, it is also presented the mean and standard deviation resulting from the data collected.

Table 7 - Mean and standard deviation from the previous students' questionnaire (<2010)

Competences	Mean	Standard deviation
Leadership	4,222	0,878
Engagement & motivation Results orientation	4,222	1,003
Self-control	4,556	1,247
Assertiveness	4,444	1,149
Relaxation	4,167	1,043
Creativity	4,611	1,037
Efficiency Reliability	3,722	1,227
Openness Consultation Values appreciation	4,500	0,985
Negotiation Conflict & crisis	4,111	1,183

According to the scale used, this results mean that students think that the programme had an overall positive impact on all competences with "Creativity" (4,611), "Self-control" (4,556) and "Openness, Consultation and Values appreciation" (4,500) being the ones where they most grew and "Efficiency and Reliability" (3,722) where the impact was the lowest but positive nonetheless. Nevertheless, there were some negative answers (students answering that the programme had no impact) that can be verified by the data distribution on the diagram below. These answers don't affect the general positive impact and are concentrated in the "Negotiation and conflict & crisis" and "Efficiency and Reliability" competences of which "Efficiency and Reliability" presents one of the highest standard deviations (1,227).
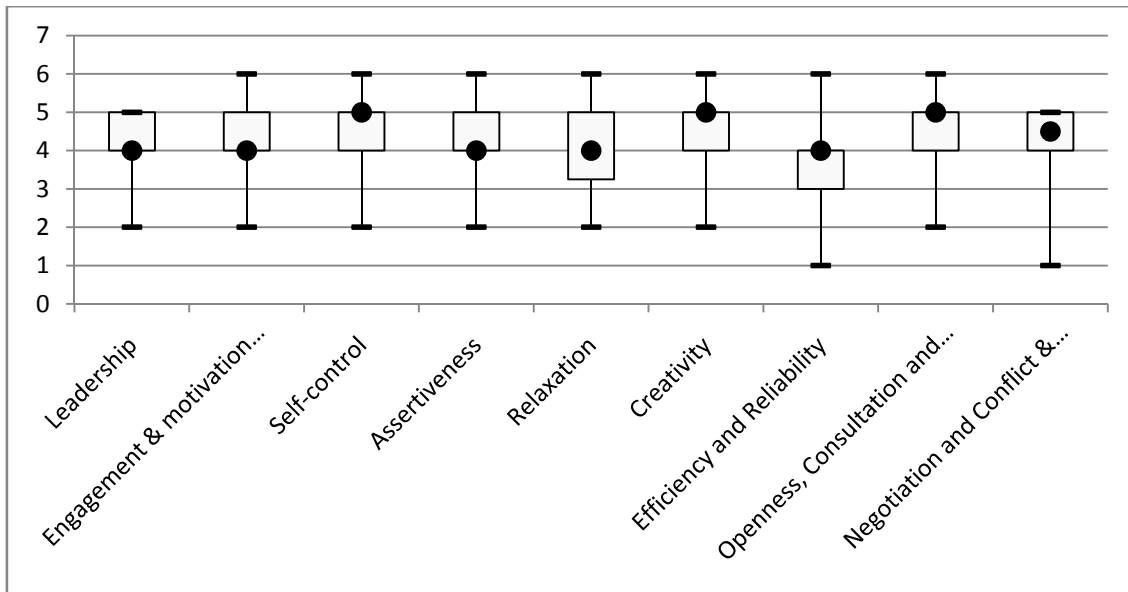
In conclusion, the students from 2010, 2009 and 2008 that filled out the questionnaire state that, in general, the CD-DIP programme had a very positive effect on them.

Comparing these conclusions with the ones from subchapter 6.1.3 and 6.2.3, it is possible to conclude that the programme is not by any means affecting negatively the students' competences or else the students would answer one year later that the programme hadn't a positive effect.

6.3.2 Questionnaire for previous year students (2011)

On the 2012 edition, a questionnaire was sent to students from the previous edition (2011) of the CD-DIP programme. Of the students who participated on the 2011 edition of the programme, 12 filled out the questionnaire.

In the table below, Table 8, the results from the data collected are presented.

**Table 8 - Mean and standard deviation from the previous students'
questionnaire (2011)**

Competences	Mean	Standard deviation
Leadership	4,077	1,256
Engagement & motivation Results orientation	4,231	1,481
Self-control	4,308	0,947
Assertiveness	4,385	1,044
Relaxation	4,154	1,144
Creativity	5,231	0,725
Efficiency Reliability	4,077	0,862
Openness Consultation Values appreciation	3,615	1,387
Negotiation Conflict & crisis	3,846	1,281

As with the results from 2010 and backwards students, the students from 2011 that filled out the questionnaire stated that the programme had a positive impact on their competences. The main difference between both is the data distribution and the fact that there weren't students from the 2011 edition stating the programme hadn't a positive impact on their competences.

On the diagram below, it is possible to verify that all students answered that they had some improvement on the competences listed during the programme. The one with most improvement was "Creativity" (5,231) while "Openness, Consultation and Values appreciation" (3,616) was the one with the lowest. The result of this last competence is explained by the high standard deviation (1,381).
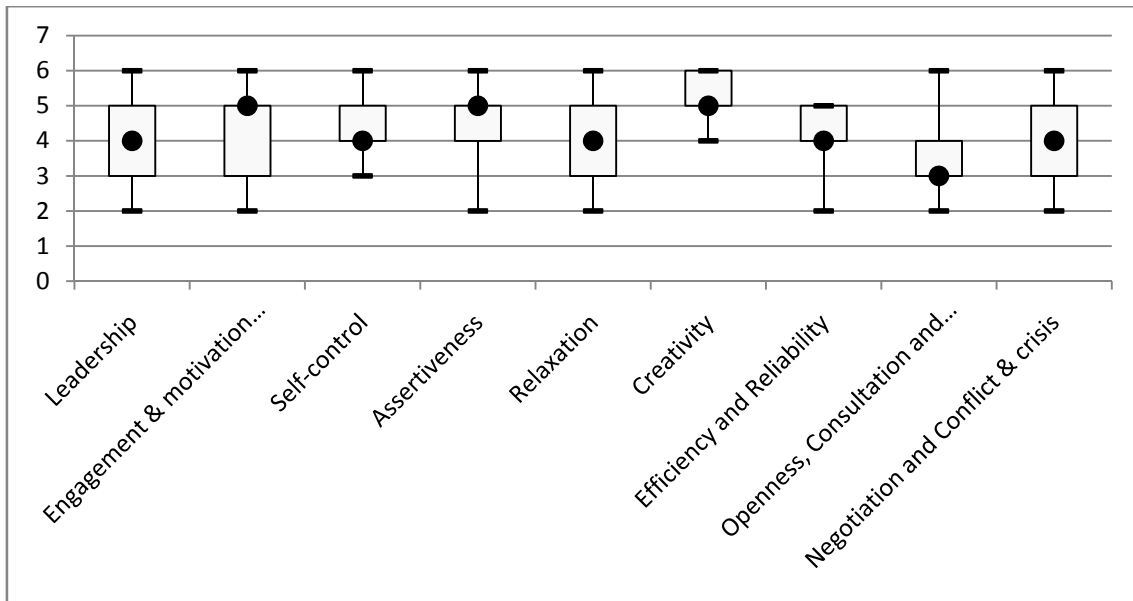
In conclusion, the students that participated on the 2011 edition and filled out the questionnaire state that, the CD-DIP programme had a positive effect on them.

Comparing these conclusions with the ones from subchapter 6.2, it is possible to create a case study from the data collected. The results from the subchapter 6.2 and the present subchapter regard the same students. They filled out the two questionnaires during the 2011 edition of the programme and, one year later, filled out a new questionnaire where they stated their opinion on the improvements the programme made on their competences. These comparing are presented on the next subchapter 6.3.3 CD-DIP 2011 post programme case study where several new conclusions are reached.

6.3.3 CD-DIP 2011 post programme case study

The data collected between the 2011 and 2012 edition of the CD-DIP programme allow for a comprehensive analysis of the evolution of the students' competences. This data was collected through two questionnaires given to the students during the beginning and ending of the 2011 edition of the programme, interviews made to them and one last questionnaire filled out one year after the programme.

The conclusions drawn from the subchapters 6.1.3 and 6.3.2 can be summarized, in general, in that students rate themselves lower than what they think others may expect from them and that they rate themselves lower at the end of the programme.

Since the students state on subchapter 6.3.2 that the programme has a positive effect on their competences but their self-perception decreases between the beginning and ending of the programme, one can conclude that the decrease is explained by the development of a new awareness on the students regarding their own competences.

7 Conclusions and future work

In this study, the perception of students from CD-DIP programme was assessed to evaluate students' competences development. At the time of this study, the programme didn't have any instrument to assess this apart from a questionnaire where they assess the programme superficially.

To accomplish the proposed objective of creating instruments so that students can register their perception on competences development during the programme, a series of assessment instruments was created with the purpose to allow the students to self-assess their competences acquisition and to collect their opinion on the importance they give to the competences and on the importance employers give to the competences listed.

The data was collected through a series of questionnaires given to the students to fill out and interviews with a few selected students. The first questionnaire was introduced on the first day of the programme. From the data collected, some students were selected to give an interview and, at the end of the programme, a final questionnaire was given. At the same time, another questionnaire was sent, this time to students from previous editions of the programme.

The data collected from these instruments was compiled and statistically analysed allowing the reaching of several conclusions.

In general, the results demonstrate that students rate themselves lower than what they think others may expect from them. This could mean that: the programme could be failing to develop the needed competences for its particular context; the students could think they aren't developing the needed competences and/or the students could be creating a better and more accurate perception of their competences development and realising the difficulties they have.

The conclusions drawn from the results from the 2011 edition demonstrate that one of these hypotheses may be confirmed.

The CD-DIP 2011 case study demonstrated that, despite the lower self-assessment after the programme, the programme had a very positive impact by improving their competences according to the students that filled out the

questionnaire one year after the programme. As such, the programme may not be failing to develop the competences but, in fact, may be creating a new and more accurate self-perception. This self-perception is lower after the programme but, since the students from previous editions state that the programme improved their competences, this self-perception is enhanced. By dealing with the programme's high demands, the students grow awareness of the high expectations they face and realise which competences they need to improve in the future.

The type of instruments used in this study only allows for an assessment of the students' perception and generates evidences on that direction. It doesn't confirm if the programme is actually doing what proposes which is the development of the students' competences but it generates evidence on that direction. To achieve a confirmation of the results of the self-perception, other kind of assessment needs to be made, one independent of the perception of the students to ensure that the perception corresponds to their actual development.

This study can be of used for programmes similar to the CD-DIP because it allows for a comprehensive knowledge on the students' perception regarding competence development allowing for feedback to be used to improve programmes of this nature.

References

Cabral-Cardoso, C., Estevão, C. V., & Silva, P. (2006). *Competências Transversais dos Diplomados do Ensino Superior: Perspectiva dos Empregadores e Diplomados.* Guimarães, Portugal: TecMinho.

Campos, D., Lima, R. M., & Fernandes, J. M. (2012). Identification and assessment of behavioural competences in multidisciplinary teams within design projects. *PAEE - International Symposium on Project Approaches in Engineering Education*, (pp. 15-22).

Deist, F. D., & Winterton, J. (2005, March). What is Competence? *Human Resource Development International, Vol. 8, No. 1*, pp. 27-46.

Ghiglione, R., & Matalon, B. (1993). *O Inquérito - Teoria e Prática* (Second Edition ed.). Oeiras, Portugal: Celta Editora Lda.

Hansen, M. S. (2012, January 3). *Conceptual design and development of innovative products*. Retrieved Janeiro 17, 2012, from Aarhus University School of Engineering: http://www.iha.dk/Default.aspx?ID=9303

Hoffman, T. (1999, March). The meanings of competency. *Journal of European Industrial Training, Vol. 23, No. 6*, pp. 275-285.

IPMA. (2006). *ICB - IPMA Competence Baseline, Version 3.0.* Netherlands: International Project Management Association.

Larsen, P. G., Fernandes, J. M., Habel, J., Lehrskov, H., Vos, R. J., Wallington, O., & Zidek, J. (2009, December). A multidisciplinary engineering summer school in an industrial setting. *European Journal of Engineering Education, Vol. 34, No. 6*, pp. 511-526.

Martin, R., Maytham, B., Case, J., & Fraser, D. (2005, May). Engineering graduates' perceptions of how well they were prepared for work in industry. *European Journal of Engineering Education, Vol. 30, No. 2*, pp. 167-180.

Martins, A., Carvalho, H., Fernandes, J., Spínola, M., Próspero, N., & Carrilho, P. (2006). *Estudos das competências e funções desempenhadas pelos Engenheiros Informáticos do IST no mercado de trabalho.* Instituto Superior Técnico.

Muller, R., & Turner, R. (2007, August). The Influence of Project Managers on Project Success Criteria and Project Success by Type of Project. *European Management Journal, Vol.25, No. 4*, pp. 298-309.

Nair, C. S., Patil, A., & Mertova, P. (2009, May). Re-engineering graduate skills - a case study. *European Journal of Engineering Education, Vol. 34, No. 2*, pp. 131-139.

OECD. (2005, May 27). *The Definition and Selection of Key Competencies - Executive Summary.* Retrieved May 11, 2011, from Definition and Selection of Competencies (DeSeCo): http://www.oecd.org/dataoecd/47/61/35070367.pdf

OECD. (n.d.). *What PISA Assesses*. Retrieved August 19, 2011, from OECD Programme for International Student Assessment (PISA): http://www.pisa.oecd.org/pages/0,3417,en_32252351_32235918_1_1_1_1_1,00.html

Powell, P. C. (2004, June). Assessment of team-based projects in project-led education. *European Journal of Engineering Education, Vol. 29, No. 2*, pp. 221-230.

Project Management Institute. (2002). *Project Manager Competency Development (PMCD) Framework.* Pennsylvania, USA: Project Management Institute, Inc.

UNESCO. (2010). *Engineering: Issues, Challenges and Opportunities for Development.* United Nations Educational, Scientifi c and Cultural Organization . UNESCO Publishing.

Appendix

Appendix I – CD-DIP Initial questionnaire

CD-DIP: Initial inquiry

The present inquiry is the first of two inquiries that will be provided to Bang & Olufsen's Summer School students. These inquiries aim to evaluate the acquisition of certain transversal competencies related to work in teams. The answers you provide on these inquiries will not affect nor will influence your evaluation throughout the summer school.

This first inquiry will take no more than 10-15 minutes and will focus on your perception of your current competencies.

The information collected will not be used for any end other than the achievement of this study.

If you have any doubts while filling in the inquiry, do not hesitate to ask for help.
Thank you for your colaboration.

* - Mandatory

Page 1 - General background information
1 - First name *

2 - Last name *

3 - Age *

4 - Gender *
 Male
 Female

5 - Educational institution *
 University of Minho
 VSB – Technical University of Ostrava
 Engineering College of Aarhus - IHA
 Hanze University Groningen
 Tomás Bata University
 Cracow University of Technology
 Newcastle University
 Struer Statsgymnasium

6 - Nationality *

7 - What's the subject of your course? (for UNIVERSITY STUDENTS ONLY)
(ex. Computer Science, Mechanical Engineering, etc.)

8 - How many years of study you have left before graduation? (for UNIVERSITY STUDENTS ONLY)
 None
 1
 2
 3
 4

9 - What's your gymnasium profile? (for HIGH-SCHOOL STUDENTS ONLY)

Page 2 - Teamwork background
10 - How often have you work in teams during your education? *
(ex. Every semester in every class; Every semester in some classes; A few times in every school year; etc.)

11 - In which types of teams did you already work during your education? Select all options that apply to your experience. *
 With team members with the SAME curricular units and the SAME nationality.
 With team members with DIFFERENT curricular units but the SAME nationality.
 With team members with the SAME curricular units but DIFFERENT nationalities.
 With team members with DIFFERENT curricular units and DIFFERENT nationality.

12 - Describe briefly those teamwork experiences. *
(ex. What was the purpose of the team work, what were you supposed to learn, etc.)

Page 3 - Competencies perception
For each statement, please select which option best describes your opinion according to the scale.

Regarding the ability to provide direction and motivate others in their roles/tasks, how do you rate:

13 - yourself. *
Very poor 1   2   3   4   5   6 Very good

14 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

15 - the importance that employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

Regarding the ability to make others believe in the project, follow and focus on key objectives, how do you rate:

16 - yourself. *
Very poor 1   2   3   4   5   6 Very good

17 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

18 - the importance that employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

Regarding the ability to deal with pressure and stress within the team, how do you rate:

19 - yourself. *
Very poor 1   2   3   4   5   6 Very good

20 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

21 - the importance that employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

Regarding the to ability to communicate points of view clearly, efficiently and persuasively, how do you rate:

22 - yourself. *
Very poor 1   2   3   4   5   6 Very good

23 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

24 - the importance that employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

Regarding the ability to take adequate actions whenever tension arises in the team, how do you rate:

25 - yourself. *
Very poor 1   2   3   4   5   6 Very good

26 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

27 - the importance that employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

Regarding the ability to generate/manage innovative ideas and different ways of thinking and acting, how do you rate:

28 - yourself. *
Very poor 1   2   3   4   5   6 Very good

29 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

30 - the importance that employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

Page 4 - Competencies perception (continuation)
For each statement, please select which option best describes your opinion according to the scale.

Regarding the ability to deliver results as they were agreed with minimum use of time and other resources, how do you rate:

31 - yourself. *
Very poor 1   2   3   4   5   6 Very good

32 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

33 - the importance that employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

Regarding the ability to listen, respect, understand and make others comfortable enough for them to express their ideas, points of view and opinions, how do you rate:

34 - yourself. *
Very poor 1   2   3   4   5   6 Very good

35 - the importance for students to have this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

36 - the importance that employees give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

Regarding the ability to deal with conflicts, to settle disagreements and to mediate different interests within the team, how do you rate:

37 - yourself. *
Very poor 1   2   3   4   5   6 Very good

38 - the importance for students to have this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

39 - the importance that employees give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

40 - If you had to lead a team, which ability you think would be the most important?
(To have patience, to communicate clearly, etc. and explain why)

41 - If you ever had to deal with conflicts and tensions inside a team, please describe briefly how would you manage the experience.
(explain how you reacted and what you did to solve the situation)

Appendix II – CD-DIP Final questionnaire

CD-DIP: Final inquiry

The present inquiry is the second and last that will be provided to B&O's summer school students.

This inquiry will take no more than 10 minutes and will focus on the development of your transversal competencies acquired during the duration of the summer school.

Focus on these last three weeks to answer this inquiry.

Once again, the information collected will not be used for any end other than the achievement of this study.

If you have any doubts while filling in the inquiry, do not hesitate to ask for help.
Thank you for your colaboration.

* - Mandatory

Page 1 - General section
1 - First name *

2 - Last name *

3 - Home institution: *
 University of Minho
 VSB – Technical University of Ostrava
 Engineering College of Aarhus - IHA
 Hanze University Groningen
 Tomás Bata University
 Cracow University of Technology
 Newcastle University
 Struer Statsgymnasium

After this summer school experience, regarding the ability to provide direction and motivate others in their roles/tasks, how do you rate:

4 - your improvement. *
No improvement 1   2   3   4   5   6 Strong improvement

5 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

6 - the importance employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6 Extremely important

After this summer school experience, regarding the ability to make others believe in the project, follow and focus on key objectives, how do you rate:

7 - your improvement. *
No improvement 1   2   3   4   5   6 Strong improvement

8 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

9 - the importance employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

After this summer school experience, regarding the ability to deal with pressure and stress within the team, how do you rate:

10 - your improvement. *
No improvement 1   2   3   4   5   6 Strong improvement

11 - the importance for students in having this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

12 - the importance employers give to this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

After this summer school experience, regarding the to ability to communicate points of view clearly, efficiently and persuasively, how do you rate:

13 - your improvement. *
No improvement 1   2   3   4   5   6 Strong improvement

14 - the importance for students to have this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

15 - the importance that employees give to this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

After this summer school experience, regarding the ability to take adequate actions whenever tension arises in the team, how do you rate:

16 - your improvement. *
No improvement 1   2   3   4   5   6 Strong improvement

17 - the importance for students to have this skill. *

Extremely unimportant 1   2   3   4   5   6   Extremely important

18 - the importance that employees give to this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

After this summer school experience, regarding the ability to generate/manage innovative ideas and different ways of thinking and acting, how do you rate:

19 - your improvement. *
No improvement 1   2   3   4   5   6 Strong improvement

20 - the importance for students to have this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

21 - the importance that employees give to this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

After this summer school experience, regarding the ability to deliver results as they were agreed with the minimum use of time and other resources, how do you rate:

22 - your improvement. *
No improvement 1   2   3   4   5   6 Strong improvement

23 - the importance for students to have this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

24 - the importance that employees give to this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

After this summer school experience, regarding the ability to listen, respect, understand and make others comfortable enough for them to express their ideas, points of view and opinions, how do you rate:

25 - your improvement. *
No improvement 1   2   3   4   5   6 Strong improvement

26 - the importance for students to have this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

27 - the importance that employees give to this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

After this summer school experience, regarding the ability to deal with conflicts, to settle disagreements and to mediate different interests within the team, how do you rate:

28 - your improvement. *
No improvement 1   2   3   4   5   6 Strong improvement

29 - the importance for students to have this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

30 - the importance that employees give to this skill. *
Extremely unimportant 1   2   3   4   5   6   Extremely important

31 - Select 3 (three) competencies that you think will be the most important in your future. *
 Ability to provide direction and motivate others in their roles / tasks.
 Ability to make others believe in the project, follow and focus on key objectives
 Ability to deal with pressure and stress within the team
 Ability to communicate points of view clearly, efficiently and persuasively
 Ability to take adequate actions whenever tension arises in the team
 Ability to generate/manage innovative ideas and different ways of thinking and acting
 Ability to deliver results as they were agreed with minimum use of time and other resources
 Ability to listen, respect, understand and make others comfortable enough for them to express their ideas and points of view
 Ability to to deal with conflicts, to settle disagreements and to mediate different interests within the team

32 - Explain briefly why do you think these 3 (three) competencies will be the most important in your future. *

33 - Did the course change your understanding of the capabilities of the other disciplines? How?

Appendix III – Questionnaire for CD-DIP Former summer school students

CD-DIP: Former summer school students

The present inquiry is part of a study that is being developed regarding transversal competencies acquisition related to teamwork in B&O's summer school . This inquiry will take no more than 10 minutes and will focus on the development of your competencies during the summer school and how much impact it had on your professional career. The information collected will not be used for any end other than for statistical purposes. Thank you for your colaboration.

* - Mandatory

Page 1 - General information

1 - First and last name *

2 - Age *

3 - Nationality *

4 - In which B&O summer school edition did you participate? *
2007
2008
2009
2010
2011

5 - What was your course when you participated on B&O's summer school? *
(ex. Bachelor-Mechanical Engineering, Masters-Electronics Engineering, etc.)

6 - In which education institution were you registered when you participated in B&O's summer school? *
University of Minho
VSB - Technical University of Ostrava
Engineering College of Aarhus - IHA
Hanze University Groningen
Tomás Bata University
Cracow University of Technology
Newcastle University
Struer Statsgymnasium

What impact did the summer school have on your ability:
For each statement, please, indicate and encircle which values describes your situation best according the scale presented.

7 - to provide direction and motivate others in their roles/tasks? *
No improvement 1   2   3   4   5   6 Strong improvement

8 - to make others believe in the project, follow and focus on key objectives? *
No improvement 1   2   3   4   5   6 Strong improvement

9 - to deal with pressure and stress within the team? *
No improvement 1   2   3   4   5   6 Strong improvement

10 - to communicate points of view clearly, efficiently and persuasively? *
No improvement 1   2   3   4   5   6 Strong improvement

11 - to take adequate actions whenever tension arises in the team? *
No improvement 1   2   3   4   5   6 Strong improvement

12 - to generate/manage innovative ideas and different ways of thinking and acting? *
No improvement 1   2   3   4   5   6 Strong improvement

13 - to deliver results as they were agreed with minimum use of time and other resources? *
No improvement 1   2   3   4   5   6 Strong improvement

14 - to listen, respect, understand and make others comfortable enough for them to express their ideas and points of view? *
No improvement 1   2   3   4   5   6 Strong improvement

15 - to deal with conflicts, to settle disagreements and to mediate different interests within the team? *
No improvement 1   2   3   4   5   6 Strong improvement

16 - Please describe how your experience in B&O's summer school made an impact on your competencies to: communicate clearly and efficiently, make oneself understood and be persuasive; deal with pressure, stressful situations within a team and also take action whenever conflicts in the team happen; listen, respect, understand and make others comfortable enough for them to express their ideas, points of view and opinions; deal with conflicts, settle disagreement and mediate different interests within the team.

17 - Please describe how your experience of the summer school made an impact on your competencies to: take responsibility to provide direction and make others focus and join the path chosen by motivating and making them

believe in their roles; take responsibility to deliver results exactly has they were agreed with minimum use of time and other resources; generate and/or manage innovative ideas and different ways of thinking and acting.

18 - On a whole, how important was B&O's summer school experience on your professional career? *