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The importance of extracurricular activities in academic success

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Dissertation

presented as partial requirement for obtaining the Master Degree Program in Statistics and Information Management

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação

Universidade Nova de Lisboa

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THE IMPORTANCE OF EXTRACURRICULAR ACTIVITIES IN ACADEMIC SUCCESS

By

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Master Thesis presented as partial requirement for obtaining the Master's degree in Statistics and Information Management, with a specialization in Information Analysis and Management

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledge the Rules of Conduct and Code of Honor from the NOVA Information Management School.

Margarida Luís Raimundo Serrador Luís

Vila Franca de Xira, 14th of July 2023

DEDICATION

In the very near past, I never thought I could be delivering this dissertation. Not because I couldn't do it or didn't have enough knowledge to do it, but because I didn't think it made sense anymore.

You always wanted the best for me, and you always did everything in your power to give me the best education in every possible way. Your dream was always for me to have a bachelor's degree and a master's degree, but unfortunately life plays tricks and you couldn't see either one of them. For a long time, I was in doubt as to whether I should go for a master's degree, and in 2021 I thought I couldn't wait any longer and had to do it. Do it for me and do it for you.

This dissertation is dedicated to you, Dad!

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ABSTRACT

The perception of the qualifications needed to enter the labor market in Portugal and in other countries is constantly changing. Nowadays, companies are increasingly looking for a new graduate with certain soft skills rather than a new graduate with an excellent GPA. On the other hand, more and more students are participating in extracurricular activities during their degree. This practice is usually often in the form of leisure and personal interest, but also to acquire certain skills that make them have a distinctive role as an individual. The purpose of this study is to understand if the practice of extracurricular activities has any impact on the Portuguese student's academic performance, as well as to understand if by participating in certain extracurricular activities, students are more likely to acquire soft skills that the job market is demanding. Two questionnaires (one for students and other for companies) were developed to obtain the results for this study. By applying certain statistical tests, it was possible to determine the conclusions for this research. Findings showed that participation in extracurricular activities not only improves academic performance but also facilitates the acquisition of soft skills. In addition, it was possible to determine which soft skills are most desired by recruiters/companies, and which soft skills students acquire the most by participating in extracurricular activities. Teamwork was the soft skill that appears in first place in both analyses, which turns out to be an excellent conclusion because it means that students have the requirements that the labor market are looking for.

KEYWORDS

Academic Performance; Extracurricular activities; GPA; Soft Skills;

Sustainable Development Goals (SGD):



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LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
BF	Brown-Forsythe
CAE-Rev.3	Classificação Portuguesa das Actividades Económicas - Revisão 3
CESE	Cursos de Estudos Superiores Especializados
ECA	Extracurricular activities
GPA	Grade Point Average
INE	Instituto Nacional de Estatística
NACE	National Association of Colleges and Employers

1. INTRODUCTION

Students enrolled in a higher education degree have been showing signs that their focus is not only being directed to better school performance and academic success, but also to understand how they can ease their entry in the labor market. Taking this in consideration, young people seek to introduce from an early age extracurricular activities and/or experiences in their lives, and there are two main reasons for doing that. On one hand, to do something they really like or to follow a vocation and, on the other hand, to somehow gain differentiating characteristics and be easier to get a job in the future (Roulin & Bangerter, 2013; Pinto & Ramalheira, 2017).

1.1. BACKGROUND

Until a few years ago, the employers in general, wanted to hire the young graduates with the best Bachelor/Master's average, because they believed that these were the ones who, due to their specific knowledge of a subject, could be the best employees for their company (Abdullah-Al-Mamun, 2012). However, as the years went by, and due to the today's economics scenario, the employers are changing their requirements about the graduates, and are preferring the famous "soft skills" due to the technical ones, and much research has focused on this issue (Balcar, 2014).

To gain differentiating characteristics, young people are interested in gaining skills, which can be technical or behavioral. The hard skills (the technical ones) are skills that can be measured or put on a scale, skills that are acquired through study or knowledge to do a precise task (Hendarman & Tjakraatmadja, 2012). In opposition there are soft skills (behavioral), that are non-technical competences that a person acquires over time, which may arise due to their personality, individual's interaction or be acquired by doing certain activities, for example career performance or extracurricular activities (Hendarman & Tjakraatmadja, 2012).

1.2. RESEARCH QUESTIONS AND OBJECTIVES

The main research objective is to try to understand if extracurricular activities have an impact (either positive or negative) on the academic success of Bachelor and Master students.

The study will be relevant in answering certain questions such as:

- a) "Do extracurricular activities affect academic success?";
- b) "What is the perception of students regarding extracurricular activities and academic success?";
- c) "Does participation in extracurricular activities conduct to the acquisition of soft skills?";
- d) "Are the soft skills desired by recruiters the same as the ones students most acquire with the participation in ECA's?";
- e) "Are there differences in academic performance and participation in extracurricular activities (ECA) depending on student's gender and area of study?";

In order to achieve the main objective and to answer to these research questions, it is important to define specific objectives:

- Identify and collect data on students who have completed a Bachelor's in the last 3 years, students in the final year of the Bachelor;
- Explore the relationship of the participation in extracurricular activities and the type of extracurricular activity with the Grade Point Average (GPA);
- Explore the relationship between the participation in the extracurricular activities with gender and area of study;
- Investigate the soft skills that student's value the most;
- Investigate the soft skills that companies or employers' value most;

Regarding the methodologies covered, this research will conduct two online questionnaires. One for students who have completed a Bachelor degree in the last 3 years or are in the last year of the Bachelor Degree, where a two-step approach will be used: (1) characterize the students' sample (analyze age groups, gender, study area, extracurricular type and others); (2) investigate the relationship of GPA with the participation in extracurricular activities, using the help of an analysis tool, Analysis of Variance (ANOVA) and the statistical tests associated with it. The second is a questionnaire for companies and it will have a subjective sampling. The objective of this one is to collect information about the characteristics that employers most look for and answer the question (c).

For this project we will consider 5 types of extracurricular activities, which were identified in the literature review:

- Sports (athletes or teachers);
- Job (part-time or tutoring);
- Association's (Student's Union, Academic Associations, Junior Enterprises, Youth Politics);
- Volunteering;
- Others (activities like music lessons, activities related with art, writing);

1.3. RESULTS AND CONTRIBUTIONS

After the completion of this research project, it is expected to obtain some results and contributions to the Scientific Community:

- Provide real data on the relationship of extracurricular activities with school success;
- Identify patterns that may improve the educational system to create better programs which will provide more suited graduates to the needs of Portuguese labor market;
- Give guidelines to students so they achieve the best possible school performance (i.e., understand the factors that can influence academic success and how to get around them);

1.4. REPORT STRUCTURE

This project research is divided in five main sections. The first one corresponds to the detail of the main topics of this report, the Literature Review. This section will explore the Portuguese higher education scenario and how is the entry in the labor market, will also explain why the soft skills are important for a graduate that is about to enter the employment world, and will investigate how soft skills are directly related to certain experiences and activities. In the second section, the Methodology will present the population, questionnaires, and the statistical analysis (what type of tests it will be used and hypothesis). In the third section, the Results will demonstrate firstly the exploratory data analysis of the two questionnaires, the results obtained with the ANOVA process, chi-square test of independence and t-test. The other section is the discussion of the results obtained and relate with other studies. Finally, the last section will provide certain conclusions that were obtained in this research project and will be also followed by the limitations and future work.

2. LITERATURE REVIEW

2.1. PORTUGUESE EDUCATIONAL AND PROFESSIONAL CONTEXT

2.1.1. Portuguese Educational Context

According to PORDATA (<https://www.pordata.pt>), in Portugal, the number of higher education graduates has been increasing over the years. As it can be seen in the figure below, in 1991 there were 18,671 higher education graduates (includes: Bachelor's Degree, Master's Degree, CESE), while in 2021 this number has increased 400%, there were 93,349 graduates (Technical courses, Bachelor's Degree, Master's Degree, Integrated Mater, Specializations and PhD).

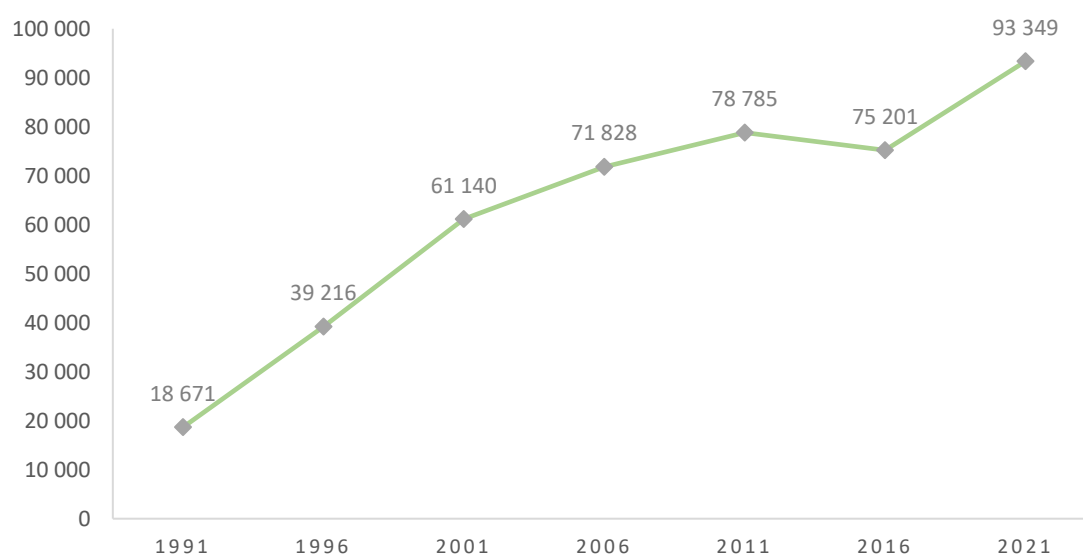


Figure 2.1 Graduates in higher education: total and by years (units: individuals). Source: PORDATA

In addition to the total number of graduates, it is also possible to distinguish them according to the gender of the student. It is possible to see in the Figure 2.2 that the gender “Female” is the one that have more graduates per year, when compared with the male gender. However, it is also possible to verify that over the years, the difference between the female and male genders has been decreasing, i.e., in 1996 the male gender represented 36% of the graduates and in 2021 it represented 41% , which means an increase of 5 percentual points.

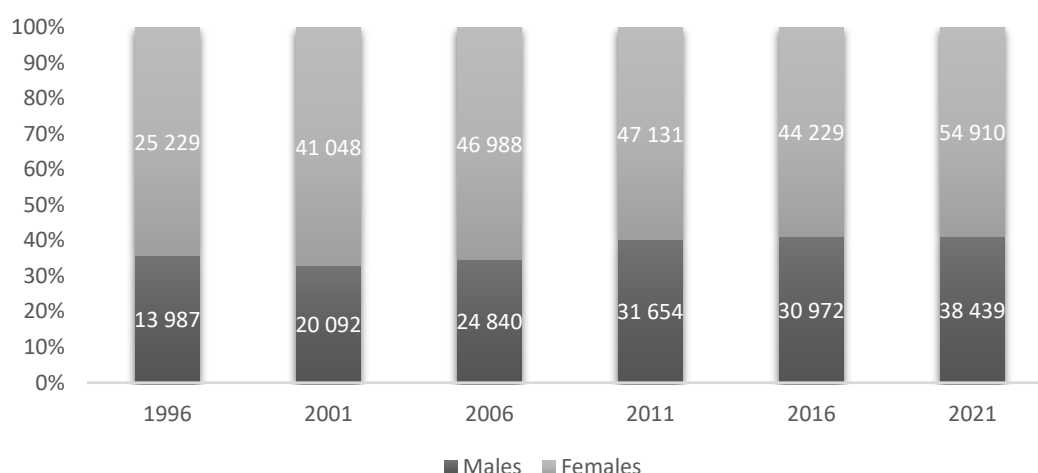


Figure 2.2 Graduates in higher education by gender (units: individuals). Source: PORDATA

The Table 2.1 shows the number of graduates according to the gender and area of study. With this table it is possible to make two different analyses. In the female gender, it is possible to see that in 1996 the area of study with more graduates were “Social Sciences, Business and Law”, this number increased 108% in 2021 (20,081 graduates vs 9,649) and it continues to be the area of study with the most graduates in 2021. In terms of male gender, in 1996 the area of study with more graduates was the same as the female, with 5,652 graduates and in 2021 was “Engineering, Manufacturing and Construction) with 11,664 graduates. It is also possible to conclude that the only area of study where the number of graduates had decreased in 2021 when compared with 1996, was “Education”, and this scenario occurred in both genders (-47% in female graduates and -20% in male graduates).

Table 2.1 Graduates in higher education by gender and area of study (units: individuals). Source: PORDATA

Area of study	1996		2021		2021 vs 1996	
	Female	Male	Female	Male	Female	Male
Education	5 148	998	2 747	796	-47%	-20%
Arts and Humanities	3 133	1 135	5 930	3 489	89%	207%
Social Sciences, Business and Law	9 649	5 652	20 081	10 948	108%	94%
Sciences, Mathematics and Computing	1 488	1 132	3 926	4 130	164%	265%
Engineering, Manufacturing and Construction	1 401	3 211	5 643	11 664	303%	263%
Agriculture	438	414	1 110	743	153%	79%
Health and Social Protection	3 174	841	12 742	3 263	301%	288%
Services	798	604	2 698	3 390	238%	461%

2.1.2. Portuguese Professional Context

In the Figure 2.3 it is possible to observe that the number of populations employed with higher education has increased over the time, and the population with the lower levels of education have decreased. It is also possible to check that 35% of the employed population in 2021 had the Higher Education level, followed by the Secondary and post-secondary with 30% and the population with no level of education represents only 0.4% of the employed population.

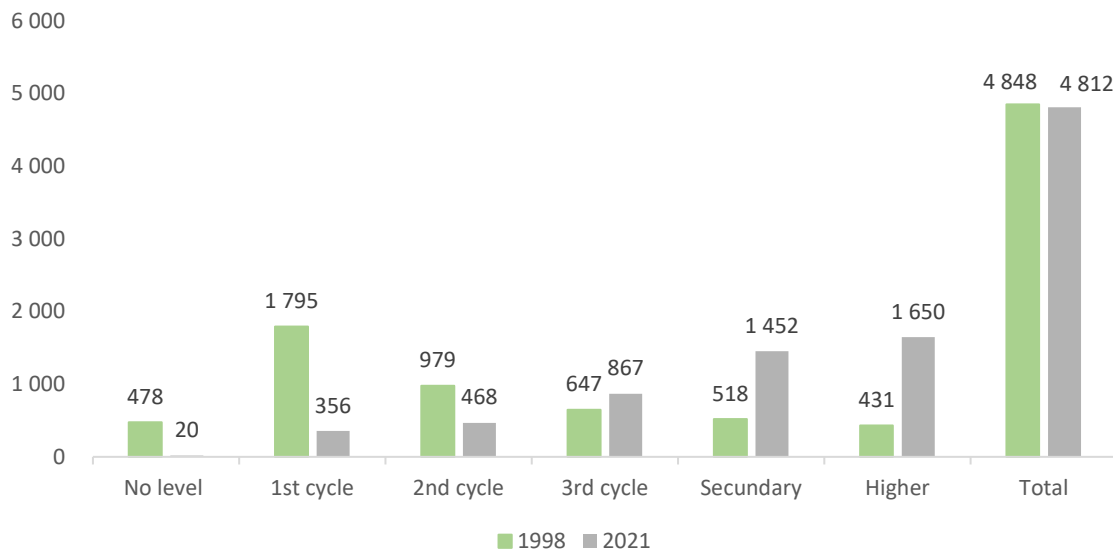


Figure 2.3 Employed population: total and by complete educational level (units: individuals in thousands). Source: PORDATA

Besides the analyze of the employed population, it is also important to see what the reflection of the educational level in terms of wage. It is expected that as the level of education increases the employee's salary should also increase (Connolly & Gottschalk, 2006).

By take a look of the Figure 2.4, it is possible to check that an employee without any education level was earning monthly 313€ in 1991, when a employee with Higher education was earning 1,071€, which is a difference of 758€, i.e., a employee with Higher Education earned 70% more than a employee with no education level. In 2019, the difference has decreased by 12 percentual points. when compared with 1991. An employee with no level of education earned 794€ in 2019 and an employee with higher education earned 1,888€ (an employee with Higher Education earned 58% more than an employee with no education level in 2019). It is possible to check that the level of education with more average monthly earnings was “Higher Education” in all the years presented (as it is expected). However, the “Higher Education” was the level of education that had the less increase of wage when compare 2019 vs 1991 (the increase was 76%). The education level with the biggest increase in the average monthly earnings was “2nd cycle” with an increase of 170%, followed by “1st cycle” with 157% and “No level” with 154%.

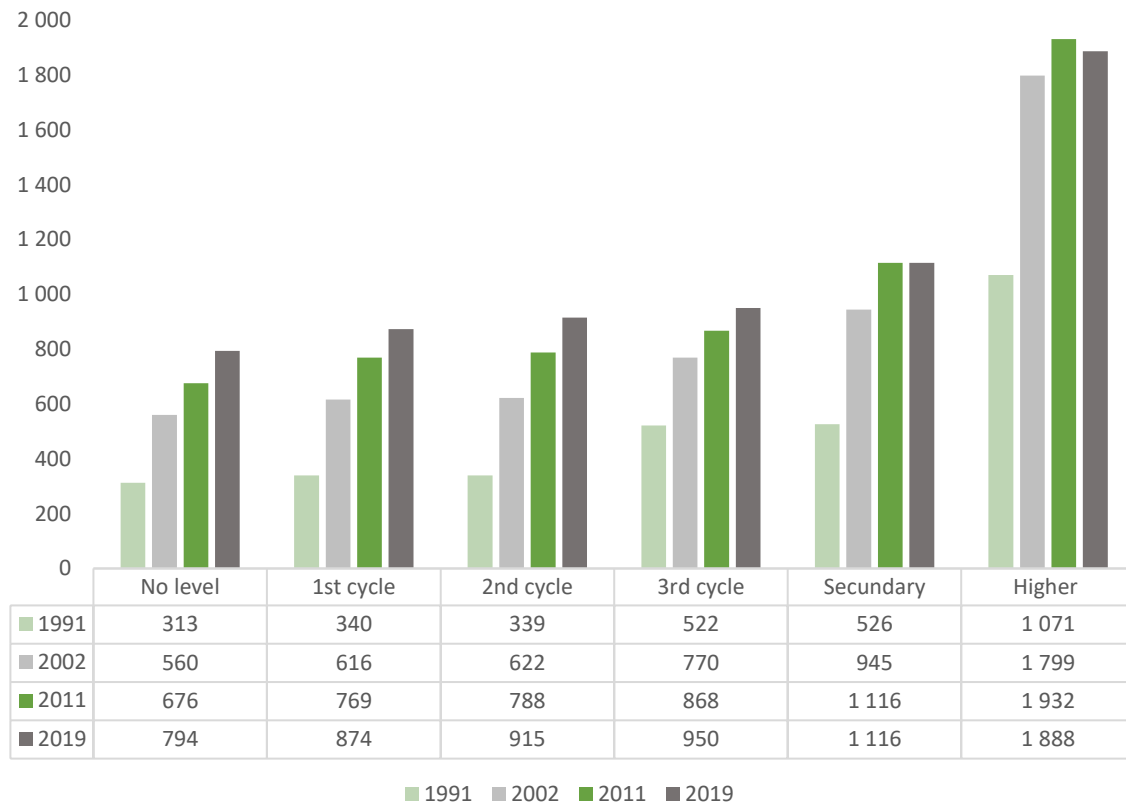


Figure 2.4 Average monthly earnings of employees: by education level (units: euros). Source: PORDATA

2.2. HUMAN CAPITAL THEORY

Human capital consists in a list of skills, knowledge, health, and attitudes that individuals invest and accumulate during their lives, and can be divided in two elements (Fleischhauer, 2007):

- Skills that can be acquired in “off-the-job training” or could be innate;
- Skills that can be acquired from formal schooling and “on-the-job training”

All these ways imply a cost that can be supported either by the employer or the employee. The theory defends that the investment will not only increase the employee’s earnings but also his productivity (therefore the employer earnings).

For Becker (1962), education is an investment of time and foregone earnings for a higher rate returns in later periods. He states that there are two different types of Human Capital, the general and the specific. General is “useful with the current employer but also with other potentials employers”. On the other hand, specific “only increases productivity in the current job”. The Human Capital theory also states that education is extremely essential in the productive capacity of a population. Besides the fact that education is extremely important for productivity, the theory also mentions that the higher level of education, in the long term there will always be more benefits, but the investment in education is only worthwhile if the long-term benefit is greater than the sum of the time spent in education and the fees for it (Almendarez, 2011).

This theory is extremely important for this study since it links skills to education, work, and extracurricular activities (“off-the-job training”) and explains the increase of young people with higher education (the benefits that higher education bring in the future).

2.3. THE IMPORTANCE OF SOFT SKILLS IN WORKPLACE

According to a study done in 2016 by the National Association of Colleges and Employers (NACE), the soft skills that are currently the most desired in young people who are about to enter the labor market are Leadership (80.1%), Teamwork (78.9%), Communication Skills – written (70.2%), Problem Solving (70.2%), Communication skills - verbal (68.9%) and Ethic (68.9%). However, there are many others which are extremely desirable, and these characteristics may differ according to the employer's activity (industry, commerce, medicine, etc.).

2.3.1. Perception of the recruiters about the soft skills in workplace

In 1990 a differentiating characteristic of a young person about to enter the labor market was to have a bachelor's degree or master's degree, because there were few young people who could afford higher education (Cerdeira & Cabrito, 2018). Nowadays, in the 21st century, this characteristic is no longer a differentiating point because the access to higher education has changed a lot. In today's times, most young people have the possibilities and opportunities to enroll in higher education instead of doing only primary or secondary school. Nowadays, having a degree not only ideally guarantees a better salary, but also brings the stability and security of being able to get a job (Portugal, 2004), and these are some reasons for the increase in the number of young people in higher education.

Since there are more young people with higher education, in 2023, to enter the labor market graduates cannot only have a good average of Bachelor and/or Master. Employers are increasingly seeking for not only a good average, but also a role of soft skills that will potentiate the new employee performance (Ibrahim et al., 2017).

The soft skills are now indispensable to the recruiters when they are hiring someone to fill the job (Deepa & Seth, 2013). The importance of soft skills can vary depending on the company's industry, the type of job function, the culture of the company in question, etc, but usually the recruiters are looking for “general” soft skills such as:

- “Teamwork” - Recruiters want applicants that can work well with others, contribute to a healthy team dynamic, and share tasks since collaboration and cooperation are crucial in many jobs (Khawam et al., 2017);
- “Creativity” – Creativity can lead to the production of valuable new ideas and sometimes can lead to the creation of solutions in terms of problem solving. In addition, it can contribute to the creation of well-being in the workplace as new ideas can emerge and help combat stress (Helzer & Kim, 2019).

As it is possible to see in Figure 2.5, more and more often, job advertisements are asking for a list of soft skills instead of an excellent average.



The image is a screenshot of a LinkedIn job advertisement. At the top, the job title "Manager, Product Management, Digital Transformation & Optimization" is displayed in a large, bold, black font. To the right of the title are two icons: a right-pointing arrow and three dots. Below the title, the location "Lisboa, Lisboa, Portugal (Híbrido)" is shown in a smaller font, followed by "há 18 horas" in green and "28 candidaturas" in grey. Underneath this is the text "All About You". A section titled "The candidate should demonstrate:" is followed by a bulleted list of eight requirements. The list includes skills such as passion for digital technology, entrepreneurial spirit, foundational product development background, analytical skills, business judgment, communication skills, and project management skills.

Manager, Product Management, Digital Transformation & Optimization

Mastercard · Lisboa, Lisboa, Portugal (Híbrido) há 18 horas · 28 candidaturas

All About You

The candidate should demonstrate:

- Passion for all things digital and intrinsic curiosity to understand new technology
- Entrepreneurial spirit and global mindset with a passion for learning and using data to solve large scale business problems
- Foundational background in product development and management
- Strong analytical skills with track record of translating data into compelling insights, market assessments and business cases
- Sound business judgment with established strategic/conceptual thinking and strategic planning skills to ideate, design, and deliver on solutions
- Excellent communication & influencing skills to work with internal and external stakeholders; ability to articulate problem statements, opportunity areas and complex data models
- Excellent project management and execution skills, with strong problem solving, highly analytical, quantitative communication and organizational skills.

Figure 2.5 MasterCard Job advertisement. Source: LinkedIn (2023/01/07)

Therefore, we have seen students investing more and sooner in activities where they can gain soft skills, since the participation in extracurricular activities leads to the have a better balance between school and the activity, which helps that the students become more responsible and efficient in both by acquiring certain skills. This type of extracurricular activities can be Association activities, Volunteering, Sports (as teachers/coaches or as federated athletes), Extra Curricular Activities (Music, Tutoring) or even Part-time work.

2.3.2. Connection between soft skills and specific areas of work

In the medical industry, the relationship between patient and doctor is fundamental, so communication skills must be present, and many times communication skills are equated with clinical skills because they are also extremely important (Kurtz et al., 2005).

There is evidence that the probability of getting a job in the financial sector (banking and finance industry) is higher if the individual has a range of soft skills. Communication, collaboration, and creativity are at the top of the list of skills for this industry, and the most in-demand skills for financial professionals are developing solutions, provide general assistance to people and working in teams (Costantino & Rodzinka, 2022).

2.4. EXTRACURRICULAR ACTIVITIES VS SOFT SKILLS

While hard skills are usually acquired through formal or informal education (workshops, webinars, online courses and so on), soft skills are acquired through activities and experiences. Teamwork, verbal communication, decision making and problem solving are the more easily acquired soft skills while students engaged in curricular experiences (sports, academic groups, participation in organizations) or off-campus jobs (Peck et al., 2016).

The soft skills that are acquired through extracurricular activities are different depending on the type of activity, so Table 2.2 summarizes the relationship between both.

Table 2.2 Relationship between soft skills and the type of extracurricular activities

Extracurricular Activity	Soft skills	Reference
Volunteering	Adaptability, responsibility, teamwork, organizational and communication skills	Khasanzanova (2017)
	Reflection, sense of civic responsibility, confidence, autonomy, decision-making and caring attitude	Hamzah et al. (2016)
Sports	Leadership, self-control, cooperation, teamwork, and discipline	Côté, et al. (2016)
	Personal growth, leadership, and social integration	Wankel and Berger (1990)
Job	Network and social skills	Tessema et al. (2014)
	Adaptability, Teamwork, Time management skills, Working under pressure	Martin and McCabe (2007)
Associations	Organization and public communication	Ferreira (2008)
	Teamwork and Communication skills	Oliveira (2021)

3. METHODOLOGY

Since the main objective of this dissertation was to study the relationship between the participation in extracurricular activities (and this is divided in five types of ECA and the no participation in ECA) and the academic performance, this chapter will present the methodology used to obtain the results for the goal. In the figure below it is possible to see the principal stages covered in the methodology.

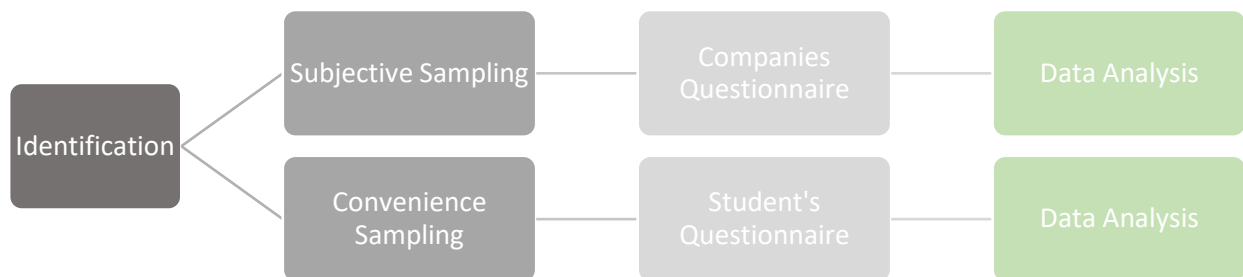


Figure 3.1 Methodology flowchart

3.1. POPULATION AND SAMPLES

Since there are two different questionnaires in this methodology, it is important to define the two different populations.

The population for the Companies questionnaire is the private companies operating in Portugal. In this questionnaire a purpose/subjective sampling method was used. This method (also known as “judgmental sampling”) besides being part of the non-Probability sampling group is a sampling technique where the researcher uses their judgment to select the elements for the sample (Vehovar et al., 2016). A list of companies has been created so that sampling includes many companies from various sectors of activity and different company sizes. This list in the Table 3.1 was based according to the rating of Great Place to Work (<https://www.greatplacetowork.pt/>). There were 50 companies from 5 different dimensions and was chosen 5 companies from each dimension of the ranking.

Table 3.1 List of companies for Companies Questionnaire. Source: Great Place to Work

Dimensions	Companies
Up to 50 collaborators	Anturio Business Software Helexia Estoril Sol Digital Galbilec Elevus People & Business Results
51-100 collaborators	Imaginary Cloud GSK Consumer Healthcare UCI GS1 Portugal - Codipor Decunify
101-500 collaborators	Medtronic Grupo Boticário DHL Express Portugal Liberty Seguros Goldenergy
501-1000 collaborators	Cisco Systems Portugal Noesis Webhelp Braga Solvay Lisboa Vestas
More than 1000 collaborators	Capgemini Portugal ERA Imobiliária Casais Talkdesk Teleperformance Portugal

The second questionnaire is the Student's Questionnaire. The population was the senior students and students who have finished their bachelor's degree within the last 3 years. To obtain the sample of students the sampling method chosen was the convenience sampling design. This method like the previous one, belongs to the non-probability sampling group. The sample is chosen from the potential volunteers who are qualified, fulfil the requirements and can give information on the matter (Murairwa, 2015).

3.2. QUESTIONNAIRES

Both Questionnaires were approved by the Ethics Committee of NOVA IMS (Appendix A).

3.2.1. Companies Questionnaire

With the help of Qualtrics, a questionnaire (Appendix B) was developed in order to get responses for the study's purpose. The survey enquired the companies listed in the Table 3.1, and the sample for this specific point (companies) consists in the companies that had answered the survey.

Since the purpose of this questionnaire was to get answers to research question c) established in the section 1.2, the main focus was the soft skills that companies value most and look for in a new graduate. Additionally, the questionnaire had one more question regarding the sector of activity of the company in order to understand whether the soft skills that companies value most may depend on the activity sector or are generally the same. In the Table 3.2 it is possible to see the two questions of the survey and the choices that can be selected (and the reference for the choices).

Table 3.2 Questions and Measurements for the Companies Questionnaire

Question	Measurements/Choices	Reference
What is the company's sector of activity?	• Activities of international organizations and other extra-territorial institutions • Activities of households as employers and undifferentiated goods-producing activities of households for own use • Administrative and support service activities • Agriculture, livestock, hunting, forestry, and fishing • Arts, entertainment, sports, and recreation • Construction and Manufacturing industries • Consulting, scientific, technical activities and Education • Electricity, gas, steam, hot and cold water and cold air • Extractive industries • Financial and insurance activities • Human health activities and social support • Information and communication activities • Lodging, restaurant and similar activities • Other service activities • Public administration and defense and Social Welfare • Real estate activities • Transportation and storage • Water collection, treatment, and distribution; sanitation, waste management and depollution • Wholesale and retail trade; repair of motor vehicles and motorcycles	Adapted from CAE Rev.3 ,INE

Question	Measurements/Choices	Reference
What are the three soft skills that you most look for in a new graduate joining the company?	• Creativity • Critical thinking • Detail orientation • Flexibility/adaptability • Honesty • Influencing skills • Interpersonal skills • Leadership skills • Multicultural skills • Oral/spoken skills • Organization skills • Problem solving skills • Questioning skills • Research skills • Risk taking skills • Self-motivation/ initiative • Teaching/ training skills • Teamwork • Time management skills • Work ethic/ dependability • Working under pressure • Written communication • Other	Adapted from John, 2009

3.2.2. Student's Questionnaire

As with the previous questionnaire, this questionnaire (Appendix C) was also developed in Qualtrics. Since the approach for this questionnaire is the convenience sampling, the survey enquired the students who are senior students or have the bachelor's degree within three years. The questionnaire has 5 indicators:

- Area of study – this indicator will define groups of respondents in order to understand if the area of study has any impact or influences in some way the other indicators;
- Extracurricular activities – the indicator that will create the groups for some test analysis;
- Soft skills – this indicator is important to answer the research questions c) and d) established in section 1.2 (combined with the answers of the companies questionnaire) and also to help in the contributions defined in section 1.3;
- GPA – this indicator will be the response variable in the statistical tests used to answer the research questions listed in the section 1.2;
- Work – this indicator is only used to relate the soft skills and the sector of activity;

The table below has the questions and the choices of the student's questionnaire, accordingly with the indicators listed before.

Table 3.3 Questions and Measurements for the Student's Questionnaire

Indicators	Question	Measurements/ Choices	Reference
Area of study	What is your area of study?	• Agriculture, Forestry & Fishing • Architecture and Construction • Arts • Life Sciences • Business Sciences • Physical Sciences • Social and Behavioral Sciences • Veterinary Sciences • Law • Education • Engineering and Related Techniques • Humanities • Manufacturing • Information & Journalism • Informatics • Mathematics and Statistics • Environmental Protection • Health • Security services • Transportation Services • Personal Services • Social Services	DGES (Source: https://www.dges.gov.pt/guias/indarea.asp)
Extracurricular activities	During your higher education did you participate in any ECA?	• Yes • No	
	What kind of ECA did you participate in?	• Sports • Job • Association's • Volunteering • Other	Defined in section 1.2
	What are the soft skills that you had acquire?	Same choices of the question about soft skills in Table 3.2	Adapted from John, 2009

Indicators	Question	Measurements/ Choices	Reference
Soft Skills	In your opinion, how do the soft skills you learned by participating in EAC relate to your academic performance?	1: Not related 2: Related 3: Highly related	
	Did university give you any of the following to acquire additional soft skills? (Select at least one option)	• School Sports • Mandatory soft skills subjects • Short term courses • Webinars • Other • No	Based on NOVA IMS and ISCTE-IUL options
GPA	What is your Bachelor GPA?	Numeric Value	
Work	Are you already working?	• Yes • No	
	What is the area of activity of your work?	Same choices of the question about Sector of Activity in Table 3.2	Adapted from CAE Rev.3, INE

3.3. STATISTICAL ANALYSIS

The software JMP 2017 is the software chosen to do all the statistical tests. Along this study, some tables and graphs are taken directly from JMP, and in that case it is identified in the legend of the same. All the additional outputs are based on values and results of the JMP tests and in those cases all JMP outputs will be present in the appendixes.

3.3.1. ANOVA Process

The principal objective of this study is to analyze if the participation in extracurricular activities influences the GPA, and consequently the academic performance. In order to study this, it's necessary to test if the populations means are equal (using One-way ANOVA process) and if they are not equal it's necessary to study which population means are different (using other statistical tests).

The Figure 3.2 demonstrates the general process that will be used in this study. All the tests and hypotheses were made at the 5% significance level.

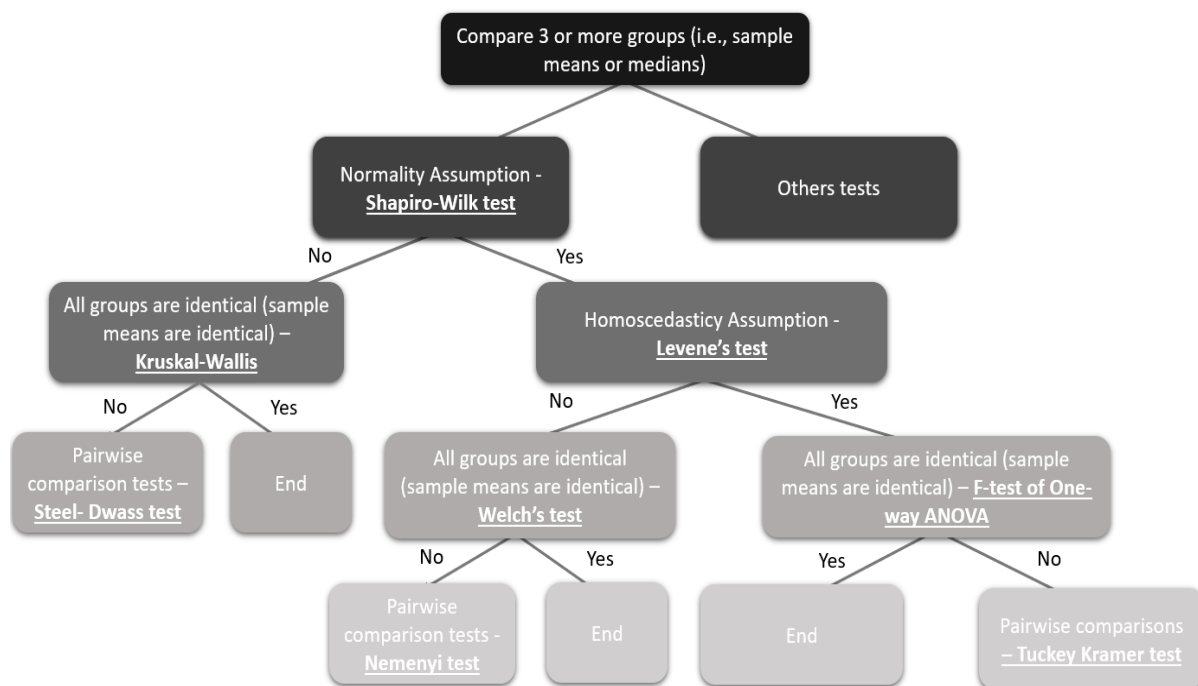


Figure 3.2 One-way ANOVA process

For the performance of One-way ANOVA there are some requirements and assumptions to guarantee before doing the statistic tests. The first condition is the independence of the samples, if they are not independent then will have some considerable biases and will have issues in the research. In order to eliminate the biases, there are some ways like transform, remove or modeling the data (Kenny & Judd, 1986). After verifying the condition of the independence of the samples two assumptions must be verified, the Normality and Homoscedasticity assumptions (Ito, 1980). For each assumption is necessary to execute some statistical tests to proceed the ANOVA process, this means that if one assumption is not verified, we need to change the process and then test other assumptions using other tests.

To test the first assumption (Normality of the populations, i.e., all the samples come from normal populations) a distribution fitting test was performed, the Shapiro-Wilk test. But first it is important to define the hypotheses for this test. Note that the test is applied separately to each sample $i = 1, \dots, k$, where k is the number of groups which is intended to compare.

- H_0 : The i – th sample come from a Normal population
- H_1 : The i – th sample does not come from a Normal population

After testing the Shapiro-Wilk test, if H_0 is not rejected then proceed to the next assumption, however if the normality condition is not observed for all populations (reject H_0), it is necessary to test if the samples come from identical populations using the Kruskal-Wallis test, that is a nonparametric test and it is a little less powerful than the ANOVA's F-test (Feir-Walsh & Toothaker, 1974). The hypothesis for the Kruskal-Wallis test are:

- H_0 : The k samples come from identical populations
- H_1 : Not all of the k samples come from identical populations

Returning to the stage where we do not reject the test Shapiro-Wilk (which means that all the samples come from a Normal Population), the next step is the Homoscedasticity assumption, and for that there the Levene's test is performed. The hypotheses for this assumption are:

- H_0 : $\sigma_1^2 = \sigma_2^2 = \sigma_3^2 = \dots = \sigma_k^2$ (The k Normal populations are homoscedastic)
- H_1 : $\exists i, j (i \neq j) \sigma_i^2 \neq \sigma_j^2, i, j = 1, 2, \dots, k$

If H_0 is rejected then it is important to test if the k Normal populations have the same mean using the Welch's test, if H_0 is not rejected then proceed for ANOVA.

The last step is performing the ANOVA (F-test), or Welch's test, to check if all the samples mean are equal.

- H_0 : The population means in all samples are equal ($\mu_1 = \mu_2 = \mu_3 = \dots = \mu_k$)
- H_1 : There is at least one pair of means that is different ($\exists i, j (i \neq j) : \mu_i \neq \mu_j$)

If H_0 is not rejected, then our population means in all samples are equal and the process is over. If H_0 is rejected, then one multiple comparison test should be performed (Tukey's HSD test, Tukey Kramer test), and the hypothesis for this test is based on the idea to understand if the two populations have the same mean.

- H_0 : $\mu_i = \mu_j, (i \neq j)$
- H_1 : $\mu_i \neq \mu_j, (i \neq j)$

Going back to the rejection of H_0 in the Kruskal-Wallis test or the Welch's test, in both cases it should be performed the Steel-Dwass test which is a Nonparametric multiple comparison test (however there are other options like the Hodges-Lehmann test or the Nemenyi test) in order to understand if the two populations have the same median (quite similar to the Tukey's test however, this one is for median while the other is for mean), Neuhäuser & Bretz, 2001. The hypothesis for this type of test is:

- H_0 : $\tilde{\mu}_i = \tilde{\mu}_j, (i \neq j)$
- H_1 : $\tilde{\mu}_i \neq \tilde{\mu}_j, (i \neq j)$

where $\tilde{\mu}_l$ denotes the median of group l ($l = 1, \dots, k$).

3.3.2. Qui-Square test of independence

In order to determine if two categorical variables have a statistically significant association, the Pearson's Qui-Square test should be performed. This test uses the observed frequencies, and the best way to consolidate the data is usually a contingency table. It is important to refer that a condition for this test is not more than 20% of classes with less than 5 expected observations (Turhan, 2020). The hypothesis for this test are:

- H_0 : *The two variables are independent (variables unrelated)*
- H_1 : *The two variables are dependent (variables are related)*

3.3.3. Independent T-test

The t-test is a test focused on the difference of means (independent samples). To be able to perform the t-test for independent samples the population must be normally distributed, however, as the sample of both groups is large, the assumption of normality can be relaxed (Gerald, 2018).

As the t-test can have two alternative test statistics depending on whether variances are equal or different, the first step is to test if the variance of the 2 groups is equal with the Brown-Forsythe (BF) test. If the variances are equal, which implies to not reject the null hypothesis of BF test, then the Student's t-test/Pooled t-test should be performed. If the variances are unequal, the student's t-test can present some inferences (can be biased and have Type I errors) and for that reason the Welch test should be performed (Delare et al., 2017).

For both tests (Students t-test or Welch test) the hypothesis are:

- $H_0 : \mu_i = \mu_j, (i \neq j)$
- $H_1 : \mu_i \neq \mu_j, (i \neq j)$

4. RESULTS

In this section the main objective is to perform some statistical tests in order to understand if some topics in the section 1.2 can be conclude or not, in particular the relationship of GPA with participation in ECA's.

This chapter id divided in 2 main parts:

- The Exploratory Data Analysis – where the data of Students and Companies questionnaire will be analyzed;
- The Statistical analysis – Where the tests will be performed. The first part will be tests based on the ANOVA process (study the relationship of GPA with other variables), followed by tests of independence (to understand if two categorical variables are related) and finally t-tests to confirm some results;

4.1. EXPLORATORY DATA ANALYSIS

4.1.1. Students Questionnaire

The questionnaire was available between 28 February and 28 March 2023 and it was shared by e-mail, LinkedIn, and other social media platforms.

There were 265 responses in total, however it was necessary to eliminate some answers:

- Since this questionnaire was voluntary to make sure that the only responses valid were from senior students or students who had graduated in the last 3 years, a question was created to exclude the answers that did not follow the criteria – 40 responses were eliminated;
- Responses that did not have the answer of the GPA (people dropped out halfway through the questionnaire and those answers were automatically saved) – 10 responses were eliminated;

For this and future analysis, we will only consider 215 answers, so the global sample size is $n=215$.

4.1.1.1. Demographic characteristics of the sample

Looking at the Figure 4.1 , the age group that had more responses were the 22-23 years, and represents 53% of the sample, followed by the group of 24-25 years with 21%, 20% for the age group 20-21 and 6% for the group 26+ (which is expected since we want only the students who have finished their bachelor's degree within 3 years, however there are people that start their bachelor's degree later and for that reason finish later).

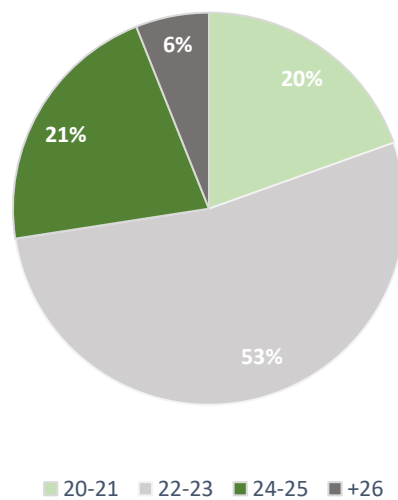


Figure 4.1 Distribution of the sample by age groups (% of responses)

In relation to gender, it is possible to observe that the gender who had more answers were female with 152 answers, representing 71% of the sample, with 51 answers were male representing 28%, and the other two options (“Prefer not to say” and “Non-binary/third gender”) had 1 answer each, representing 1% both (Figure 4.2).

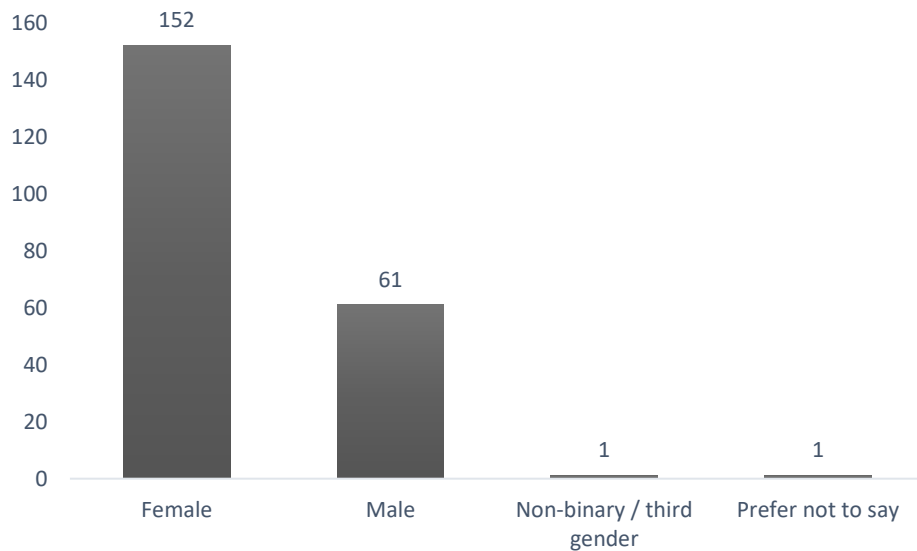


Figure 4.2 Distribution of the sample by gender (nº of responses)

There were 22 options available in the questionnaire for the areas of study question, however, the questionnaire responses remained at only 16 options. Accordingly, with Figure 4.3, the areas of study that had more answers were Business Sciences and Social and Behavioral Sciences with, 27% and 26% respectively, and areas of study with less answers were Life Sciences, Law and Architecture and Construction with 1% each category.

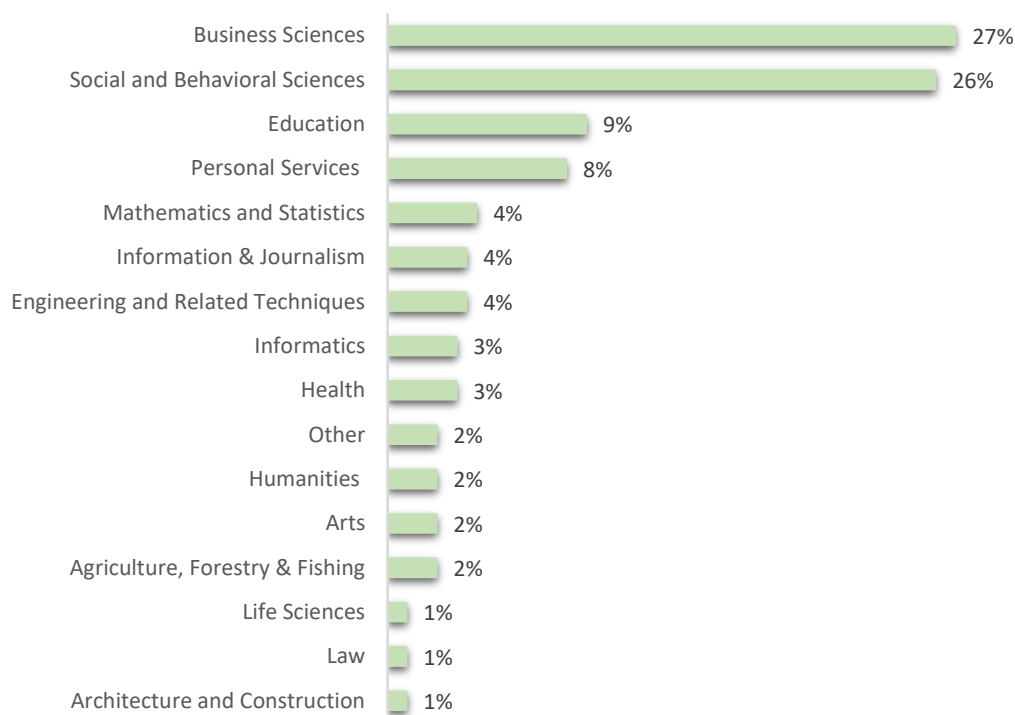


Figure 4.3 Distribution of the sample by Area of study (% of responses)

For the subsequent analysis, the areas of study were grouped according to their similarity and to guarantee at least 7 observations in each one. However, to simplify, new names were created as can be seen in Table 4.1.

Table 4.1 Areas of study grouped - New names

Area of study	New Names	N (observations)
Agriculture, Forestry & Fishing + Life Sciences	Area 1	7
Arts + Architecture and Construction	Area 2	7
Business Sciences + Mathematics and Statistics	Area 3	68
Education	Area 4	20
Health	Area 5	7
Informatics + Engineering and Related Techniques	Area 6	15
Personal Services	Area 7	18
Social and Behavioral Sciences + Law + Humanities + Information & Journalism	Area 8	73

4.1.1.2. GPA Analysis

To be able to measure the academic performance of a student, the quantitative variable, GPA, was used. The GPA in Portugal is the final classification of the bachelor's degree, which varies between 10-20. Although it is a quantitative variable, it can be analyzed with a qualitative approach as it is possible to see in the classification in the table below (Ministério da Ciência, Inovação e Ensino Superior, 2005).

Table 4.2 Classification of GPA

CLASSIFICATION	GPA
Sufficient	10-13
Good	14-15
Very Good	16-17
Excellent	18-20

The Table 4.3 shows the descriptive analysis of the GPA variable. The minimum and maximum GPA value of the sample was 10 and 19 (respectively), and the mean was 14,73, which indicates that the students have a “Good” GPA (accordingly with the classification of the table above).

Table 4.3 GPA Descriptive Statistics

GPA	
MEAN	14.7349
STANDARD ERROR	0.1019
MEDIAN	15.0000
MODE	15.0000
STANDARD DEVIATION	1.4944
SAMPLE VARIANCE	2.2331
MINIMUM	10.0000
MAXIMUM	19.0000
COUNT	215.0000

In the sample and accordingly with the answers given, 66% of students participate or have participated during their Bachelor in extracurricular activities (142 responses), meaning that the remaining 34% of students have not participated in any ECA (73 responses).

However, students who participated in ECA had to indicate in which type of extracurricular activity they participated (it was possible to choose more than one option), the options of extracurricular activities were defined in section 1.2. Within the option of having participated in extracurricular activities it's possible to observe that the most practiced extracurricular activity was the “Associations”, with 28% of responses, followed by “Sports” with 25%, “Volunteering” with 20%, “Job” with 19%, and the ECA with less participations was “Other Activities” with 8% of responses.

For the following analysis, it's important to define that “Type of ECA” are the 5 ECA's mentioned above and option “None”, which means the student didn't participate in any ECA. As can be seen in Figure 4.4, the type of ECA with more responses (73) were “None”, and the average of the GPA of the student's that didn't participate in any ECA was 14.29. The second and third option with more responses were Associations and “Sports”, and the average of GPA were 15.00 and 15.06, respectively. The option “Volunteering” appears in 4th place, with 51 responses and a GPA average of 15.00, followed by the option “Job” with a GPA average of 14.74 and finally the option with less responses were “Other Activities” with 20 responses and a GPA average of 14.95.

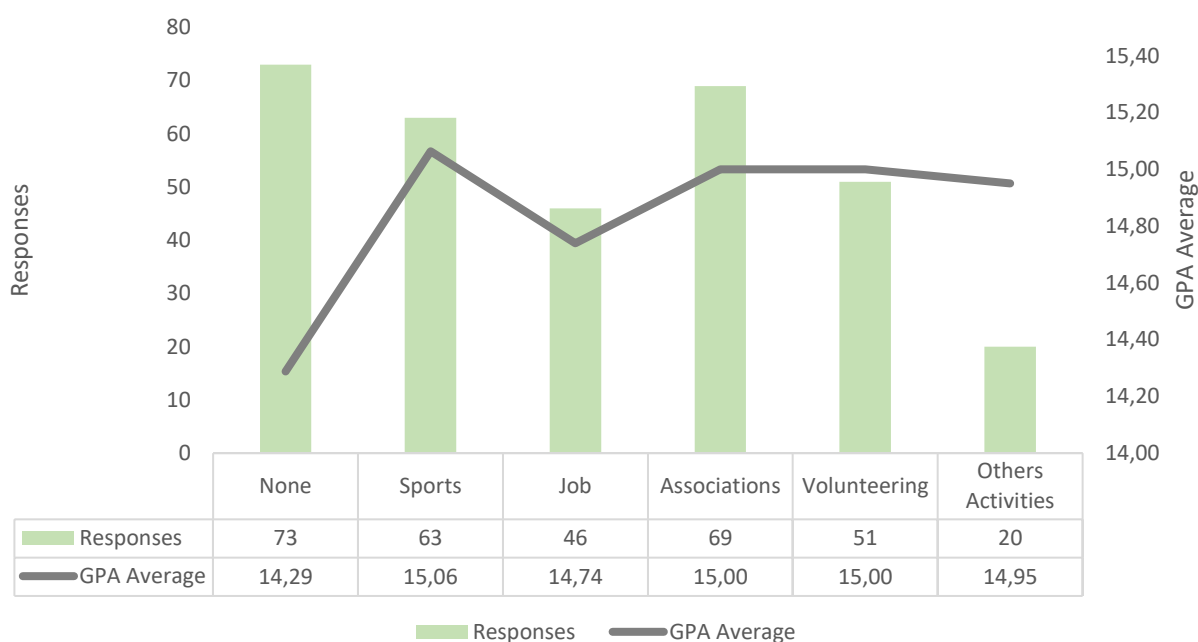


Figure 4.4 N° of Responses and GPA Average by the Type of ECA

Besides the analysis by type of ECA, it's possible to analyze how many ECA's a student had participated (since the questionnaire allowed to choose any option, and could choose how many they wanted), the range of options goes between 0 and 5 ECA's. The option "0" is the same of the option "None" in the analysis before. The number of answers decreases as the number of ECA's participated in increases, which is to be expected, i.e., it is more likely that a student participates in only one ECA than in 4. However, the students who had participated in 4 ECA's are the students that have the bigger GPA Average, 15.33 (it is important to consider that the number of observations is much lower), as it can be seen in Figure 4.5.

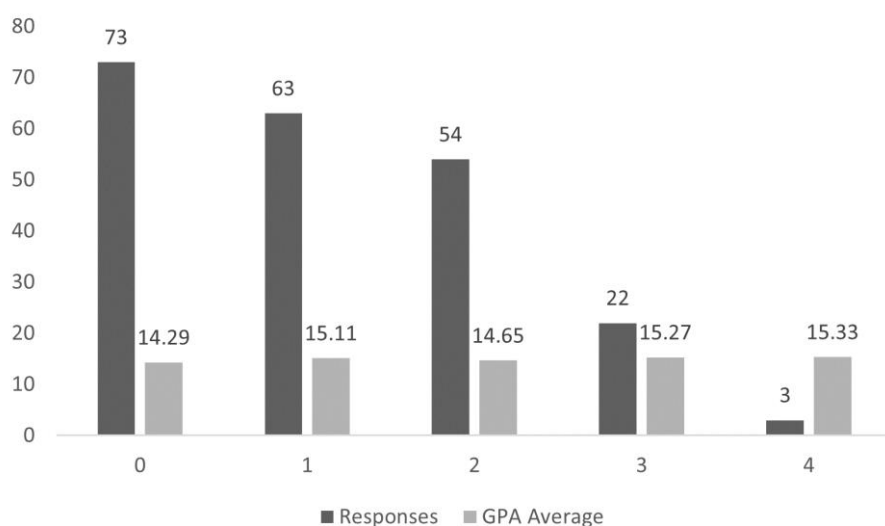


Figure 4.5 N° of Responses and GPA Average by the N° of ECA

The main objective of this study is to understand if extracurricular activities have an impact the academic success, so it is important to study their relationship. In the Students questionnaire a

question was made for only the students who had participated in any ECA to understand their perception about the relationship between participation in ECA's and their GPA. There were available 3 options for the relationship as it can be seen in the Table 3.3. The option that had more responses were the option "Related" with 77 responses and a GPA average of 14.79, followed by the option "Highly Related" with 51 responses and a GPA average of 15.22, finally the option remain is "Not Related" with 13 responses and a GPA Average of 14.31, Figure 4.6. This is an interesting result since the students who had choose the option that the GPA and participation in ECA's are not related are the group of students that have the lowest GPA Average.

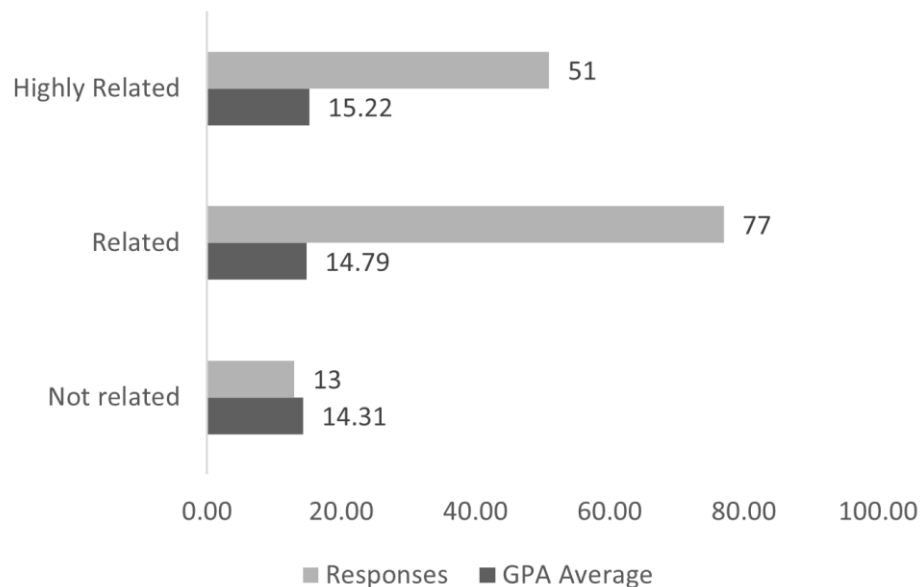


Figure 4.6 N° of Responses and GPA Average by perception on the relationship of GPA and Participation in ECA's

4.1.1.3. Soft Skills Analysis

In order to answer the research question c) and d) in the section 1.2, a question was made in the students questionnaire about the soft skills that the students (who participated in any ECA) had gained in participating in those ECA's. The students were able to choose up to 3 Soft Skills in the list of options, (options are in the Table 3.3 plus the option "None"). The results are in Figure 4.7. As it can be seen, the 5 soft skills that the student's had gain in participating in ECA's were Teamwork, Flexibility/Adaptability, Organization skills, Leadership skills and Interpersonal skills. A good point in about these results, is that only one student chooses the option "None", which means that in general the participation in extracurricular activities can be directly related with the acquisition of soft skills like it was stated in the section 2.4.

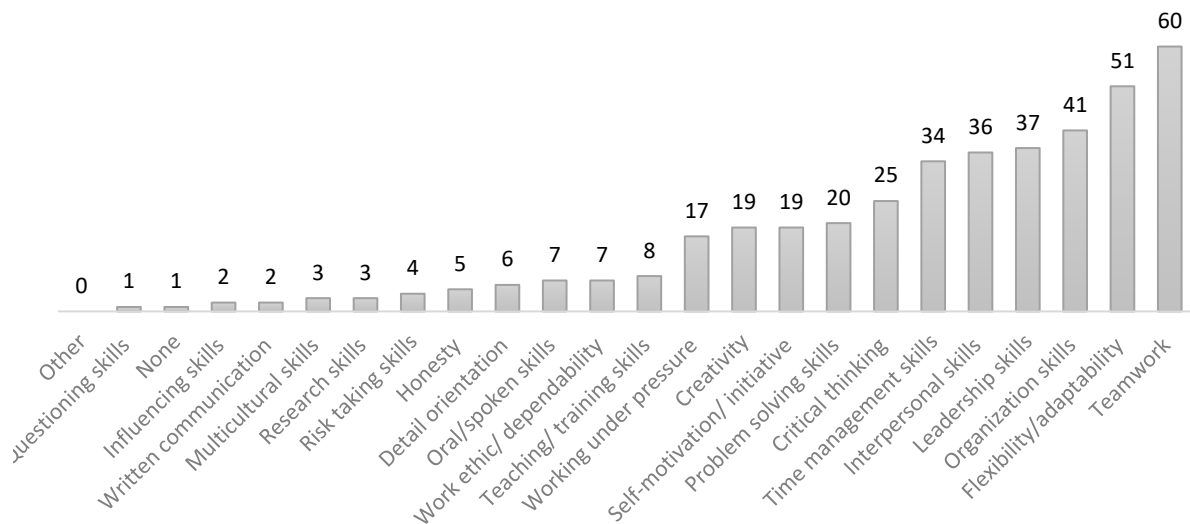


Figure 4.7 Soft Skills chosen in Students Questionnaire (nº of responses)

Soft Skills and area of study

In the table below shows what are the three soft skills that students had choose accordingly their area of study. Except for “Problem solving skills” skill that appears in 3rd place for the “Business Sciences + Mathematics and Statistics”, all the others soft skills appear more than one time, which means that in general, the soft skills that the student’s had acquire in the participation in ECA’s are very similar.

Table 4.4 Top 3 Soft Skills by area of study

Area of study	Top 1 Soft Skill	Top 2 Soft Skill	Top 3 Soft Skill
Area 1	Flexibility/adaptability	Interpersonal skills	Teamwork
Area 2	Teamwork	Flexibility/adaptability	Interpersonal skills
Area 3	Teamwork	Flexibility/adaptability	Problem solving skills
Area 4	Time management skills	Organization skills	Interpersonal skills
Area 5	Time management skills	Leadership skills	Organization skills
Area 6	Teamwork	Leadership skills	Organization skills
Area 7	Flexibility/adaptability	Organization skills	Teamwork
Area 8	Teamwork	Leadership skills	Flexibility/adaptability

Soft skills and area of work

In a way to compare with the answers of the Companies questionnaire, it is important to understand how the soft skills of students who are already working relate to the area of work. There were 94 student’s that are already working (44% of the student’s that answered the questionnaire), however two of them did not specify which are the area of work, so for this analysis we are only considering 92 responses. In the figure below, it is possible to see that the 3 areas of work that had more responses were “Consulting, scientific, technical activities and Education” with 26 responses, followed by “Other service activities” with 14 responses and “Financial and insurance activities” with 13 responses. These results are not surprising given that the 3 area of study with more responses were Business Sciences,

Social and Behavioral Sciences and Education, which coincides with the 3 areas of work with more responses.

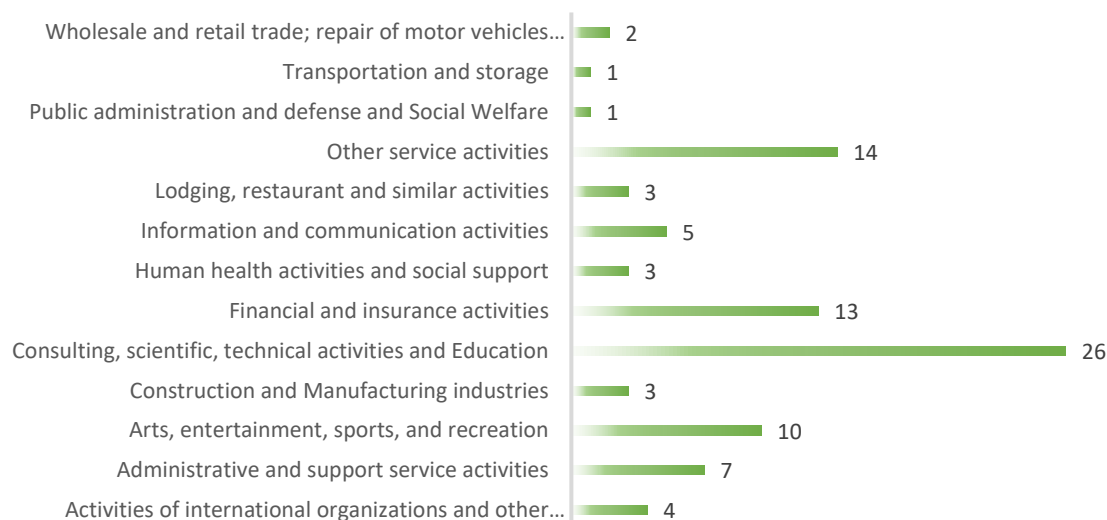


Figure 4.8 Nº of Responses by area of work

In the Table 4.5, it is possible to see what is the relationship between the area of work and the soft skills chosen, for that it will only appear the Soft Skills that in Figure 4.7 have more than 10 responses. The values in grey means that are the 3 or more (when there the nº of answers is equal) soft skills more chosen in each sector of activity. The soft skill that is present in top 3 in more sectors of activity are the soft skills “Teamwork” and “Flexibility/adaptability”.

Table 4.5 Sector of activity and soft skills (nº of responses) – Students Questionnaire

Area of work	Creativity	Self-motivation/initiative	Problem solving skills	Critical thinking	Time management skills	Interpersonal skills	Leadership skills	Organization skills	Flexibility/adaptability	Teamwork	Working Under Pressure
Activities of international organizations and other institutions extra-territorial institutions	2	0	0	2	1	1	2	0	1	0	1
Administrative and support service activities	1	0	3	3	1	0	1	2	3	3	0
Arts, entertainment, sports, and recreation	1	2	1	1	2	3	1	4	5	5	2
Construction and Manufacturing industries	0	1	0	0	0	1	1	0	1	0	0
Consulting, scientific, technical activities and Education	2	6	6	6	5	8	8	8	8	9	4
Financial and insurance activities	2	1	4	3	3	2	6	4	4	7	1
Human health activities and social support	0	1	0	0	2	0	1	1	1	0	1
Information and communication activities	3	1	0	1	2	2	0	2	1	3	0
Lodging, restaurant and similar activities	1	0	0	0	1	0	0	1	0	2	1
Other service activities	2	1	2	1	1	3	6	6	4	5	2
Public administration and defense and Social Welfare	0	0	0	0	0	0	0	0	0	1	0
Transportation and storage	0	0	0	0	0	0	0	0	1	1	0
Wholesale and retail trade; repair of motor vehicles and motorcycles	0	1	0	0	0	1	0	0	2	0	0

Soft skills and Type of Extracurricular activities

Besides the general analysis of the soft skills more acquired by students, it is possible to differentiate the soft skills accordingly with the type of ECA that student participates.

In relation to the ECA “Sport”, the top 5 soft skills are presented in Figure 4.9, the we can check that the most acquired soft skills were “Teamwork” and “Flexibility/Adaptability” with 23 responses each.

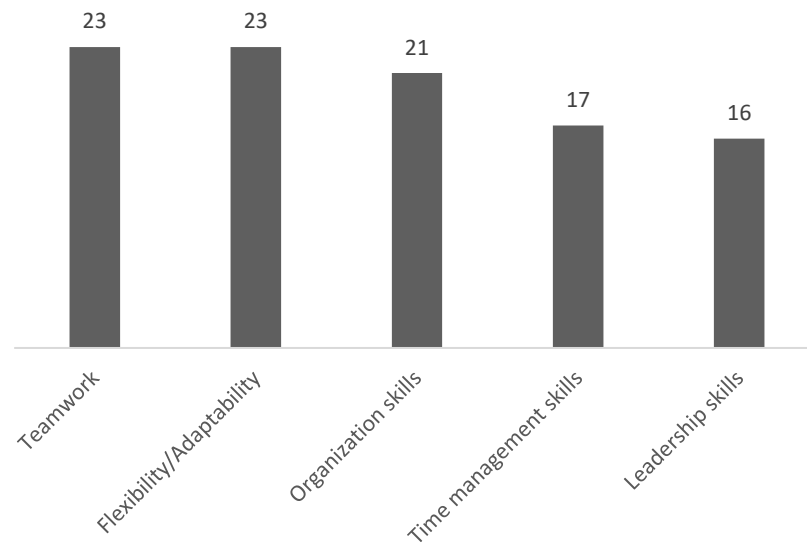


Figure 4.9 Top 5 soft skill of ECA “Sports” (nº of responses)

In terms of the ECA “Job” the Figure 4.10 shows the 6 soft skills more chosen by the student who had some type of job during their bachelor’s degree. Emphasizing the soft skill “Teamwork” that is in 1st place, followed by Organization skills. The skill “Working under pressure” appears in the top 6 for this ECA, however it is important to highlight that those skill only appears in this top.

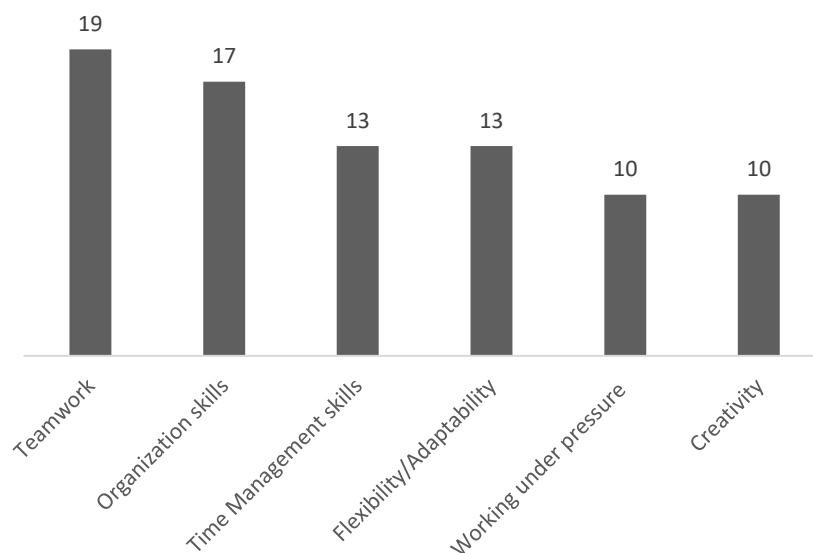


Figure 4.10 Top 6 Soft Skills of ECA “Job” (nº of responses)

Regarding the “Associations” ECA, the skill “Teamwork” stands out with 32 responses, “Time management skills” appears in 5th place with 17 responses as it can be seen in the table below.

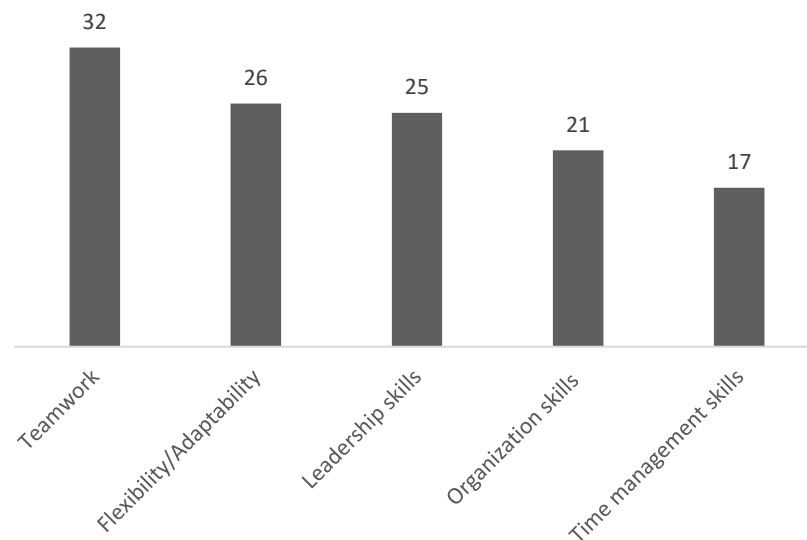


Figure 4.11 Top 5 Soft Skills of ECA “Associations” (nº of responses)

The top 5 of the ECA “Volunteering” is presented in the Figure 4.12. The soft skills with more responses are “Flexibility/Adaptability” and “Teamwork” with 20 responses each. It is important to emphasize that the skill “Interpersonal skills” appears in 3rd place, and until this ECA this soft skill had not yet appeared in any top.

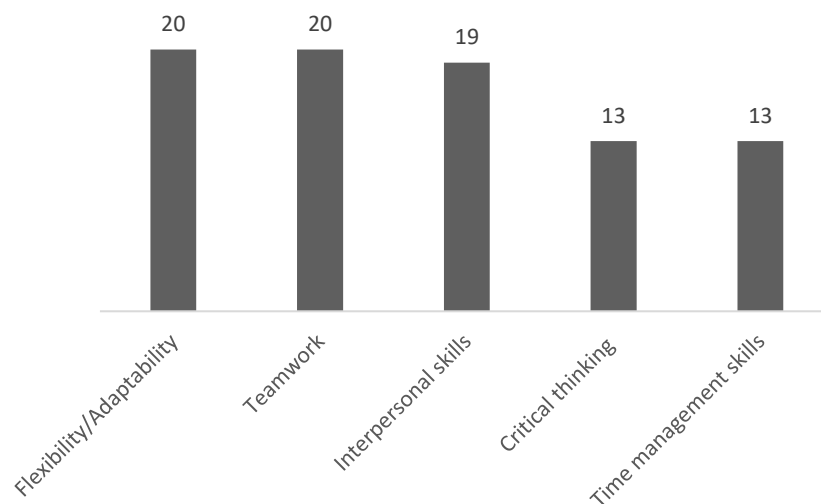


Figure 4.12 Top 5 Soft Skills of ECA “Volunteering” (nº of responses)

Finally, the last ECA is “Other activities” (Figure 4.13). This ECA is more oriented towards activities related to art, music and the soft skill with more responses is “Creativity” (which is expected) with 7 responses in total.

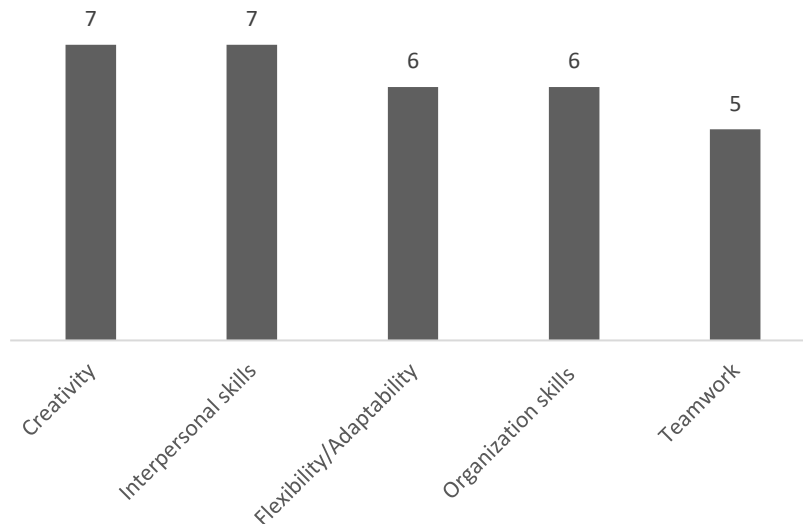


Figure 4.13 Top 5 Soft Skills of ECA “Other Activities” (nº of responses)

4.1.2. Companies Questionnaire

In order to response the research questions c) and d) defined in the section 1.2, a questionnaire for companies was made with the intuition to understand what 3 soft skills are more desired when they are hiring a recent graduate for the company. Since this questionnaire had a subjective sampling, 25 companies were chosen (the companies chosen are in the section 3.2.1). The questionnaire was shared by LinkedIn and email for workers of the company that are responsible or work in the Human Resources area. Although the questionnaire was sent to 25 people/companies, only 21 responses were received, so the global sample size is n=21.

It is important to mention that the person who answered the questionnaire had to choose 3 soft skills from the list (list of soft skills available is in Table 3.2), so we have 63 soft skills chosen in total. Of the 23 soft skills available, 6 of them (“Detail orientation”, “Influencing skills”, “Multicultural skills”, “Research skills”, “Time management skills” and “Written communication”) did not have a response, and for that reason they will not appear in the analysis.

4.1.2.1. Soft Skills

As can be seen from the figure below, the top 3 soft skills more chosen were “Teamwork” with 13% of responses, “Problem solving skills” with 11% and “Flexibility/Adaptability” with 10%. The option “Other” was chosen one time (2%), and when the person chooses “Other” had to write was the option, and in this case was “Autonomy” which is a very interesting soft skill that wasn’t available in the list of options.

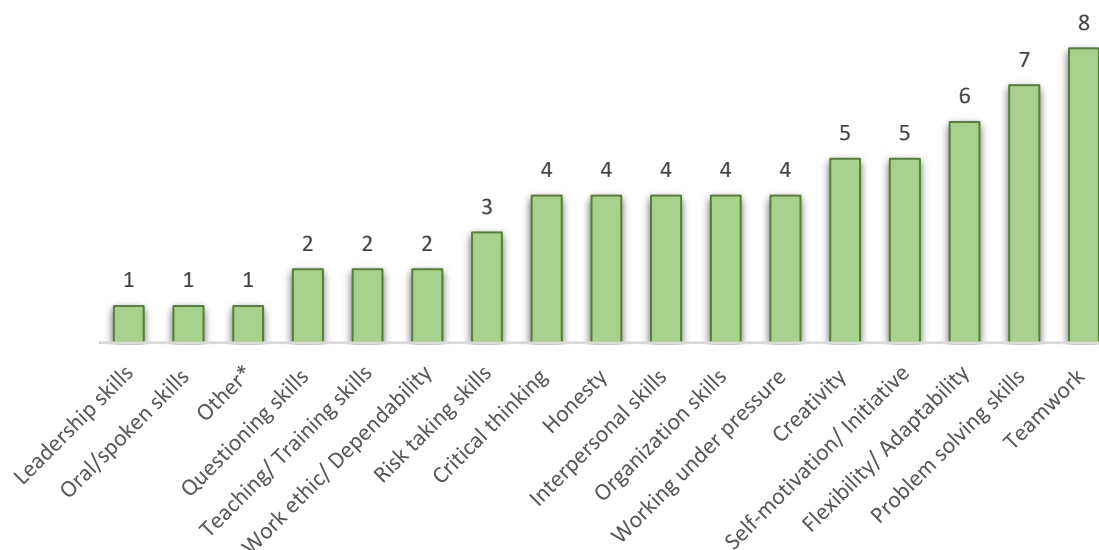


Figure 4.14 Soft Skills chosen in Companies Questionnaire (nº of responses)

Besides the analysis of the soft skills, it is possible analyze which are the soft skills more chosen per sector activity. The questionnaire had a question where the sector of activity needed to be chose, there was 20 options available (options in Table 3.2) and in the sample only appears 11 of them.

The sector of activity with more responses were “Consulting, scientific, technical activities and Education” with 4 responses, followed by “Other service activities” and “Financial and insurance activities” with 3 responses each, as it can be seen in Figure 4.15.

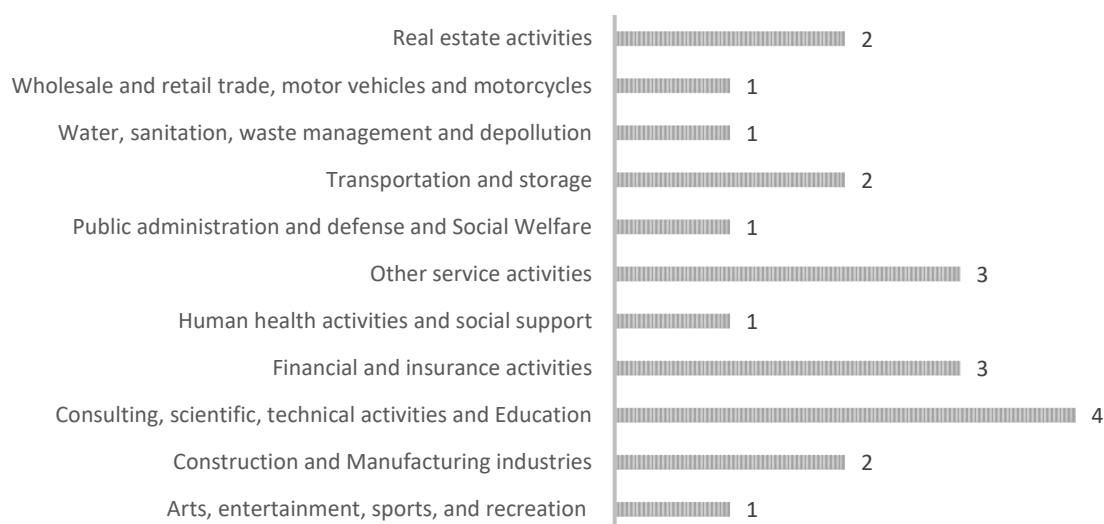


Figure 4.15 Sector of activity (nº of responses)

In order to understand the relationship between the soft skills more desired by the companies and the sector of activity of the company a table was made (Table 4.6) to observe the percentage of soft skills chosen (note that were 21 responses, but in total there were 63 soft skills chosen). Apart from the sectors of activity that only had one response, the “Real estate activities” sector was the sector

that had 6 different soft skills chosen, which means that there is no "preferred" soft skill in that sector of activity. The soft skill that appears in more sectors of activity is the soft skill "Teamwork" (appears in 6 out the 11 sectors of activity).

Table 4.6 Sector of activity and soft skills (nº of responses) – Companies Questionnaire

Sector of activity	Arts, entertainment, sports, and recreation	Construction and Manufacturing industries	Consulting, scientific, technical activities and Education	Financial and insurance activities	Human health activities and social support	Other service activities	Public administration and Social Welfare	Transportation and storage	Water, sanitation, waste management and depollution	Wholesale and retail, motor vehicles and motorcycles	Real estate activities
Leadership skills						1					
Oral/spoken skills							1				
Other* (Autonomy)											1
Questioning skills				1			1				
Teaching/ Training skills	1		1								
Work ethic/ Dependability			1								1
Risk taking skills				1	1	1					
Critical thinking			2	1		1					
Honesty		1						2			1
Interpersonal skills			1	1		1					1
Organization skills						2			1	1	
Working under pressure					1	1	1	1			
Creativity	1			2				1		1	
Self-motivation/ Initiative		1	2						1	1	
Flexibility/ Adaptability		2	1	1				1			1
Problem solving skills			3	1	1				1		1
Teamwork	1	2	1	1		2		1			

4.2. STATISTICAL ANALYSIS

In this section the tests are based on ANOVA process and association tests, as described in the Methodology (section 3.3). The significance level for all the tests is 5%, unless otherwise stated.

4.2.1. GPA and Number of ECA

In this analysis of the academic success, measured by GPA, there are 5 independent samples from the 5 populations defined by the k=5 groups of the number of ECA:

- Study/Response Variable: GPA
- Factor = Number of ECA's in which the student participates (Zero, One, Two, Three, Four)
- Nº levels = 5 = k
- Sample sizes: N(Zero)=73; N(One)=63; N(Two)=54; N(Three)=22; N(Four)=3

Looking at the boxplot of the data set below, it is possible to see that the means look different from each other's, and the size of the boxes are different. We can also retain a new conclusion that is the data set have outliers. In each group we can observe points that are outside of the boxplot, and the group "Two" has 7 outliers. However, these (moderately) extreme observations were kept in the analysis.

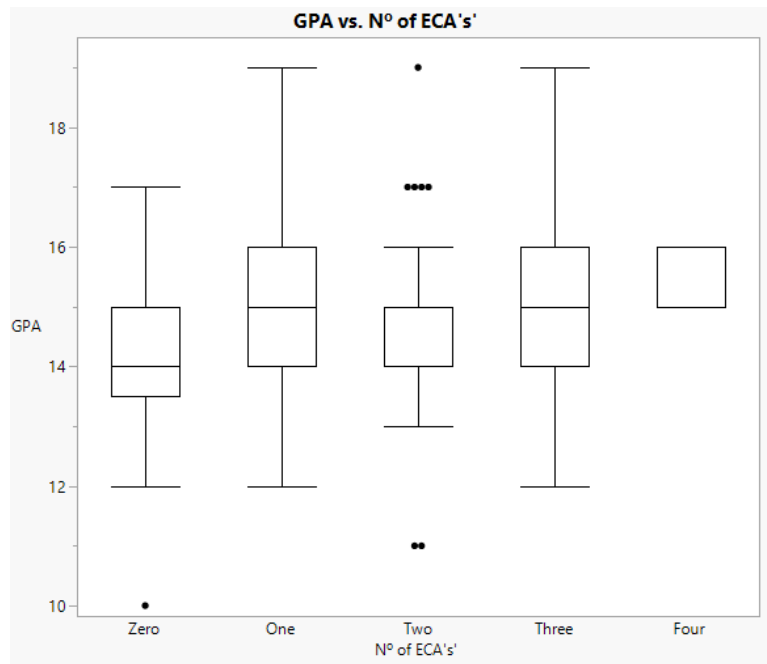


Figure 4.16 Boxplot's for the Relationship between GPA and nº of ECA's (created in JMP)

Following the One-factor ANOVA methodology and based on the values and tests made in JMP (all the outputs are in Appendix D), the first step is to check if the condition of the Normality of the population is verified and for that we will execute the Shapiro-Wilk test. The Table 4.7 presents the p-values for Shapiro-Wilk test of the 5 samples. The p-values for "Zero", "One", "Two" and "Four" are < 0.05 (α). At the 5% significance level, we reject H_0 for all samples except the "Three" group. So, we can conclude that the samples are not from a population with a normal distribution (only sample "Three" is from a normal population, because $p\text{-value}=0.4951 > 0.05$).

Table 4.7 Shapiro-Wilk test results for Relationship between GPA and nº of ECA's

Shapiro-Wilk test	W (Shapiro – Wilk statistic)	P-value
Zero	0.9397	0.0017
One	0.9460	0.0079
Two	0.9274	0.0029
Three	0.9603	0.4951
Four	0.7500	<0.0001

Since we reject the Normality assumption, we should now do the Kruskal-Wallis test to check if the samples come from identical populations. However, and although not mandatory before performing the Kruskal-Wallis test, the "Brown-Forsythe homogeneity of variance test" was applied, which it is the equivalent test of Levene's test but for median.

- Brown-Forsythe statistic = 0.9188
- P-value (Brown-Forsythe) = 0.4539 $> 0.05 \rightarrow$ Not Reject H_0

Since we did not reject the null hypothesis, we can proceed to the Kruskal-Wallis test.

- Kruskal-Wallis statistic = 11.8434
- P-value (Kruskal-Wallis) = 0.0186 < 0.05 → Reject H_0

The null hypothesis of the Kruskal-Wallis test was rejected, and for that reason, Nonparametric multiple comparison tests should be performed, because it only allows to conclude that the distribution of the 5 groups is not identical. The Steel-Dwass test was performed, and the results are in the table below. For the pair “Zero” and “One”, we should reject H_0 at the 5% significance level and we have enough evidence to say that this pair have different medians. For all the other pairs we should not reject H_0 at 5% significance level. However, if the significance level of the test was 10%, we should also reject the pair “Zero” and “Three” (different medians).

Table 4.8 Steel-Dwass test results for GPA by Number of ECA’s

Level	- Level	Score Mean Difference	Std Err Dif	Z	P-Value
Three	One	3.0357	5.9851	0.5072	0.9867
Three	Four	-0.7576	4.4060	-0.1719	0.9998
One	Four	-5.7619	11.0970	-0.5192	0.9855
Two	One	-8.3056	6.1260	-1.3558	0.6561
Zero	Two	-8.4248	6.4140	-1.3135	0.6828
Two	Three	-8.6364	5.4200	-1.5934	0.5016
Two	Four	-11.0833	9.4843	-1.1686	0.7694
Zero	Three	-16.2967	6.5357	-2.4935	0.0920
Zero	One	-18.0831	6.6142	-2.7340	0.0492
Zero	Four	-19.0868	12.6508	-1.5087	0.5567

4.2.2. GPA and Type of ECA

For this analysis we will consider:

- Study/Response Variable: GPA
- Factor = Type of ECA (None, Sports, Job, Associations, Volunteering, Other Activities)
- N° levels = 6 = k
- Sample sizes: N(None)=73; N(Sports)=63; N(Job)=46; N(Associations)=69; N(Volunteering)=51; N(Other Activities)=20;

For this analysis, it is possible to see that the means for the ECA’s excluding “None” are very similar. The only sample with outliers is “None” (Figure 4.17).

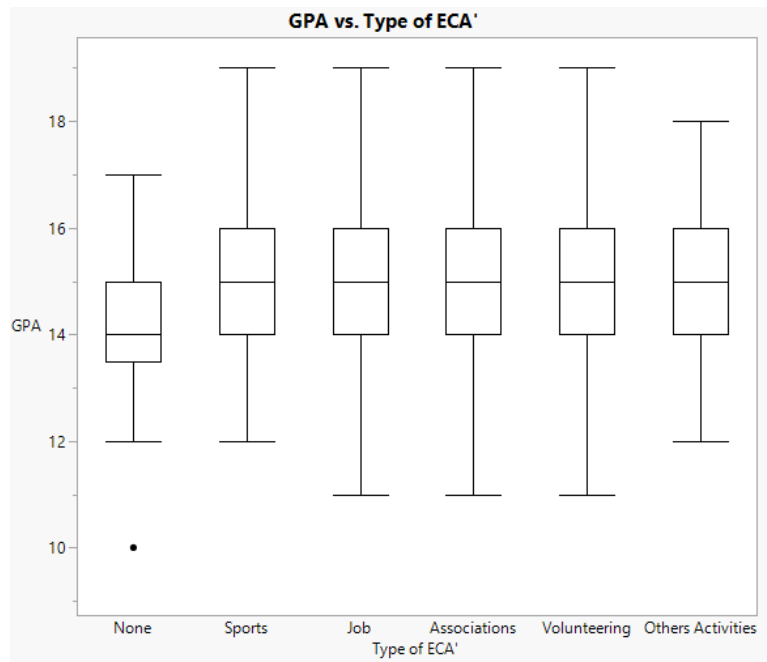


Figure 4.17 Boxplot's for the Relationship between GPA and Type of ECA (created in JMP)

The process of the statistical tests is the same as the process above and the output of JMP are in the Appendix E, and the Shapiro-Wilk test was performed, and the results are in the table below. We will also reject H_0 at 5% significance level, which means that there is at least one sample that is not from a normal population (in this case all of them except "Other Activities").

Table 4.9 Shapiro-Wilk test results for Relationship between GPA and type of ECA

Shapiro-Wilk test	W (Shapiro-Wilk statistics)	P-value
None	0.9397	0.0017
Sports	0.9216	0.0006
Job	0.9427	0.0247
Associations	0.9268	0.0006
Volunteering	0.9500	0.0316
Other Activities	0.9610	0.5646

The Brown-Forsythe test performed since the Normality assumption was rejected and the results are:

- Brown-Forsythe statistics = 0.2310
- P-value (Brown-Forsythe) = 0.9488 > 0.05 → Not Reject H_0

The H_0 was not rejected at 5% significance level, and for that reason we can say that the 6 populations have the same scale parameter and for that reason the Kruskal-Wallis test was performed.

- Kruskal-Wallis statistic = 11.8960
- P-value (Kruskal-Wallis) = 0.0362 < 0.05 → Reject H_0

Since Kruskal-Wallis test was rejected at 5% significance level, the Steel-Dwass test was performed, and the results are in the Table 4.10. The only pair that H_0 is rejected at 5% significance level and for that reason has different medians is the “None” vs “Associations” ($p\text{-value}=0.0452 < 0.05$), all the other pairs do not reject H_0 which means that those pairs have the same median.

Table 4.10 Steel-Dwass test results Relationship between GPA and Type of ECA

Level	- Level	Score Mean Difference	Std Err Dif	Z	P-Value
Sports	None	16.6636	6.5937	2.5272	0.1162
Volunteering	None	16.5866	6.3865	2.5971	0.0979
Other Activities	None	11.8798	6.6366	1.7900	0.4722
Volunteering	Job	5.7886	5.5797	1.0374	0.9054
Sports	Job	5.5102	5.9723	0.9226	0.9408
Other Activities	Job	3.4435	5.0199	0.6860	0.9836
Volunteering	Sports	1.0467	6.0573	0.1728	1.0000
Volunteering	Other Activities	0.3132	5.3051	0.0590	1.0000
Volunteering	Associations	0.0171	6.2229	0.0027	1.0000
Other Activities	Associations	-0.1612	6.3403	-0.0254	1.0000
Sports	Other Activities	-0.3952	6.0242	-0.0656	1.0000
Sports	Associations	-1.5638	6.4587	-0.2421	0.9999
Job	Associations	-7.0290	6.1547	-1.1421	0.8638
None	Job	-8.8063	6.3264	-1.3920	0.7320
None	Associations	-19.3675	6.7118	-2.8856	0.0452

4.2.3. GPA and Relationship between participation in ECA and academic performance

In this analysis, the main objective is to understand if there is difference in the means of GPA accordingly with the Relationship that students have with the participation in ECA and academic performance.

- Study/Response Variable: GPA
- Factor =Relationship between participation in ECA and academic performance
- (Not Related, Related, Highly Related,)
- Nº levels = 3 = k
- Sample sizes: N(Not Related)=13; N(Related)=77; N(Highly Related)=51;

The first thing to do is the Shapiro-Wilk test, it is possible to conclude that there is at least one sample that does not come from a Normal Population (only the sample “Not Related” follows a normal distribution), so we have Rejected H_0 at 5% significance level, as it can be seen in the Table 4.11.

Table 4.11 Shapiro-Wilk test results for Relationship between GPA and Relationship of participation in ECA and academic performance

Shapiro-Wilk test	W (Shapiro-Wilk statistics)	P-value
Not Related	0.9088	0.1766
Related	0.9399	0.0012
Highly Related	0.9164	0.0016

The results for the Brown-Forsythe test were:

- Brown-Forsythe statistic = 0.8627
- P-value (Brown-Forsythe) = 0.4243 > 0.05 → Not Reject H_0

Now it is time to perform the Kruskal-Wallis test and the results were:

- Kruskal-Wallis statistic = 4.7985
- P-value (Kruskal-Wallis test) = 0.0908 > 0.05 → Not Reject H_0

Since we did not Reject H_0 , we can conclude that all samples come from identical population with the same median at 5% significance level (the outputs of JMP regarding this analyse are in Appendix F).

4.2.4. GPA and Area of study

Besides this analysis is not related to the main purpose and objective of this thesis, it is important to investigate how academic performance can be related according to the various areas of study.

For this analysis we have:

- Study/Response Variable: GPA
- Factor = Area of study (Area 1, Area 2, Area 3, Area 4, Area 5, Area 6, Area 7, Area 8)
- N° levels = 8 = k
- Sample sizes= N(Area 1)=7; N(Area 2)=7; N(Area 3)=68; N(Area 4)=20; N(Area 5)=7; N(Area 6)=15; N(Area 7)=18; N(Area 8)=73;

By using the JMP (outputs in Appendix G), the Shapiro-Wilk test was made, and the results are in the table below. At the 5% significance level, we should reject H_0 because at least one sample does not come from a normal population So, we can conclude that the samples are not from a population with a normal distribution (only 4 out of 8 areas of study the p-value > 0.05).

Table 4.12 Shapiro-Wilk test results for Relationship between GPA and area of study

Shapiro-Wilk test	W (Shapiro-Wilk statistics)	P-value
Area 1	0.7320	0.0082
Area 2	0.9274	0.5294
Area 3	0.9498	0.0083
Area 4	0.9592	0.5285
Area 5	0.8334	0.0861
Area 6	0.8226	0.0073
Area 7	0.9230	0.0971
Area 8	0.9210	0.0002

The Normality assumption was rejected, and the results for the Brown-Forsythe test were:

- Brown-Forsythe statistic = 1.3467
- P-value (Brown-Forsythe) = 0.2299 > 0.05 → Not Reject H_0

The Kruskal-Wallis test was performed to check if the samples come from identical populations.

- Kruskal-Wallis statistic = 16.9674
- P-value (Kruskal-Wallis test) = 0.0176 < 0.05 → Reject H_0

The results of Steel-Dwass test are in the Table 4.13. It is possible to conclude that the pairs for “Area 6” with “Area 3”, “Area 7” and with “Area 8” reject H_0 at 5% significance level, so we have enough evidence to say that those 3 pairs have different medians. It is also important to mention that 6 of the pairs has a p-value equals to 1, which means that in those cases there is strongly evidence that the medians are equal.

Table 4.13 Steel-Dwass test results Relationship between GPA and area of study

Level	- Level	Score Mean Difference	Std Err Dif	Z	P-Value
Area 8	Area 6	24.1498	7.0173	3.4415	0.0135
Area 7	Area 6	10.0222	3.2889	3.0473	0.0476
Area 8	Area 5	8.3757	8.8035	0.9514	0.9809
Area 7	Area 5	3.2738	3.1161	1.0506	0.9665
Area 4	Area 3	2.0382	6.3693	0.3200	1.0000
Area 7	Area 3	0.2108	6.4500	0.0327	1.0000
Area 4	Area 2	0.1929	3.4196	0.0564	1.0000
Area 7	Area 2	0.0000	3.1940	0.0000	1.0000
Area 3	Area 2	-0.1576	8.4759	-0.0186	1.0000
Area 7	Area 4	-0.8444	3.5305	-0.2392	1.0000
Area 2	Area 1	-1.0000	2.1329	-0.4688	0.9998
Area 5	Area 2	-1.4286	2.1738	-0.6572	0.9980
Area 4	Area 1	-1.5429	3.3886	-0.4553	0.9998
Area 7	Area 1	-2.3810	3.1556	-0.7545	0.9952
Area 8	Area 2	-3.3659	8.8701	-0.3795	0.9999
Area 8	Area 7	-3.5320	6.6813	-0.5286	0.9995
Area 5	Area 1	-3.8571	2.1355	-1.8062	0.6158
Area 5	Area 4	-4.2429	3.4050	-1.2461	0.9180
Area 8	Area 3	-5.0702	6.6773	-0.7593	0.9950
Area 6	Area 2	-5.3429	2.8498	-1.8748	0.5684
Area 6	Area 5	-5.4476	2.8428	-1.9163	0.5396
Area 8	Area 4	-6.6884	6.5893	-1.0150	0.9724
Area 3	Area 1	-7.0116	8.4561	-0.8292	0.9915
Area 6	Area 1	-8.0667	2.8846	-2.7964	0.0958
Area 5	Area 3	-9.0599	8.4307	-1.0746	0.9621
Area 6	Area 4	-9.3917	3.4304	-2.7378	0.1114
Area 8	Area 1	-13.0724	8.8487	-1.4773	0.8198
Area 6	Area 3	-22.4181	6.7413	-3.3255	0.0199

4.2.5. Gender and Participation in ECA

The Chi-square of independence (Pearson's test) was performed in order to verify if the variables gender (Male, Female) and participation in ECA (Yes, No) are related. Firstly, it is important to define the hypothesis:

- H_0 : No association between gender and participation in ECA
- H_1 : There is an association between gender and participation in ECA

A contingency table was produced (Appendix H) and the p-value for the Pearson's test is:

- Pearson statistic = 4.4990

- P-value (Pearson's test) = 0.0339 < 0.05 → Reject H_0 at 5% significance level → The participation in ECA is related to the gender of the student

For this analysis it is possible to calculate the Relative Risk:

- $Relative\ Risk = \frac{P(Yes|Male)}{P(Yes|Female)} = \frac{77.05}{61.84} = 1.2460$ → The RR result indicates that the male students are 1.25 times more likely to participate in an extracurricular activity.

4.2.6. Gender and Type of ECA

The hypothesis for this test are:

- H_0 : No association between gender and type of ECA participated
- H_1 : There is a association between gender and type of ECA participated

The result for the Chi-square test of independence (Pearson's) is:

- Pearson statistic = 4.4210
- P – value = 0.3521 > 0.05 → Not Reject H_0 at 5% significance level → The Type of ECA is not related to the gender of the student

All the outputs for this test and the Contingency table is in Appendix I.

4.2.7. Area of study and Participation in ECA

For this analysis, the areas of study were grouped so that the number of observations in each group was not so disparate, the new areas of study were joined according to the closeness of the areas and whether it made sense to bring them together. The groups of area of study are in the table below.

Table 4.14 Groups of areas of study used in the test

Areas of study
Agriculture, Forestry & Fishing + Life Sciences (Biology, Renewable Energies) + Health
Business Sciences + Mathematics and Statistics
Education
Informatics + Engineering and Related Techniques + Arts + Architecture and Construction
Personal Services (Sports and Tourism)
Social and Behavioral Sciences + Law + Humanities + Information & Journalism

The hypothesis is the following:

- H_0 : No association between area of study and participation in ECA
- H_1 : There is a association between area of study and participation in ECA

A contingency table was made (the table and the outputs are in Appendix J) and the result for the Chi-square test of independence (Pearson's) is:

- Pearson's statistic = 7.9750
- P – value = 0.1576 > 0.05 → Not Reject H_0 at 5% significance level → The Participation in ECA's is not related to the area of study of the student

4.2.8. GPA and Gender

For this analysis the t-test was performed (outputs in Appendix K). This test pretends to know if there are any differences in the mean for GPA between the female and male students, i.e., if there are any differences in GPA depending on the gender of the student.

The first step is to perform the Brown-Forsythe test.

- Brown-Forsythe statistic = 0.2854
- P-value (Brown-Forsythe) = 0.5938 > 0.05 → Not Reject H_0 → The variances are equal

Since we do not Reject H_0 , the variances are equal and for that reason the student's t-test (Pooled t-test) should be performed.

- Difference (Male-Female) = -0.0976
- P-value (Pooled t-test) = 0.6660 > 0.05 → Not Reject H_0 → There are no differences in the GPA means for male and female gender

4.2.9. GPA and Participation in ECA

For this test the procedure is the same of the test above. The main objective of this test is to understand if there are differences in the means for the GPA between the students who participates in any type of ECA ("ECA") and the students who did not participate ("None"). Therefore, the hypothesis for this test is:

The results of the Brown-Forsythe test are:

- Brown-Forsythe statistic = 0.4230
- P-value (Brown-Forsythe) = 0.5161 > 0.05 → Not Reject H_0 → The variances are identical

The results for the Pooled t-test are:

- Difference (Yes – No) = 0.6771
- P-value (Pooled t-test) = 0.0015 < 0.05 → Reject H_0 → There are differences in the GPA means for students who participate in ECA's and who does not participate in any ECA

All the outputs of the test in JMP for this analysis is in Appendix L.

5. DISCUSSION

5.1. GPA

This section discusses some ideas regarding the tests made and their results.

It was expected that the GPA was related with gender, since many studies states that female students have higher grades (GPA) when compared with male students (O'Dea et al., 2018). However, in the results of this study, it was concluded that GPA is not significantly related with the gender of the student. Moreover, the area of study of the student has an impact on GPA, in particular the area of study of "Informatics and Engineering" is the area of study where the GPA differs from another 3 areas of study (Social Behavioral Sciences, Law, Humanities; Business Sciences, Personal Services, Mathematics and Statistics).

The study of Pinto and Ramalheira (2017), indicates that students who combined academic performance with the involvement in extracurricular activities usually achieve some distinctiveness. The results of ANOVA confirm that the GPA is higher for the students who participates in "Associations" when it is compared with the students that do not participate in any ECA. Besides this difference we also concluded that there are differences in the students that participates in one ECA and the students that do not participates in any ECA, and in this case the students who participated in one ECA have a higher GPA than the students who did not participate in any ECA. The t-test complements the ANOVA conclusions since the result was that there are differences in the means for students who participate in ECA's and who do not participate in any ECA.

5.2. PARTICIPATION IN EXTRACURRICULAR ACTIVITIES

Besides the relationship between GPA and Participation in Extracurricular activities that was covered above, it is possible to see that the participation in ECA'S is related with the gender of the student: male students are more likely to participate in ECA's than female students. This was an expected result, because other studies also found that there are differences in the participation of ECA's according to gender, usually male students are more expected to participate than female students (Darling et al., 2005).

In terms of relationship of area of study and participation in ECA's, the test concluded that the two variables are not related. However, there are two curious examples of differences in the participation in extracurricular activities and the area of study. The only area of study where there are more students that do not participate in any ECA is the area of study "Humanities", with 60% of the students. Meaning that in all the other areas (and in general) there are more students that participate in ECA's than students that do not participate. It is also relevant to point out that all the students in the area of study "Health" practice extracurricular activities (there are other 3 areas of study where this happens, however those 3 areas only have 2 students; for that reason, it is not relevant because it is a very small sample).

5.3. SOFT SKILLS

5.3.1. Soft skills analysis - Students

In section 4.1.1.3, it is possible to look at the top of soft skills more acquired by the type of ECA that the student participates. The skill “Teamwork” and the skill “Flexibility/Adaptability” are the only two soft skills that appear in all the 5 top of skills, which means that the students usually acquire those soft skills in all types of Extracurricular activities. The study of de Prada Creo et al. (2021) indicates that, besides the “Teamwork” that is extremely correlated with the participation in ECA’s, the university students usually acquire decision-making skills, interpersonal skills and are more flexible in the way of live.

Regarding the soft skills that students acquired according to the type of extracurricular activity that they had participate, it is possible to discuss the results as follows:

- **“Sports”** – According to the study of Arat (2014), soft skills can be acquired with the participation of Sports, examples of them are teamwork (because usually sports are in team and must have team responsibilities), time management skills (there must be a balance of time between graduation, sport and personal life) and adaptability. In the Results of soft skill in this study for this type of ECA, “Teamwork” appears in 1st place, followed by “Flexibility/Adaptability” in 2nd place and “Time management” in 4th place, which leads to close results of the study mentioned above.
- **“Job”** – The results for this type of ECA with more responses were “Teamwork”, “Organization Skills”, “Time Management skills”, and “Flexibility/Adaptability”. In the study of Martin and McCabe (2007), besides the students who work to gain some money during their bachelor (which is an important factor), they tend to develop skills, from self-conscience, interaction with people, communication skills, teamwork, adaptability, time management and others, which is very similar to the results present in this study.
- **“Associations”** – “Teamwork” is the soft skill more acquired in this type of ECA. Oliveira (2021) states that students who participate for example in student associations usually gain communication skills, ability to work as part of a team and problem resolution.
- **“Volunteering”** – In this type of ECA, some of the skills that are usually more acquired are not just soft skills. Quite often, when students engage to some volunteer activities, usually they earn a caring attitude, gain the skills of reflection and connection. They can also gain soft skills like autonomy, teamwork, and decision-making (Hamzah et al., 2016). In this study, there are only present soft skills so it can not be compared with the study of Hamzah et al. (2016). However, this in the only type of ECA where the skill “Critical thinking” appears in the top 5 of soft skills acquired, and the skill “Interpersonal skills” appears in 3rd place (this skill only appears in this type of ECA and in “Other Activities”). These two soft skills are those that can most relate to skills at the level of character and principles.

- **“Other Activities”** – This type of ECA was created for extracurricular activities more connected to the arts and music, and other activities that do not fit into the other type of ECA. For this type of ECA the soft skill that appears in 1st place is “Creativity”. The study of Arat (2014) states that the students of arts dream something and realize that they must use their creativity. Besides that, the skills “Organization skills” appears in the top 5 for this ECA and it is also relevant, since sometimes students have deadlines to deliver some projects and the organization is an important skill for them.

5.3.2. Soft Skills analysis – Students vs Companies

Considering the research questions defined in section 1.2, one of the objectives is to understand if the extracurricular activities more desired by the companies/recruiters are the same that students more acquired during their bachelor's degree. The Figure 5.1 represents all the soft skills chosen by the Students and the Companies and their percentage of responses.

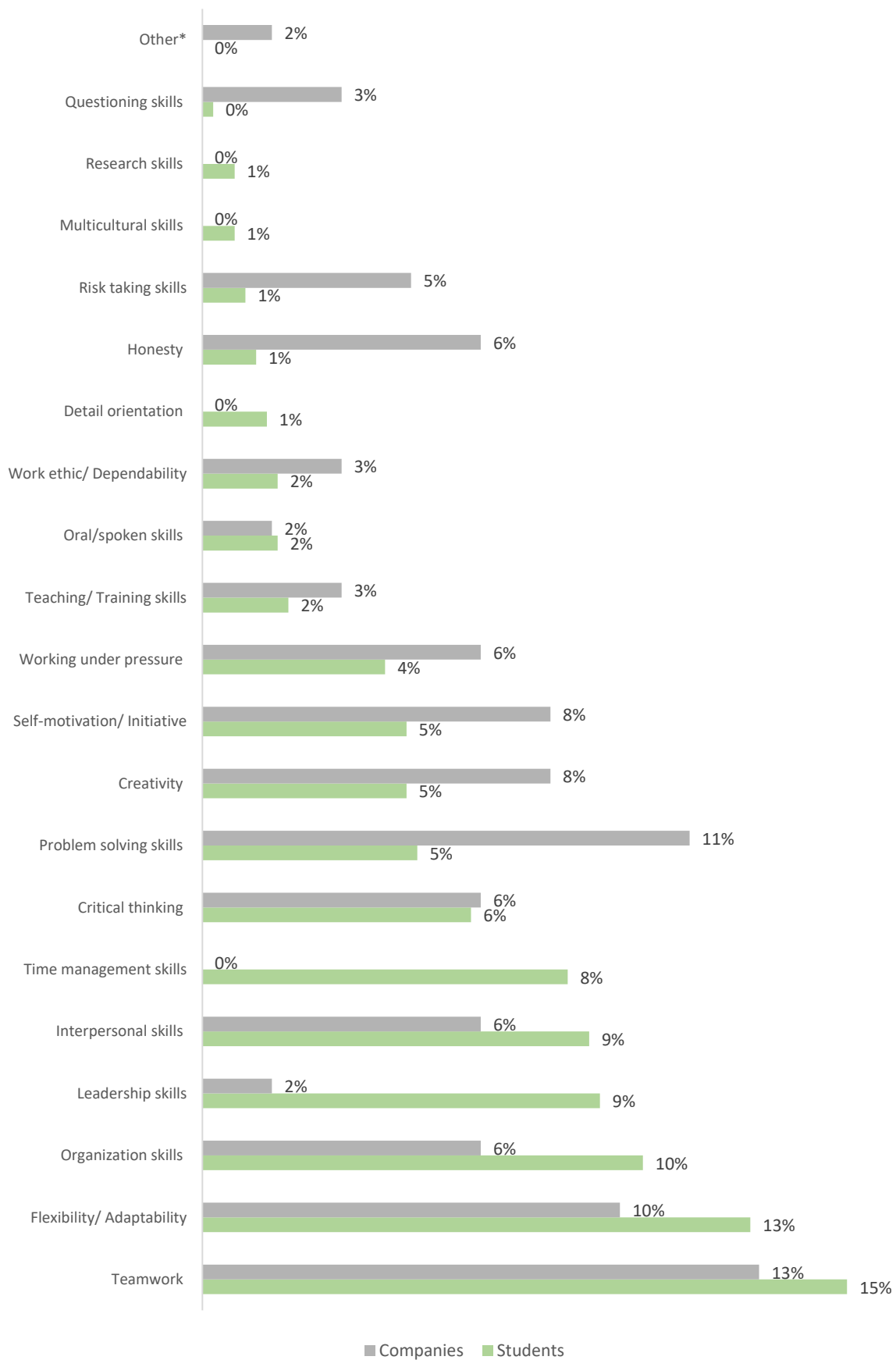


Figure 5.1 Students vs Companies – Soft Skills (% of responses)

It can be verified that the soft skill “Teamwork” is the soft skill with more percentage of responses in both Students and Companies, which means that students develop a lot the soft skill and the companies are looking for that soft skill “Teamwork”. Other insights we can draw is that the soft skills with more differences in percentage of responses are:

- **“Time Management skills”** – with an absolute value of difference of 8% → For the Companies these soft skills do not have much importance, while it represents 8% in the soft skills that students more develop;
- **“Leadership skills”** – with an absolute value of difference of 7% → In general, 9% of the students acquire this soft skill while for the companies it only represents 2%;
- **“Problem-solving skills”** – with an absolute value of difference of 6% → For the companies this soft skill is the 2nd most desired soft skill (with 11%), however for the students it only represents 5%;
- **“Honesty”** – with an absolute value of difference of 5% → This case is the most doubtful because the question in the questionnaire for the students was “What are the soft skills that you had acquire in the participation of extracurricular activities?” and for the companies was “What are the three soft skills that you most look for in a new graduate joining the company?”. “Honesty” represents 6% for the companies, while for the students is only 1%. Students may have thought that “Honesty” is a moral characteristic, which is usually a characteristic that people cannot get from participating in ECA, and for that reason they did not chose “Honesty” as soft skill (Nault & Thau, 2022).

6. CONCLUSIONS AND FUTURE WORKS

The most important contribution of the research work, which culminated in the writing of this dissertation, consisted in understanding if the participation in extracurricular activities had an impact (either positive or negative) in the academic performance. Since the GPA is the most reliable indicator to measure the academic performance, and this indicator was the one used to make the statistical tests, the results revealed that the participation in extracurricular activities have an impact on the academic success. It is also possible to say that this impact is positive, i.e., a student who participates in an extracurricular activity during the degree tends to achieve a higher GPA and thus a better academic performance. This research focused only on participation in extracurricular activities as an influencing factor on academic success, however there are many other factors that can condition academic performance such as the sleep (Hershner, 2020), family support (Roksa & Kinsley, 2019), social media use (Leyrer-Jackson et al., 2018) and mental health (Duffy et al., 2020).

As in other studies (Darling et al., 2005), it was possible to conclude that there are differences in the participation of ECA's depending on the gender of the students. The results show that 77% of the male students participate in ECA's and 62% of female students participate in ECA's, which means that male students participate more than female students. However, despite of this contrast, there were no significant differences in the GPA of male and female students.

In terms of the perception of the students and the relationship between participation in ECA's and academic performance, only 9% of students thought that was not related, when the others 91% thinks that are related, namely 55% thinks that is related and the others 36% thinks that is highly related. It is possible to conclude that the students who participate in extracurricular activities in general think that their participation was related to their academic performance.

In addition to this contribution, it is possible to relate the participation in extracurricular activities with the propensity to acquire soft skills. In total, there were 142 students who participated in extracurricular activities, and only one student chose the option "None" in the question of what soft skills he had acquired during his participation. Therefore, it can be concluded that graduate or senior students are able to acquire soft skills by participating in ECA's. This happens because when a student enrolls in any ECA, he/she is more susceptible to develop certain qualities, expand their social network, constantly challenge themselves and that leads to acquiring soft skills (Feraco et al., 2023). We concluded that the most acquired soft skill, in the students who answered the questionnaire, was "Teamwork".

Considering that it is already perceived that soft skills can be acquired by participating in ECA's, it is important to understand where they can be practiced. In terms of extracurricular activities, these may be present at the university, such as the Students' Association, but also may not be (e.g., music lessons at a professional academy, federated sports at a club, etc.). However, it is possible to acquire soft skills by participating in other activities that are not necessarily ECA's. Hence, in the student's questionnaire, there was a specific question to understand if universities could really give these options to students. It was possible to conclude that, in general, universities facilitate access to various options, such as mandatory soft skill subjects (e.g., English, personal development, communication classes), school sports, short term courses (e.g., Soft Skills Training week) and Webinars. Only 47 students out of 215 students consider that their university did not provide options to acquire soft skills.

Continuing the topic of soft skills, but this time on the business/recruiter side, a conclusion can also be drawn that nowadays the employers not only look for a student with good academic performance, but increasingly look for students with soft skills, and this is a factor that weighs heavily in the choice of employers. They are looking for students who have distinctive attitudes, develop interpersonal skills, work as a team, and have a sense of ethics, among other things (Majid et al., 2019). The soft skill most requested by companies when it comes to recruiting a new graduate is also "Teamwork".

Overall, all research questions have been answered and the most important conclusions can be drawn:

1. The gender of students influences the participation of ECA's but does not affect the GPA;
2. Employers are increasingly looking for new graduates who have soft skills;
3. Soft skills can be acquired through participation in extracurricular activities;
4. Participation in extracurricular activities has a positive relationship with academic performance;
5. Participation in extracurricular activities facilitates the entry of new graduates in the labor market due to the development of soft skills;
6. "Teamwork" is the soft skill more acquired for students and more desired by employers.

6.1. LIMITATIONS

This study has several limitations, in particular the small number of enterprises who answered the questionnaire. The companies were chosen based on the list of the best companies to work for in Portugal in 2022. Despite having been chosen 25 companies, only 21 responded (84%), and contact with them was very difficult and the process took a considerable amount of time. In an ideal scenario and since the population of companies of size "Large" in Portugal is 1,378 companies, according to PORDATA (<https://www.pordata.pt>), to improve this study and obtain more confident results, a good database would have to have approximately 306 responses from companies in order to avoid sampling errors (Kotrlík & Higgins, 2001).

Another limitation was the impossibility of splitting the students exclusively by the type of extracurricular activities, namely for the soft skills question. While students who participated in only one ECA, the 3 soft skills that the students had acquire by participating in ECA was targeted to that ECA, the students who chose more than one (could choose all the options) ECA might have wanted to choose different soft skills for each ECA, and it was not possible in the questionnaire. The analysis of the top 5 soft skills for each type of ECA may be biased.

6.2. FUTURE RESEARCH

In future research, it might be interesting to analyze with more detail how participation in extracurricular activities can affect de academic success by including other factors. With this addition it would be possible to understand how impactful the participation in ECA's in the academic performance is when compared with the other factors.

Other thing that can foster this research is to add the perspective of the Bachelor professors, because they can have another vision of the relationship between participation in ECA's and academic performance that students and companies do not have.

Another suggestion is exploring more the side of the companies regarding soft skills and try to understand what the criteria of entry to the labor market. Is it more important the GPA or to have some soft skills? They want 50/50 or another measure? This type of analysis would help to understand if the students' participation in ECA's is more valuable for the achievement of a good GPA or if it is more important for acquiring soft skills. Following this theme, we also suggest exploring the students' perception about this subject.

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APPENDIX A

NOVA IMS Ethics Committee



This is to certify that

Project No.: **STAT2023-7-124669**

Project Title: **The importance of extracurricular activities in academic success**

Principal Researcher: **Margarida Luís**

according to the regulations of the Ethics Committee of NOVA IMS and MagIC Research Center this project was considered to meet the requirements of the NOVA IMS Internal Review Board, being considered **APPROVED** on 7/12/2023.

It is the Principal Researcher's responsibility to ensure that all researchers and stakeholders associated with this project are aware of the conditions of approval and which documents have been approved.

The Principal Researcher is required to notify the Ethics Committee, via amendment or progress report, of

- Any significant change to the project and the reason for that change;
- Any unforeseen events or unexpected developments that merit notification;
- The inability of the Principal Researcher to continue in that role or any other change in research personnel involved in the project.

Lisbon, 7/12/2023

NOVA IMS Ethics Committee
ethicscommittee@novaims.unl.pt

APPENDIX B

Companies Questionnaire

Dear participant,

The main objective of this study is to identify which soft skills companies value most and look for when hiring new graduates. There is no risk in answering this questionnaire, the participation is optional, can be stopped at any time, and is free of charge. In turn, responses are anonymous and will only be used for academic purposes. The questionnaire takes less than 1 minute to answer (only have 2 questions).

Thank you very much for your contribution.

Informed Consent Form: By clicking "I agree", I declare that I am at least 18 years old and that I agree to participate in this research. I declare that I have been informed that my participation in this study is voluntary, that I can leave the survey at any time without penalty, and that all data will be kept confidential. I understand that there are no serious risks associated with this study.

☐ I agree (1)

☐ I do not agree (2)

Q1 What is the company's sector of activity?

- ☐ Activities of international organizations and other institutions extra-territorial institutions (1)
- ☐ Activities of households as employers and undifferentiated goods-producing activities of households for own use (2)
- ☐ Administrative and support service activities (3)
- ☐ Agriculture, livestock, hunting, forestry, and fishing (4)
- ☐ Arts, entertainment, sports, and recreation (5)
- ☐ Consulting, scientific, technical activities and Education (7)
- ☐ Electricity, gas, steam, hot and cold water and cold air (8)
- ☐ Extractive industries (9)
- ☐ Financial and insurance activities (10)
- ☐ Human health activities and social support (11)
- ☐ Information and communication activities (12)
- ☐ Lodging, restaurant and similar activities (13)
- ☐ Other service activities (14)
- ☐ Public administration and defense and Social Welfare (15)
- ☐ Real estate activities (16)
- ☐ Transportation and storage (17)
- ☐ Water collection, treatment, and distribution; sanitation, waste management and depollution (18)
- ☐ Wholesale and retail trade; repair of motor vehicles and motorcycles (19)

Q2 What are the three soft skills that you most look for in a new graduate joining the company?

☐

Creativity (1)

☐

Critical thinking (2)

☐

Detail orientation (3)

☐

Flexibility/ Adaptability (4)

☐

Honesty (5)

☐

Interpersonal skills (7)

☐

Leadership skills (8)

- ☐ Multicultural skills (9)
- ☐ Oral/spoken skills (10)
- ☐ Organization skills (11)
- ☐ Problem solving skills (12)
- ☐ Questioning skills (13)
- ☐ Research skills (14)
- ☐ Risk taking skills (15)
- ☐ Self-motivation/ Initiative (16)
- ☐ Teaching/ Training skills (17)
- ☐ Teamwork (18)
- ☐ Time management skills (19)
- ☐ Work ethic/ Dependability (20)
- ☐ Working under pressure (21)
- ☐ Written communication (22)
- ☐ Other (23) _____

APPENDIX C

Student's Questionnaire

Dear participant,

The purpose of this study is to investigate the relationship between extracurricular activities and the academic performance. There is no risk in answering this questionnaire, the participation is optional, can be stopped at any time, and is free of charge. In turn, responses are anonymous and will only be used for academic purposes.

Thank you very much for your contribution.

Informed Consent Form: By clicking "I agree", I declare that I am at least 18 years old and that I agree to participate in this research. I declare that I have been informed that my participation in this study is voluntary, that I can leave the survey at any time without penalty, and that all data will be kept confidential. I understand that there are no serious risks associated with this study.

☐ I agree (1)

☐ I do not agree (2)

Q1 Are you a senior student (last year of Bachelor) or a Graduated (within 3 years)?

☐ Yes (1)

☐ No (2)

Q2 What is your age?

Q3 What is your gender?

☐ Male (1)

☐ Female (2)

☐ Non-binary / third gender (3)

☐ Prefer not to say (4)

Q4 What is the area of study of your Bachelor?

- ☐ Agriculture, Forestry & Fishing (1)
- ☐ Architecture and Construction (2)
- ☐ Arts (Film, Dance, Design, Photography, Music, Theatre) (3)
- ☐ Business Sciences (Accounting, Finance, Management, Human Resources, Marketing) (4)
- ☐ Education (5)
- ☐ Engineering and Related Techniques (6)
- ☐ Environmental Protection (7)
- ☐ Health (8)
- ☐ Humanities (Archaeology, Philosophy, History, Languages, Translation) (9)
- ☐ Informatics (10)
- ☐ Information & Journalism (Journalism, Communication Sciences, Public Relations) (11)
- ☐ Law (12)
- ☐ Life Sciences (Biology, Biochemistry, Renewable Energies) (13)
- ☐ Manufacturing (14)
- ☐ Mathematics and Statistics (15)
- ☐ Personal Services (Sports, Tourism) (16)
- ☐ Physical Sciences (Physics, Meteorology, Chemistry) (17)
- ☐ Security services (18)
- ☐ Social and Behavioral Sciences (Political Science, Economics, Geography, Psychology, Sociology, Commerce) (19)
- ☐ Social Services (20)

- ☐ Transportation Services (21)
- ☐ Veterinary Sciences (22)
- ☐ Other (23) _____

Q5 During your higher education did you participate in any extracurricular activities?

- ☐ Yes (1)
- ☐ No (2)

Display This Question:

If During your higher education did you participate in any extracurricular activities? = Yes

Q6 What kind of extracurricular activities did you participate in?

- ☐ Sports (athletes or teachers) (1)
- ☐ Job (part-time or tutoring) (2)
- ☐ Association's (Student's Union, Academic Associations, Junior Enterprises, Youth Politics) (3)
- ☐ Volunteering (4)
- ☐ Other (activities like music lessons, activities related with art, writing) (5)
-

Display This Question:

If During your higher education did you participate in any extracurricular activities? = Yes

Q7 What are the soft skills that you had acquire in the participation of extracurricular activities? (you can choose up to 3 options)

- ☐ Creativity (1)
- ☐ Critical thinking (2)
- ☐ Detail orientation (3)
- ☐ Flexibility/adaptability (4)
- ☐ Honesty (5)
- ☐ Influencing skills (6)
- ☐ Interpersonal skills (7)
- ☐ Leadership skills (8)
- ☐ Multicultural skills (9)
- ☐ Oral/spoken skills (10)
- ☐ Organization skills (11)
- ☐ Problem solving skills (12)
- ☐ Questioning skills (13)
- ☐ Research skills (14)
- ☐ Risk taking skills (15)
- ☐ Self-motivation/ initiative (16)

- ☐ Teaching/ training skills (17)
- ☐ Teamwork (18)
- ☐ Time management skills (19)
- ☐ Work ethic/ dependability (20)
- ☐ Working under pressure (21)
- ☐ Written communication (22)
- ☐ Other (23) _____
- ☐ None (24)

Display This Question:

If During your higher education did you participate in any extracurricular activities? = Yes

And What are the soft skills that you had acquire in the participation of extracurricular activities... != None

Q8 Given the statement, please choose one option:

	Not related (1)	Related (2)	Highly Related (3)
In your opinion, how the soft skills you learned by participating in extracurricular activities relate to your academic performance? (1)	☐	☐	☐

Q9 What is your Bachelor GPA (GPA is the grade point average; if you are a finalist you must put your current GPA)?

Q10 Did university gave you any of the following options to acquire additional soft skills?

- ☐ School Sports (1)
- ☐ Mandatory soft skills subjects (e.g. English, Personal Development and Communication classes) (2)
- ☐ Short term courses (e.g. Soft Skills Training Week) (3)
- ☐ Webinars (4)
- ☐ Other (5)
- ☐ No (6)

Q11 Are you already working?

- ☐ Yes (1)
- ☐ No (2)

Display This Question:

If Are you already working? = Yes

Q16 What is the area of activity of your work?

- ☐ Activities of international organizations and other institutions extra-territorial institutions (1)
- ☐ Activities of households as employers and undifferentiated goods-producing activities of households for own use (2)
- ☐ Administrative and support service activities (3)
- ☐ Agriculture, livestock, hunting, forestry, and fishing (4)
- ☐ Arts, entertainment, sports, and recreation (5)
- ☐ Construction and Manufacturing industries (6)

- ☐ Consulting, scientific, technical activities and Education (7)
- ☐ Electricity, gas, steam, hot and cold water and cold air (8)
- ☐ Extractive industries (9)
- ☐ Financial and insurance activities (10)
- ☐ Human health activities and social support (11)
- ☐ Information and communication activities (12)
- ☐ Lodging, restaurant and similar activities (13)
- ☐ Other service activities (14)
- ☐ Public administration and defense and Social Welfare (15)
- ☐ Real estate activities (16)
- ☐ Transportation and storage (17)
- ☐ Water collection, treatment, and distribution; sanitation, waste management and depollution (18)
- ☐ Wholesale and retail trade; repair of motor vehicles and motorcycles (19)

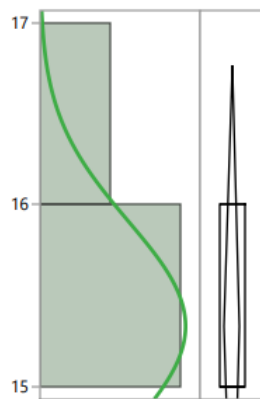
APPENDIX D

Test results and Outputs for Statistical Analysis of “GPA and Number of ECA” in JMP

1.Shapiro Wilk test

Distributions N° of ECA's=Four

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	15,333333	0,3333333	13,899116	16,767551
Dispersion σ	0,5773503	0,3333333	0,3006022	3,6284933

Measures

-2*LogLikelihood	4,2178
AICc	.
BIC	6,4150

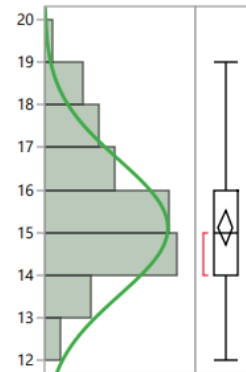
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,75	<,0001*
	Simulated	
	A ²	p-Value
Anderson-Darling	0,4877667	<,0001*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions N° of ECA's=One

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	15,111111	0,1999886	14,71134	15,510883
Dispersion σ	1,5873605	0,1431275	1,3505114	1,9257342

Measures

-2*LogLikelihood	236,0074
AICc	240,2074
BIC	244,2937

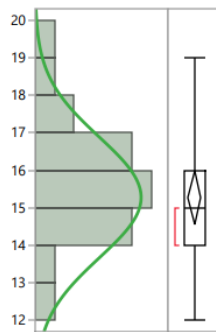
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9460218	0,0079*
	Simulated	
	A ²	p-Value
Anderson-Darling	1,5190145	0,0008*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions N° of ECA's=Three

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	15,272727	0,3430309	14,559355	15,986099
Dispersion σ	1,6089576	0,251277	1,2378537	2,2993045

Measures

-2*LogLikelihood	82,3591
AICc	86,9907
BIC	88,5412

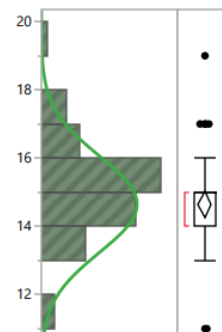
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9602854	0,4951
	Simulated	
	A ²	p-Value
Anderson-Darling	0,486992	0,2040

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions N° of ECA's=Two

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,648148	0,1927357	14,261569	15,034727
Dispersion σ	1,4163121	0,1382179	1,1905863	1,7484573

Measures

-2*LogLikelihood	189,8354
AICc	194,0707
BIC	197,8134

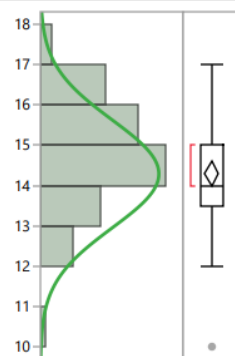
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9273838	0,0029*
	Simulated	
	A ²	p-Value
Anderson-Darling	1,7074952	0,0004*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions N° of ECA's=Zero

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,287671	0,1566383	13,975418	14,599924
Dispersion σ	1,3383183	0,1119158	1,1509352	1,5991535

Measures

-2*LogLikelihood	248,7114
AICc	252,8829
BIC	257,2924

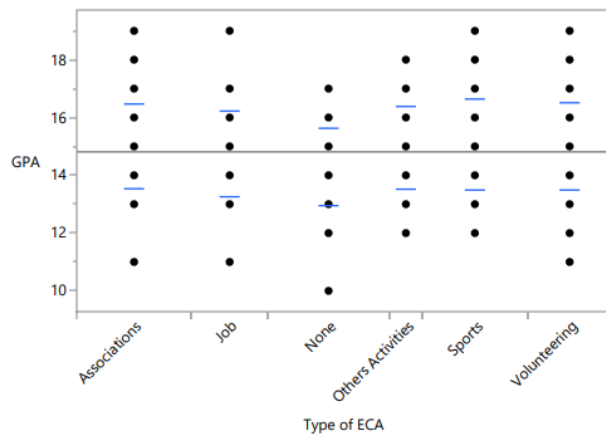
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9397035	0,0017*
	Simulated	
	A ²	p-Value
Anderson-Darling	1,8454364	<,0001*

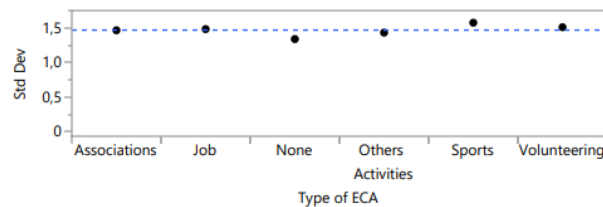
Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

2. Brown-Forsythe Test

Oneway Analysis of GPA By Type of ECA



Tests that the Variances are Equal



Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
Associations	69	1,465285	0,985507	0,985507
Job	46	1,482262	1,153119	1,130435
None	73	1,338318	1,062864	1,027397
Others Activities	20	1,431782	1,065000	1,050000
Sports	63	1,574730	1,168052	1,142857
Volunteering	51	1,509967	1,098039	1,098039

Test	F Ratio	DFNum	DFDen	Prob > F
O'Brien[.5]	0,2831	5	316	0,9222
Brown-Forsythe	0,2310	5	316	0,9488
Levene	0,2917	5	316	0,9174
Bartlett	0,3791	5	.	0,8634

3. Kruskal-Wallis test

Kruskal-Wallis Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
11,8434	4	0,0186*

4. Steel-Dwass test

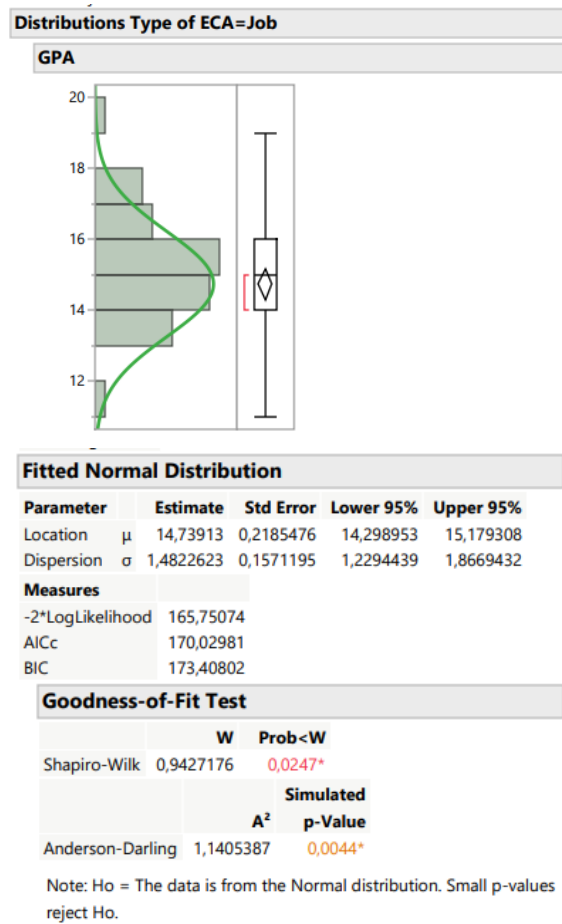
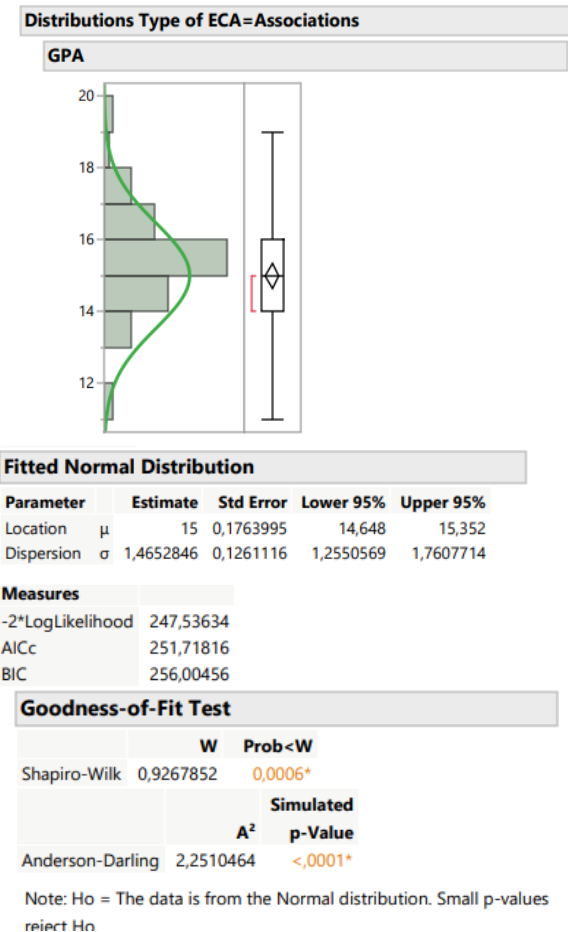
Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*		Alpha						
2,72777		0,05						
Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Three	One	3,0357	5,98505	0,50722	0,9867	0,00000	-1,00000	1,000000
Three	Four	-0,7576	4,40600	-0,17194	0,9998	0,00000	.	.
One	Four	-5,7619	11,09701	-0,51923	0,9855	0,00000	-3,00000	3,000000
Two	One	-8,3056	6,12595	-1,35580	0,6561	0,00000	-1,00000	0,000000
Zero	Two	-8,4248	6,41403	-1,31349	0,6828	0,00000	-1,00000	0,000000
Two	Three	-8,6364	5,41996	-1,59344	0,5016	-1,00000	-2,00000	0,000000
Two	Four	-11,0833	9,48428	-1,16860	0,7694	-1,00000	-4,00000	2,000000
Zero	Three	-16,2967	6,53571	-2,49349	0,0920	-1,00000	-2,00000	0,000000
Zero	One	-18,0831	6,61422	-2,73397	0,0492*	-1,00000	-1,00000	0,000000
Zero	Four	-19,0868	12,65077	-1,50874	0,5567	-1,00000	-4,00000	1,000000

APPENDIX E

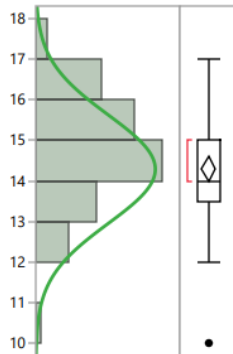
Test results and Outputs for Statistical Analysis of "GPA and type of ECA" in JMP

1.Shapiro Wilk test



Distributions Type of ECA=None

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,287671	0,1566383	13,975418	14,599924
Dispersion σ	1,3383183	0,1119158	1,1509352	1,5991535

Measures

-2*LogLikelihood	248,71145
AICc	252,88287
BIC	257,29236

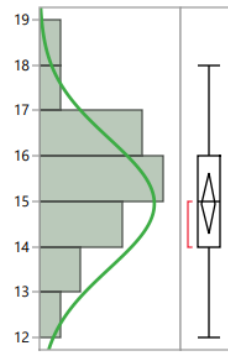
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9397035	0,0017*
	Simulated	
	A ²	p-Value
Anderson-Darling	1,8454364	0,0004*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Type of ECA=Others Activities

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,95	0,3201562	14,279905	15,620095
Dispersion σ	1,4317821	0,2353835	1,0888565	2,0912203

Measures

-2*LogLikelihood	70,114337
AICc	74,82022
BIC	76,105802

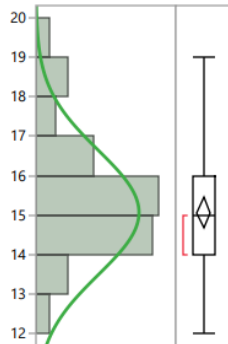
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9610266	0,5646
	Simulated	
	A ²	p-Value
Anderson-Darling	0,4644669	0,2292

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Type of ECA=Sports

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	15,063492	0,1983973	14,666901	15,460083
Dispersion σ	1,57473	0,1419886	1,3397656	1,9104113

Measures

-2*LogLikelihood	235,00082
AICc	239,20082
BIC	243,28709

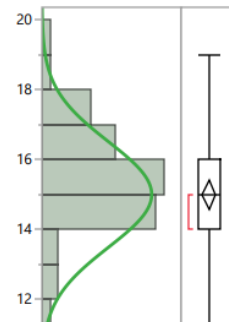
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9216381	0,0006*
	Simulated	
	A ²	p-Value
Anderson-Darling	2,1412475	<,0001*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Type of ECA=Volunteering

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	15	0,2114377	14,575315	15,424685
Dispersion σ	1,5099669	0,1517574	1,263403	1,8770069

Measures

-2*LogLikelihood	185,76468
AICc	190,01468
BIC	193,62833

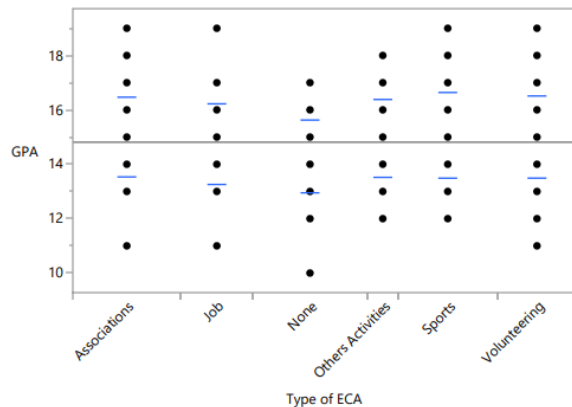
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9500285	0,0316*
	Simulated	
	A ²	p-Value
Anderson-Darling	1,2593636	0,0024*

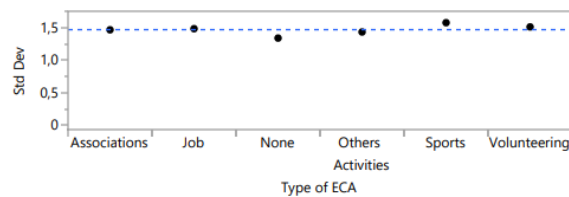
Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

2. Brown-Forsythe Test

Oneway Analysis of GPA By Type of ECA



Tests that the Variances are Equal



Level	Count	Std Dev	MeanAbsDif	
			to Mean	to Median
Associations	69	1,465285	0,985507	0,985507
Job	46	1,482262	1,153119	1,130435
None	73	1,338318	1,062864	1,027397
Others Activities	20	1,431782	1,065000	1,050000
Sports	63	1,574730	1,168052	1,142857
Volunteering	51	1,509967	1,098039	1,098039

Test	F Ratio	DFNum	DFDen	Prob > F
O'Brien[.5]	0,2831	5	316	0,9222
Brown-Forsythe	0,2310	5	316	0,9488
Levene	0,2917	5	316	0,9174
Bartlett	0,3791	5	.	0,8634

3. Kruskal Wallis Test

Kruskal-Wallis Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
11,8960	5	0,0362*

4. Steel-Dwass Test

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*		Alpha						
2,84970		0,05						
Level	- Level	Score Mean		Z	p-Value	Hodges-		
		Difference	Std Err Dif			Lehmann	Lower CL	Upper CL
Sports	None	16,6636	6,593693	2,52721	0,1162	1,00000	0,00000	1,000000
Volunteering	None	16,5866	6,386546	2,59712	0,0979	1,00000	0,00000	1,000000
Others Activities	None	11,8798	6,636628	1,79003	0,4722	1,00000	0,00000	2,000000
Volunteering	Job	5,7886	5,579674	1,03744	0,9054	0,00000	-1,00000	1,000000
Sports	Job	5,5102	5,972282	0,92263	0,9408	0,00000	-1,00000	1,000000
Others Activities	Job	3,4435	5,019935	0,68596	0,9836	0,00000	-1,00000	1,000000
Volunteering	Sports	1,0467	6,057334	0,17280	1,0000	0,00000	-1,00000	1,000000
Volunteering	Others Activities	0,3132	5,305086	0,05904	1,0000	0,00000	-1,00000	1,000000
Volunteering	Associations	0,0171	6,222938	0,00274	1,0000	0,00000	-1,00000	1,000000
Others Activities	Associations	-0,1612	6,340308	-0,02543	1,0000	0,00000	-1,00000	1,000000
Sports	Others Activities	-0,3952	6,024219	-0,06561	1,0000	0,00000	-1,00000	1,000000
Sports	Associations	-1,5638	6,458673	-0,24213	0,9999	0,00000	-1,00000	1,000000
Job	Associations	-7,0290	6,154734	-1,14205	0,8638	0,00000	-1,00000	0,000000
None	Job	-8,8063	6,326425	-1,39198	0,7320	0,00000	-1,00000	0,000000
None	Associations	-19,3675	6,711753	-2,88561	0,0452*	-1,00000	-1,00000	0,000000

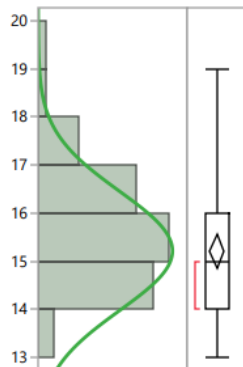
APPENDIX F

Test results and Outputs for Statistical Analysis of “GPA and Relationship between participation in ECA and academic performance” in JMP

1.Shapiro Wilk test

Distributions Relationship=Highly Related

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	15,215686	0,1733493	14,867504	15,563869
Dispersion σ	1,2379616	0,1244198	1,0358138	1,5388831

Measures

-2*LogLikelihood	165,50528
AICc	169,75528
BIC	173,36893

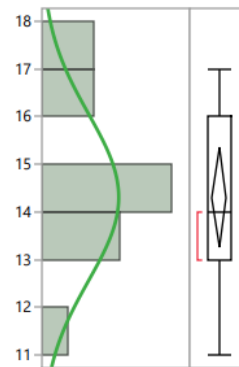
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9164297	0,0016*
	Simulated	
	A ²	p-Value
Anderson-Darling	1,742956	<,0001*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Relationship=Not Related

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,307692	0,4854896	13,249901	15,365483
Dispersion σ	1,7504578	0,3649957	1,2552288	2,8895422

Measures

-2*LogLikelihood	50,449213
AICc	55,649213
BIC	55,579112

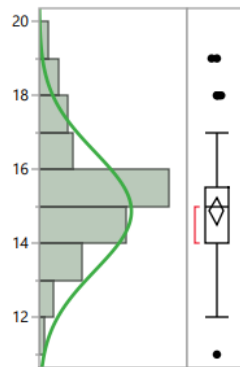
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9088071	0,1766
	Simulated	
	A ²	p-Value
Anderson-Darling	0,6242742	0,0816

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Relationship=Related

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,87013	0,1824031	14,506843	15,233417
Dispersion σ	1,6005809	0,1302534	1,3816115	1,9026787
Measures				
-2*LogLikelihood	289,95299			
AICc	294,11516			
BIC	298,6406			

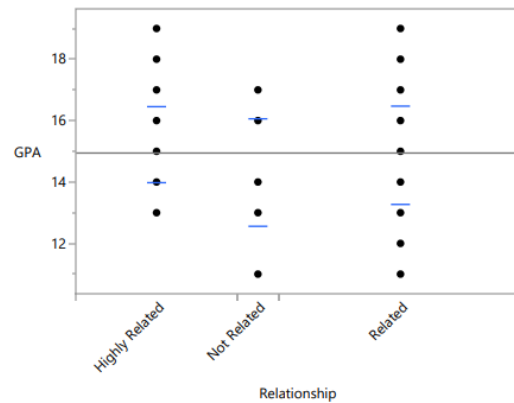
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9398689	0,0012*
	A ²	Simulated p-Value
Anderson-Darling	2,222223	<,0001*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

2. Brown-Forsythe Test

Oneway Analysis of GPA By Relationship



Tests that the Variances are Equal



Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
Highly Related	51	1,237962	0,976547	0,921569
Not Related	13	1,750458	1,349112	1,230769
Related	77	1,600581	1,168157	1,142857

Test	F Ratio	DFNum	DFDen	Prob > F
O'Brien[.5]	1,7262	2	138	0,1818
Brown-Forsythe	0,8627	2	138	0,4243
Levene	1,0069	2	138	0,3680
Bartlett	2,2379	2	.	0,1067

3. Kruskal-Wallis test

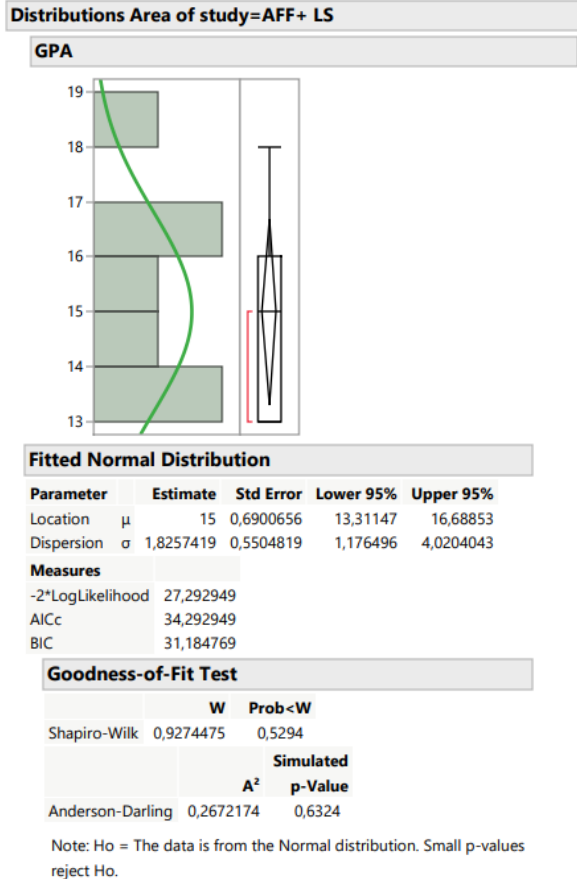
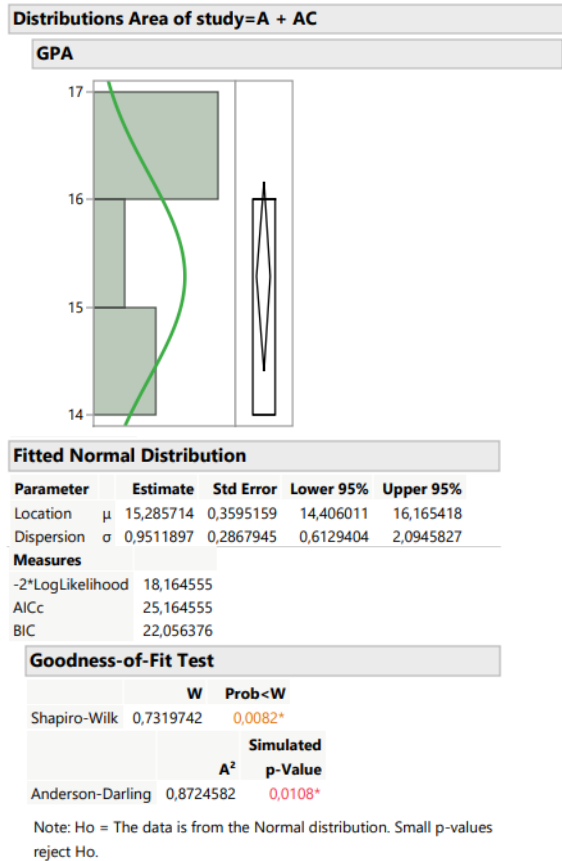
Kruskal-Wallis Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
4,7985	2	0,0908

APPENDIX G

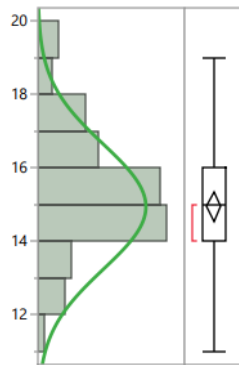
Test results and Outputs for Statistical Analysis of “GPA and Area of study” in JMP

1. Shapiro-Wilk test



Distributions Area of study=BS + MS

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,941176	0,206227	14,529546	15,352807
Dispersion σ	1,7005912	0,14746	1,4550598	2,0465844

Measures

-2*LogLikelihood	264,18837
AICc	268,37299
BIC	272,62739

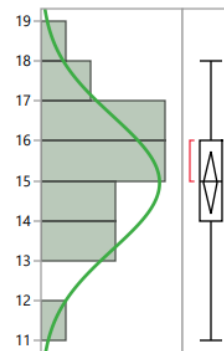
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9498395	0,0083*
	Simulated	
	A ²	p-Value
Anderson-Darling	1,5278351	<,0001*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Area of study=EDU

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,95	0,3732856	14,168704	15,731296
Dispersion σ	1,6693838	0,274445	1,2695503	2,4382546

Measures

-2*LogLikelihood	76,255723
AICc	80,961606
BIC	82,247188

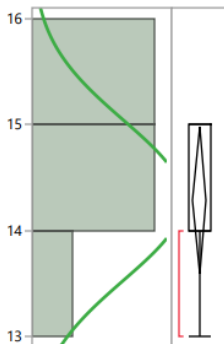
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,9592281	0,5285
	Simulated	
	A ²	p-Value
Anderson-Darling	0,41402	0,3244

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Area of study=HEA

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,285714	0,2857143	13,586597	14,984832
Dispersion σ	0,7559289	0,2279212	0,4871156	1,6646055

Measures

-2*LogLikelihood	14,947829
AICc	21,947829
BIC	18,839649

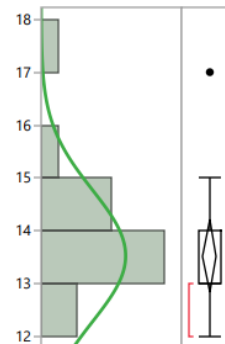
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,8333848	0,0861
	Simulated	
	A ²	p-Value
Anderson-Darling	0,5923122	0,0756

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Area of study=I + ERT

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	13,533333	0,3217018	12,843352	14,223315
Dispersion σ	1,2459458	0,2397824	0,91219	1,9649799

Measures

-2*LogLikelihood	48,165004
AICc	53,165004
BIC	53,581104

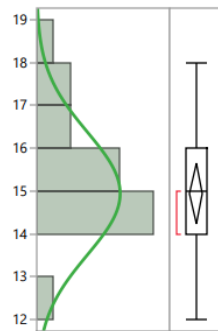
Goodness-of-Fit Test

	W	Prob<W
Shapiro-Wilk	0,8225605	0,0073*
	Simulated	
	A ²	p-Value
Anderson-Darling	1,0873629	0,0036*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Area of study=PS

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,944444	0,3379313	14,231472	15,657417
Dispersion σ	1,4337209	0,2495788	1,0758464	2,149354

Measures

-2*LogLikelihood	63,051618
AICc	67,851618
BIC	68,832361

Goodness-of-Fit Test

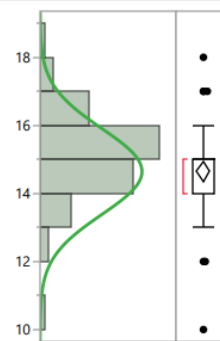
	W	Prob<W
Shapiro-Wilk	0,912988	0,0971

	Simulated
	A ² p-Value
Anderson-Darling	0,8216816 0,0272*

Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

Distributions Area of study=SBS + I + H + IJ

GPA



Fitted Normal Distribution

Parameter	Estimate	Std Error	Lower 95%	Upper 95%
Location μ	14,643836	0,1477506	14,3493	14,938371
Dispersion σ	1,2623816	0,1055657	1,0856307	1,5084169

Measures

-2*LogLikelihood	240,18304
AICc	244,35447
BIC	248,76396

Goodness-of-Fit Test

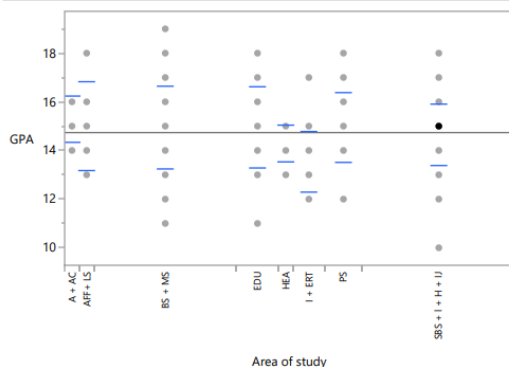
	W	Prob<W
Shapiro-Wilk	0,921033	0,0002*

	Simulated
	A ² p-Value
Anderson-Darling	2,4596929 <,0001*

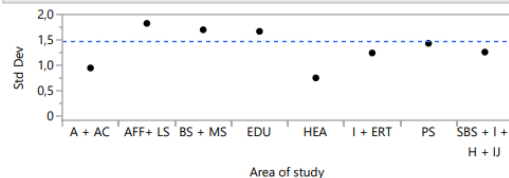
Note: Ho = The data is from the Normal distribution. Small p-values reject Ho.

2. Brown-Forsythe Test

Oneway Analysis of GPA By Area of study



Tests that the Variances are Equal



Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
A + AC	7	0,951190	0,816327	0,714286
AFF + LS	7	1,825742	1,428571	1,428571
BS + MS	68	1,700591	1,273356	1,264706
EDU	20	1,669384	1,265000	1,250000
HEA	7	0,755929	0,612245	0,571429
I + ERT	15	1,245946	0,906667	0,800000
PS	18	1,433721	1,061728	1,055556
SBS + I + H + IJ	73	1,262382	0,957778	0,904110

Test	F Ratio	DFNum	DFDen	Prob > F
O'Brien[5]	1,2096	7	207	0,2988
Brown-Forsythe	1,3467	7	207	0,2299
Levene	1,2272	7	207	0,2892
Bartlett	1,8663	7	.	0,0706

3. Kruskal-Wallis test

Kruskal-Wallis Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
16,9674	7	0,0176*

4. Steel-Dwass test

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*		Alpha							
3,03088		0,05							
Level	- Level	Score Mean	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	
SBS + I + H + U	I + ERT	24,1498	7,017280	3,44147	0,0135*	1,00000	0,00000	2,000000	
PS	I + ERT	10,0222	3,288870	3,04731	0,0476*	1,00000	0,00000	3,000000	
SBS + I + H + U	HEA	8,3757	8,803468	0,95141	0,9809	0,00000	-1,00000	2,000000	
PS	HEA	3,2738	3,116059	1,05063	0,9665	0,00000	-1,00000	3,000000	
EDU	BS + MS	2,0382	6,369300	0,32001	1,0000	0,00000	-1,00000	1,000000	
PS	BS + MS	0,2108	6,449978	0,03268	1,0000	0,00000	-1,00000	1,000000	
EDU	AFF+ LS	0,1929	3,419623	0,05640	1,0000	0,00000	-3,00000	3,000000	
PS	AFF+ LS	0,0000	3,194013	0,00000	1,0000	0,00000	-3,00000	3,000000	
BS + MS	AFF+ LS	-0,1576	8,475861	-0,01859	1,0000	0,00000	-3,00000	2,000000	
PS	EDU	-0,8444	3,530455	-0,23919	1,0000	0,00000	-2,00000	2,000000	
AFF+ LS	A + AC	-1,0000	2,132944	-0,46884	0,9998	0,00000	.	.	
HEA	AFF+ LS	-1,4286	2,173770	-0,65719	0,9980	-1,00000	.	.	
EDU	A + AC	-1,5429	3,388572	-0,45531	0,9998	0,00000	-3,00000	2,000000	
PS	A + AC	-2,3810	3,155604	-0,75452	0,9952	0,00000	-2,00000	2,000000	
SBS + I + H + U	AFF+ LS	-3,3659	8,870129	-0,37947	0,9999	0,00000	-3,00000	2,000000	
SBS + I + H + U	PS	-3,5320	6,681324	-0,52863	0,9995	0,00000	-1,00000	1,000000	
HEA	A + AC	-3,8571	2,135519	-1,80619	0,6158	-1,00000	.	.	
HEA	EDU	-4,2429	3,404950	-1,24609	0,9180	-1,00000	-3,00000	2,000000	
SBS + I + H + U	BS + MS	-5,0702	6,677317	-0,75932	0,9950	0,00000	-1,00000	1,000000	
I + ERT	AFF+ LS	-5,3429	2,849832	-1,87480	0,5684	-1,00000	-5,00000	1,000000	
I + ERT	HEA	-5,4476	2,842821	-1,91627	0,5396	-1,00000	-2,00000	1,000000	
SBS + I + H + U	EDU	-6,6884	6,589330	-1,01503	0,9724	0,00000	-1,00000	1,000000	
BS + MS	A + AC	-7,0116	8,456055	-0,82918	0,9915	0,00000	-2,00000	2,000000	
I + ERT	A + AC	-8,0667	2,884630	-2,79643	0,0958	-2,00000	-3,00000	1,000000	
HEA	BS + MS	-9,0599	8,430711	-1,07463	0,9621	-0,50000	-3,00000	1,000000	
I + ERT	EDU	-9,3917	3,430436	-2,73775	0,1114	-2,00000	-3,00000	0,000000	
SBS + I + H + U	A + AC	-13,0724	8,848655	-1,47733	0,8198	-1,00000	-2,00000	1,000000	
I + ERT	BS + MS	-22,4181	6,741260	-3,32551	0,0199*	-1,00000	-3,00000	0,000000	

APPENDIX H

Test results and Outputs for Statistical Analysis of "Gender and Participation in ECA" in JMP

1. Contingency Table

		Gender		
Participation	Count	Female	Male	Total
	Total %			
	Col %			
	Row %			
	No	58	14	72
		27,23	6,57	33,80
		38,16	22,95	
Yes		80,56	19,44	
		94	47	141
		44,13	22,07	66,20
		61,84	77,05	
Total		66,67	33,33	
		152	61	213
		71,36	28,64	

		Participation		
Gender	Count	No	Yes	Total
	Expected			
	Female	58	94	152
		51,38028	100,6197	
	Male	14	47	61
		20,61972	40,38028	
Total		72	141	213

2. Pearson test

Tests			
N	DF	-LogLike	RSquare (U)
213	1	2,3461253	0,0184
Test	ChiSquare	Prob>ChiSq	
Likelihood Ratio	4,692	0,0303*	
Pearson	4,499	0,0339*	

APPENDIX I

Test results and Outputs for Statistical Analysis of “Gender and Type of ECA” in JMP

1. Contingency Table

		ECA				
Gender	Count	Associations	Job	Other Activities	Sports	Volunteering
	Expected					
Female	48	30	13	35	37	163
	45,35081	29,57661	13,14516	41,40726	33,52016	
Male	21	15	7	28	14	85
	23,64919	15,42339	6,854839	21,59274	17,47984	
Total	69	45	20	63	51	248

2. Pearson test

Tests			
N	DF	-LogLike	RSquare (U)
248	4	2,1799688	0,0057
Test	ChiSquare	Prob>ChiSq	
Likelihood Ratio	4,360	0,3595	
Pearson	4,421	0,3521	

APPENDIX J

Test results and Outputs for Statistical Analysis of “Area of study and Participation in ECA’s” in JMP

1.Contingency Table

Contingency Table		Participation		
Area of study	Count	No	Yes	Total
	Expected			
	Agriculture, Forestry & Fishing + Life Sciences (Biology, REnewable Energies) + Health	1	13	14
	Business Sciences + Mathematics and Statistics	4,753488	9,246512	
		27	41	68
		23,08837	44,91163	
	Education	8	12	20
		6,790698	13,2093	
	Informatics + Engineering and Related Techniques + Arts + Architecture and Construction	5	17	22
		7,469767	14,53023	
	Personal Services (Sports and Tourism)	8	10	18
		6,111628	11,88837	
	Social and Behavioral Sciences + Law + Humanities + Information & Journalism	24	49	73
		24,78605	48,21395	
	Total	73	142	215

2. Pearson test

Tests			
N	DF	-LogLike	RSquare (U)
215	5	4,6235479	0,0336
Test	ChiSquare	Prob>ChiSq	
Likelihood Ratio	9,247	0,0996	
Pearson	7,975	0,1576	

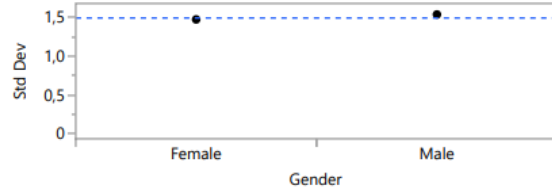
APPENDIX K

Test results and Outputs for Statistical Analysis of “GPA and Gender” in JMP

1. Brown-Forsythe

Oneway Analysis of GPA By Gender

Tests that the Variances are Equal



Level	Count	Std Dev	MeanAbsDif	
			to Mean	to Median
Female	152	1,471452	1,125952	1,098684
Male	61	1,535375	1,196453	1,180328

Test	F Ratio	DFNum	DFDen	p-Value
O'Brien[.5]	0,1208	1	211	0,7285
Brown-Forsythe	0,2854	1	211	0,5938
Levene	0,2424	1	211	0,6230
Bartlett	0,1562	1	.	0,6927
F Test 2-sided	1,0888	60	151	0,6697

2. Pooled t-test

Summary of Fit

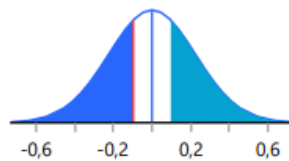
Rsquare	0,000885
Adj Rsquare	-0,00385
Root Mean Square Error	1,489908
Mean of Response	14,74178
Observations (or Sum Wgts)	213

Pooled t Test

Male-Female

Assuming equal variances

Difference	-0,09761	t Ratio	-0,43223
Std Err Dif	0,22582	DF	211
Upper CL Dif	0,34755	Prob > t	0,6660
Lower CL Dif	-0,54276	Prob > t	0,6670
Confidence	0,95	Prob < t	0,3330



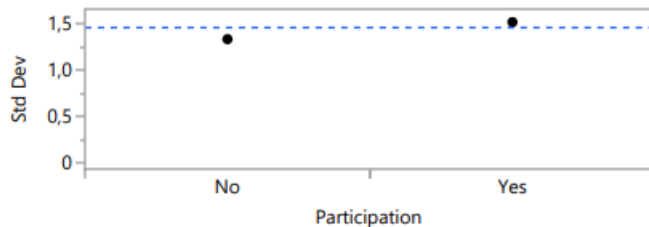
APPENDIX L

Test results and Outputs for Statistical Analysis of “GPA and Participation in ECA” in JMP

1. Brown-Forsythe

Oneway Analysis of GPA By Participation

Tests that the Variances are Equal



Level	Count	Std Dev	MeanAbsDif to Mean	MeanAbsDif to Median
No	73	1,338318	1,062864	1,027397
Yes	142	1,522465	1,127157	1,119718

Test	F Ratio	DFNum	DFDen	p-Value
O'Brien[.5]	1,2142	1	213	0,2717
Brown-Forsythe	0,4230	1	213	0,5161
Levene	0,2201	1	213	0,6395
Bartlett	1,5291	1	.	0,2163
F Test 2-sided	1,2941	141	72	0,2245

2. Pooled t-test

Summary of Fit

Rsquare	0,046257
Adj Rsquare	0,041779
Root Mean Square Error	1,462814
Mean of Response	14,73488
Observations (or Sum Wgts)	215

Pooled t Test

Yes-No

Assuming equal variances

Difference	0,67712	t Ratio	3,214114
Std Err Dif	0,21067	DF	213
Upper CL Dif	1,09238	Prob > t	0,0015*
Lower CL Dif	0,26185	Prob > t	0,0008*
Confidence	0,95	Prob < t	0,9992

