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Sustainability Competences and Sustainable Consumption In Higher Education: Differences Between Student Groups

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ABSTRACT

Purpose Our current lifestyle, based on compulsive consumption, seems to have surpassed the planet's limits of sustainability. This problem especially concerns the younger generations, as they will suffer the consequences; so, for that reason, they should participate in finding solutions. University aims to provide students with basic competences for taking decisions and conducting professional activities from the sustainability perspective. **Methodology** This is an exploratory study of a quantitative character about the consumption habits of a group of young university students. Data were collected through a survey with a sample size of 271 students from three faculties belonging to different fields of knowledge. **Findings** Through an analysis of the differences in the distribution of consumption patterns of the three groups of students, the study detected different patterns of consumption, depending on the academic orientation. In some cases, this could explain less sustainable patterns associated to the variable 'gender'. It was also found that syllabus does not adequately incorporate these competences. **Implications to Research and Practice** Our results provide clues about how to act to improve individuals' perception of the environmental impact of their consumption habits and thus how to improve environmental education from the point of view of the educators of future consumers.

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Introduction

Sustainability through environmental awareness and restricted consumption habits involves making choices and improve the quality of human life without putting extra pressure on supporting ecosystems. The need is to create an equilibrium between consumerist human culture and the environmental resources, by adopting a life pattern that doesn't waste or unnecessarily deplete natural resources. Sustainability has attracted public attention in both academic and industrial spheres. Students in academic institutions understand the need for protecting environment and they fight against the contamination of atmosphere as today's student is tomorrow's citizen. Environmental education contributes to developing this awareness and helping them save various energy sources.

Environmental education promotes knowledge, attitudes and conducts favorable sustainable development, preparing young students through scientific literacy (Franco et al., 2018). In this context, Higher Education plays an essential role in training future professionals who can play an active role in protecting the environment (UNESCO, 2009). The new generation of university students will have to actively work in the search for solutions and their attitude towards environmental question is therefore crucial (Cortese, 2003; Gwekwerere, 2014). The university students are the hope for attaining environmental sustainability (Abbas & Singh, 2014; Bauri & Behera, 2018); even more so perhaps in the case of those university students in the educational branches who, in the mid-term, will oversee the awareness raising of tomorrow's consumers (Gwekwerere, 2014; Pe'er et al., 2007).

The responsibility for the environmental deterioration usually falls upon the contexts beyond the scope of personal decisions, fixing the attention and decision-taking upon public or private institutions. Whether any educational institution or a commercial organization, the demands of sustainability of environment should be directed towards all levels of government, from the supranational organisms of the lower levels of local administration, associating diverse competences with each level. Thus, for example, the United Nations or the European Union are asked to establish and coordinate global agreements, while local authorities are deemed responsible for such environmental questions as monitoring urban waste and water treatment. Businesses must take care of distribution of competences and responsibilities as they are associated with the use of non-renewable resources, the generation of waste and atmospheric pollution.

In this exploratory paper, we have carried out an analysis of the consumer habits of a group of young university students through their patterns of consumption, including other sociodemographic variables such as gender and whether people live in urban or rural areas. One's behavior is the maximum expression of one's environmental awareness, so the students' environmental education should be reflected in their consumer habits (Goldman et al., 2015). Although many students may have a favorable attitude toward sustainability, they may not understand the importance of behavioral components that contribute to sustainable outcomes (Whitley et al., 2018). In our empirical analysis, we aim to analyze whether there exist differences between the various categories or subgroups of students as far as their consumer habits are concerned, with special emphasis on the possible differences according to the orientation of their university studies. In addition, we also explore the study plans of the degrees in order to discover what advances have been made

in the introduction of competences on sustainability, along the same lines as those indicated by different authors (Bianchi, 2020; Karadeniz et al., 2021; Minguet & Solís, 2009; Vilches & Pérez, 2012 or among others), who point out the need to modernize university curricula, including values related to sustainability.

Problem statement

The responsibility of governments and foreign enterprises are given equal consideration, especially when it is a question of highly developed economies or ones that have had a very fast growth. However, the focus is less frequently set on individuals' consumption habits, and it is these that ultimately generate the necessities that cover or regulate both governments and enterprises. Even so, as indicated above, it is evident that this subject concerns society in general and there is the perception of an increase in the individual conscience as far as responsibility for the environmental deterioration is concerned. The voices that raise the alarm concerning the situation and demanding urgent solutions are ever more frequent. Having reached our present position, we should ask ourselves whether anyone in the new generations can have a clear conscience concerning the implications of their consumption habits or whether, on the contrary, it is simply a question of looking for a new source of blame, displacing the previous generations.

Moreover, the increase in the environmental impact generated by human beings has surpassed the limits at which the planet can recuperate, with ever greater pressure on biodiversity. There are many question marks surrounding this subject, but irrespective of upon which group in the population, economic sector, or level of government the responsibility for the problem lies, it would seem to be clear that a part of the solution must come through a change in individual consumer habits. The Living Planet Report (Almond et al., 2020) points out that the solutions will come from changing the patterns of food production and consumption, stopping the transformation of land use, or taking political and economic decisions that respect the planet's limits.

The rest of the work is structured as follows: the next section sets out the theoretical structure of the research and a brief review of the literature. Section 3 presents the methodology and the data used in the analysis. Section 4 offers the results and discussion and, finally, the main conclusions are presented followed by the bibliographical references.

Literature review

Over the last few decades, increasing attention has been paid to the relationship between environment and education (Bianchi, 2020) and, more specifically, to Education for Sustainable Development (ESD). ESD refers to educational programs and experiences designed for people to acquire the knowledge, skills, and values necessary to achieve a sustainable future. The aims of the decade (UNESCO, 2014) demonstrate that there is a need for tools and measures to assess ESD, and several initiatives and projects have been carried out in higher education institutions (Biasutti & Frate, 2017; Dieko, 2020; Makrakis & Kostoulas-Makrakis, 2012). One of them, the Reorient University Curricula to Address Sustainability (RUCAS) project, whose main objective was to reorient the curricula of several courses of 11 European and Middle Eastern universities toward SD, providing knowledge, skills, perspectives and values of sustainability (Bassey, 2020; Caliskan & Zhu, 2020; Erdil-Moody & Thompson, 2020).

In that regard, the university aims to provide students with skills with which to function in their working life. Those professional competences are defined as the set of knowledge, abilities, skills and attitudes required in the field of each profession, that the subjects have to apply in real work situations, according to the intrinsic social responsibility criteria for each professional area (Sladogna, 2001). For this reason, universities must incorporate the necessary changes into their degrees for society to advance in respect for environmental sustainability. As Albareda-Tiana and Fernández (2016) indicate, various studies have investigated what the key sustainability competences are and how to incorporate them into the education system. Wiek et al. (2011) and Bianchi (2020), for example, recognize the need to develop a more encompassing system to identify and update the sustainability competences critical to perform sustainability-related jobs.

The literature on competences in sustainability education is extensive and not without controversy (Bianchi, 2020; Brundiers et al., 2021). Information and knowledge play an important role when it comes to taking decisions that respect sustainability. However, although information and knowledge are necessary, they are not in themselves sufficient to provide an adequate environmental awareness (Aoyagi-Usui et al., 2003; Corraliza & Collado, 2019; Hungerford & Volk, 1990). In fact, the environmental education to young people should always attend to triple cognitive, affective, and behavioral dimensions, as well as being rooted in, or with reference to, the subject's daily life as a consumer and citizen. Promoting more environmentally friendly lifestyles means seeking an efficient connection between such factors as social norms, values, attitudes, beliefs, context and behavior (Franco et al., 2018).

Roth (1992) indicated that individuals who have been educated in environmental topics have the knowledge as well as the disposition, commitment, and skills to motivate themselves and which allow them to take responsible environmental action. Hollweg et al. (2011) defined the environmentally educated individual as "someone who, both individually and together with others, makes informed decisions concerning the environment; is willing to act on these decisions to improve the well-being of other individuals, societies, and the global environment; and participates in civic life" (p. 2-3). The consumer habits of everyone can also be considered as a key variable and as significant evidence of their degree of environmental awareness and responsibility: How much water do they use in their daily lives? How much food do they throw away? How much clothes do they need? How do they usually move about? And how much garbage do they generate? In short, what is the size of their ecological footprint?

The concept of "ecological footprint" has been widely used since Wackernagel and Rees coined the term as an approximation to the idea of the impact that human activity has on the environment (Rees, 1992; Wackernagel, 1994). Even though, as an indicator of sustainability, it has generated certain criticism in the literature (see, for instance Ayres (2000); Fiala (2008); Syrovátka (2020)), it is undeniable that the concept of the ecological footprint has been widely accepted in the debate, on both an academic level and a more informal level of discussion about environmental problems. Furthermore, the use of the footprint of consumption as a reference variable, even with all its limitations, has the advantage of offering a concept that is easily understandable and which enjoys some popularity among the population being studied. This is because, over the last few years, it has become usual to calculate the different variants of the footprint to analyze the relationships between human behavior and the planet's capacity to tolerate such behavior.

Thus, the Ecological Footprint represents the demand exerted by humanity on the Earth's capacity to supply renewable natural resources and ecological services. According to calculations made by the Global Footprint Network (2019), humanity currently needs the regenerative capacity of 1.6 planets to obtain the goods and services we consume each year. This measurement of the Ecological Footprint allows interesting analyses related to the consumer habits of countries or population groups to be made. For example, the per capita footprint of richer and poorer countries can be compared or, as in our case, the environmental damage that is the result of the habits of certain population groups.

Our relationship with the environment may be influenced by socioeconomic aspects and cultural factors (Aoyagi-Usui et al., 2003). In fact, there may be multiple factors that affect environmental attitudes, such as age, gender, socioeconomic status, whether we live in the city or the country ('rurality'), religion, politics, or education (Bradley et al., 1999; Bronfman et al., 2015; Gifford & Sussman, 2012). The relationship of these factors with approaches to the environment is not easy to establish a priori. Omran and Mohammadi (2008), for example, point out that men have more environmental knowledge than women, but those women have a better environmental attitude than men.

Theoretical Framework

The theoretical framework of this exploratory study comprised variables such as gender, rurality, and education, included in the analysis of the consumer habits of the young university students. In fact, the study also compared the ecological footprints of students in a faculty of education (to be precise, in a degree to become infant or primary school teachers) with that of students in more technical faculties (economics and engineering). The objective was to premise that the role of future teachers was more decisive, and that their environmental awareness will affect the environmental education of the next generation of children (Braun et al., 2018; Gwekwerere, 2014; Soleimanpour, 2014).

In addition, the syllabuses of the three degrees included in the sample were reviewed to find out to what extent progress has been made in the process of including sustainability competences in the curricula. Because students belong to diverse fields of knowledge (economics, engineering, and education), we can expect different results in each of them, both in terms of the direct reflection of sustainability competences in specific subjects, and their inclusion as transversal competences in various subjects of the curriculum. We also explored the study plans of the degrees, in order to discover what advances have been made in the introduction of competences on sustainability, along the same lines as those indicated by different authors, such as (Karadeniz et al., 2021), who pointed out that it was imperative that universities integrate sustainability into their various programs to counter ever-growing global environmental issues.

In Spain, the Conference of Rectors of Spanish Universities (CRUE), on several occasions, have pointed out the need to modernize university curricula, as an essential part of the European higher-education harmonization process, whose guidelines contain principles for the application of criteria directing university studies toward sustainability. In the same way, many other authors state that university students should receive training that includes values related to sustainability, whatever their field of expertise (Minguet & Solís, 2009; Ramos et al., 2020; Soleimanpour, 2014).

Method

Research design

This research aimed to carry out work with descriptive and inferential implications. Following the ideas of Roth (1992), Wackernagel (1994), and Goldman et al. (2015), in this article, we analyzed the consumer habits (ecological footprint) of a group of Spanish university students, with the main objective of discovering possible differences in the groupings based on the orientation of the university studies. However, the difference in environmental degradation caused by students according to gender and rurality was also analyzed. Based on the ecological footprint indicator proposed by Turner (2004), sub-indicators were developed to quantify the causes of environmental degradation, and these were the dependent variables used for this research: water use, food consumption, transport use, household habitability, energy use, clothing consumption, waste generation, and leisure consumption.

On the other hand, following the objectives of the research, the independent variables were divided into three: first, the orientation of university studies, where, based on a review of the literature, students from the Faculty of Economics (Sidiropoulos, 2014), the School of Industrial Engineering (Zamora-Polo et al., 2010) and the Faculty of Education (Zamora-Polo et al., 2016) were included in this study. Secondly, gender; it is interesting to study this variable because the literature has found significant differences in this area (Sammalisto et al., 2016). Finally, the students' home background, i.e., whether the student comes from a rural or urban family home (Arcury & Christianson, 1993).

Research sample

To achieve the research objectives, the sample consisted of 271 students from the Faculty of Economics, the Faculty of Education, and the School of Industrial Engineering of the University of Extremadura. The students were from the first year of their university degrees, so they were between 18 and 20 years of age. Table 1 presents the demographic distribution of the sample, according to the official data of the University of Extremadura (Universidad de Extremadura, 2021) and is deemed to be a representative sample:

Table 1

Sociodemographic variables of the participants' studies.

Variable	Number of students	Percentage of the sample
Gender		
Male	132	48.7%
Female	139	51.3%
Environment		
Rural	118	43.5%
Urban	153	56.5%
Branch of studies		
Education	101	37.3%
Economics	99	36.5%
Technical Industrial Engineering	71	26.2%

Source: Research results.

Research instruments and procedure

The data was collected from a questionnaire proposed by Turner (2004).The questionnaire can be found through the following link: https://forms.office.com/r/YRNYrh0iTm The choice of this questionnaire was based on the need to use concepts appropriate to the age range of the sample. It was applied during March 2021 to students, anonymously and in person, in the university classrooms thanks to the support of their teachers, who helped to resolve any doubts that arose when answering the questionnaire at that time. The questionnaire was divided into nine blocks of questions. The first concerns the sociological data of the students (*Q1 - Q4*). The next eight blocks analyzed each of the dependent variables of the paper: water use (*Q5 - Q10*), food consumption (*Q11 - Q16*), transport use (*Q17 - Q22*), household habitability (*Q23 - Q25*), energy use (*Q26 - Q32*), clothing consumption (*Q33 - Q40*), waste generation (*Q41 - Q47*), and leisure consumption (*Q48 - Q50*). For the analysis, the answer to each question had a value as a function of the degradation produced in the ecological footprint, the calculation of the dependent variables was the sum of these values in each block.

For the design of the questionnaire, the current literature was analyzed, and after analyzing several questionnaires used to calculate the ecological footprint, it was determined that Turner (2004) questionnaire was appropriate, due to its use of concepts adapted to students in the first years of university studies. The questionnaire was reviewed by a researcher in the field of Sociology, who made minor modifications to its wording, adapting it to the level of the students.

Finally, concerning the reliability of the questionnaire, Cronbach's Alpha test was used. Molina et al. (2013) stated that this indicator must be equal to or higher than 0.7 for a questionnaire to be consistent; although they also said that it depended on the use and development of the tool. Other authors considered the minimum reliability coefficient to be 0.6 (Godoy Izquierdo et al., 2008; Soler et al., 2009) among others. In our case, the alpha was 0.62, a number between 0.6 and 0.7, which showed that the questionnaire could still be developed further. This was perhaps the study's greatest weakness.

Data analysis

The Statistical Package for Social Science (SPSS) software v. 20 (IBM Corp, 2011) program was used to analyze the data. A strategy was followed to compare the consumer habits in the different groupings. We first carried out a descriptive analysis of the dependent variables, including a normality test using the Kolmogorov-Smirnov test with the Lilliefors correction (Lilliefors, 1967). As the sample was over 50, Shapiro Wilk stated that its use was not recommended (Ghasemi & Zahediasl, 2012).

The objective was to discover whether the sample had a normal distribution, which would allow us to carry out a parametric analysis. However, the result of non-normality meant we had to perform a non-parametric analysis. We then carried out a correlation analysis between the different independent variables. Given that the distribution of the variables was not parametric, we used Spearman's test to verify whether there was a linear relation between the said variables.

Attending to the characteristic of non-normality, we performed two tests to check whether there were different patterns of consumption in each of the sample's groupings. On one hand, we used the Mann-Whitney test (Mann & Whitney, 1947) to compare different consumer habits with respect to belonging to two complementary groups (gender, city versus country, or temporal variation). This test allowed us to estimate the hypothesis of the existence of differences in the means of two groups extracted from a sample which, in our case, was divided attending to the abovementioned characteristics (gender, rurality, and time). Should such a difference be determined between the two means of the subsamples, the said difference would be presented by means of a graphic instrument, i.e., the violin graph (Hintze & Nelson, 1998), which visualized the difference between the means and, in addition, offered a comparison of the distribution of the data.

The analysis of the differences in the distribution of the groups generated by the orientation of their studies (degrees in education, economics, and engineering) was based on the Kruskal-Wallis test (Kruskal & Wallis, 1952) as, on this occasion, we had three different distributions. The interpretation was like that offered in the Mann-Whitney test, where the hypothesis of the existence of different means in each of the samples was contrasted. When such differences do exist, a visual analysis will also be offered by means of a violin graph. Furthermore, since we had three groups, a comparison in pairs was carried out to detect what the relations were between the various university degrees. The significance used for the tests was 0.05 (α= 95% confidence level).

Results

Table 2 offers a summary of the principal descriptive indicators of the dependent variables used in the analysis:

Table 2

Descriptive Statistics

	Water	**Food**	**Transport**	**Housing**	**Energy use**	**Clothing**	**Waste**	**Leisure**
Mean	138.155	279.188	412.048	183.948	63.432	172.288	38.192	140.775
Std. Deviation	46.079	113.556	280.902	191.523	102.446	97.708	68.342	37.640
Minimum	50.000	60.000	30.000	-40.000	-180.000	5.000	-60.000	20.000
Maximum	280.000	510.000	1040.000	600.000	350.000	440.000	340.000	260.000
Kolmogorov - Smirnov	0.126	0.122	0,160	0.249	0.074	0.103	0.077	0.160
P-value of Kolmogorov - Smirnov	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001

Source: Research results.

It can be observed that the consumer groupings which have the heaviest environmental impact are transport (412.0) and food (279.2), followed by the effect from housing (183.9) and clothing (172.3). Also, worth mentioning are the contaminating effects produced by leisure (140.8) and water consumption (138.2). However, the environmental deterioration derived from the use of energy and the generation of waste turns out to be of marginal importance in comparison with other types of consumption, with means significantly lower than the rest of the groups (63.4 and 38.2, respectively). Appendix 1 shows the descriptive analysis of each group in relation to the independent variables (gender, city

versus country, university degree and temporal variation in the degree of economics).

On the other hand, it can be observed that none of the dependent variables followed a normal distribution. Thus, as we pointed out earlier, the inferential analysis carried out next used non-parametric statistics. Finally, before starting the analysis of the differences in the impact between the different groupings of individuals, we studied the correlation between the dependent variables. To do so, we used Spearman's correlation coefficient, which is more appropriate for non-parametric analyses. The results of this analysis have been summarized in Figure 1 (the detailed numerical results can be found in Appendix 2). It can be observed that the environmental impact of expenditure in housing and in food have no relation to any of the impacts associated to other types of expense, hence seen unconnected to other variables. However, there does exist a very significant positive relation between the environmental impact from transport and the consumption of water (0.31), these two consumer groups being, in addition, the ones that on average contaminate the most.

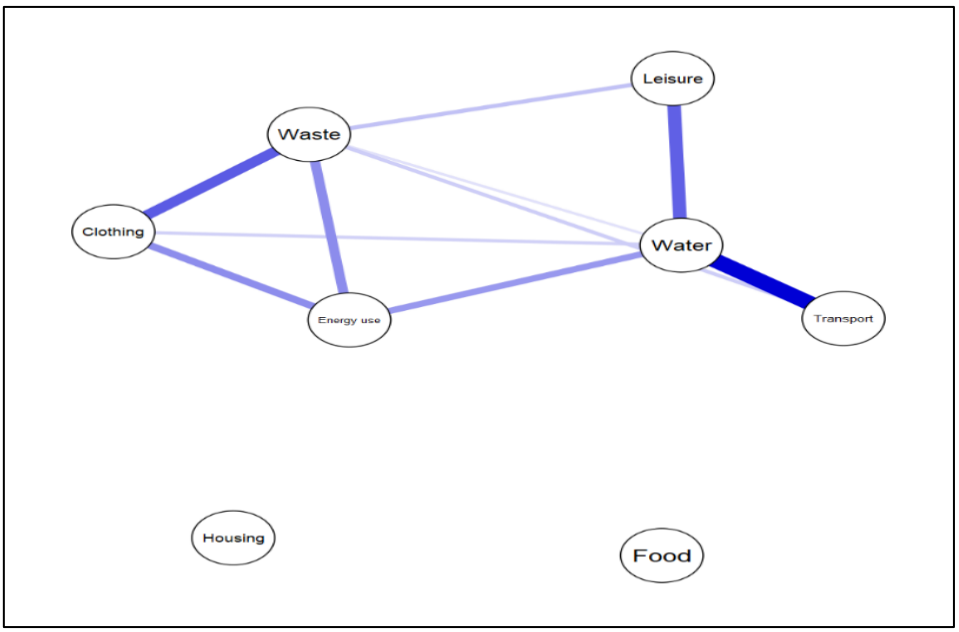


Figure 1: *Spearman's correlation of dependent variables. Each joint shown means that the Spearman's correlation is significant. If the line is thicker, it shows that the relationship is stronger. Where there are no joints, shows no relationship.*
Source: Research results

We began the inferential analysis by trying to discover whether there are differences associated to the degree being studied in the environmental impact of the consumer habits of the students in the sample. Table. 3 shows the results obtained in the non-parametric contrast of Krushal Wallis for the three groups of students (economics, engineering, and education).

Table 3

Krushal-Wallis H test. Differences by university studies.

	H	p-value
Water	0.879	0.879
Food	2.644	0.267
Transport	2.225	0.329
Housing	0.942	0.624
Energy use	20.823	0.000
Clothing	7.514	0.023
Waste	4.139	0.126
Leisure	1.896	0.388

Source: Research results.

Significant differences can be observed in the impact of the consumption in two types of expenditure, to be precise, the environmental impact of the expenditure in energy use and in clothing. Figure 2 and Figure 3 explore the origin of these differences through comparisons in pairs of three groups of students. This type of analysis allows us to estimate whether the environmental impact derived from the consumption of each group is different or whether, on the contrary, the differences originate from the consumer habits of one of the groups of students.

Energy use

Pairwise comparison

Each node shows the sample average rank of University Studies.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Economics-T.I.Engineering	-6,099	12,178	-,501	,616	1,000
Economics-Education	-47,167	11,074	-4,259	,000	,000
T.I.Engineering-Education	41,068	12,127	3,386	,001	,002

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is ,05.

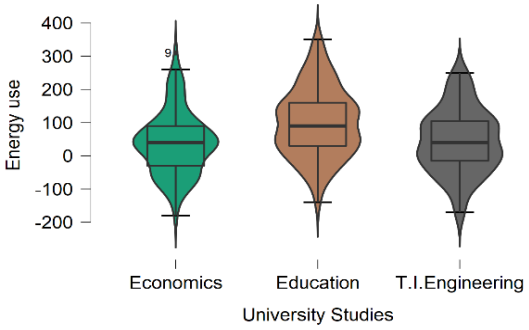
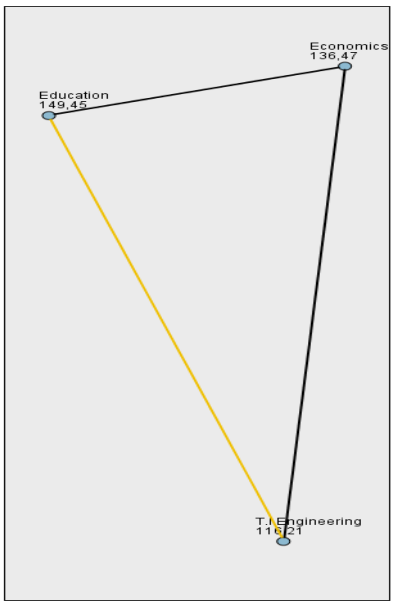


Figure 2: *Differences by university studies Analysis by pairs in Energy.*

Clothing

Pairwise comparison



Each node shows the sample average rank of University Studies.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
T.I.Engineering-Economics	20,258	12,181	1,663	,096	,289
T.I.Engineering-Education	33,239	12,131	2,740	,006	,018
Economics-Education	-12,981	11,078	-1,172	,241	,724

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is ,05.

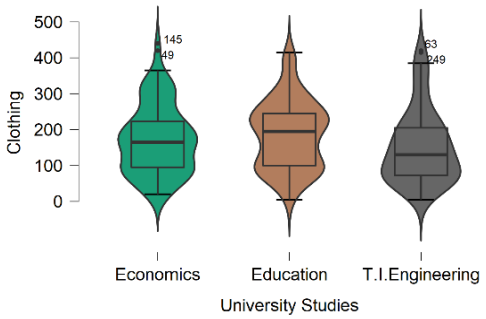


Figure 3: *Differences by university studies Analysis by pairs in Clothing.*
Source: Research results.

The analysis by pairs allowed us to discover that the differences in the environmental impact of energy consumption come from a different behavior pattern of the students of education, while no significant differences were found in the said impact between the economics and engineering students. The highest mean environmental impact derived from energy consumption corresponded to the group of education students. Similarly, for expenditure in clothing, the students of education produced a higher mean environmental impact than those of engineering. However, in this case, we did not find significant differences between the mean impact of the education group and that of economics.

Table 4 presents the results obtained in the analysis of the differences in the patterns of the various subsamples, grouped with respect to the rest of the considered variables: gender and where they live (rural or urban). This analysis could help us to understand and formulate a hypothesis concerning the results of the behavior of these university students by degree. In all these cases, the question is to contrast the differences between two groups, which is why we used the Mann-Whitney U test, according to what was said in the methodology section, instead of the Kruskal-Wallis H test, used to compare three samples.

First, beginning with the groupings based on the variable gender (Table 4), we found significant differences in the environmental impact of the consumer habits between men and women. The significant differences are based on some components of the consumer basket the data concerning the use of energy and expenditure in clothing and leisure. However, no differences were found in the remaining categories.

Table 4.

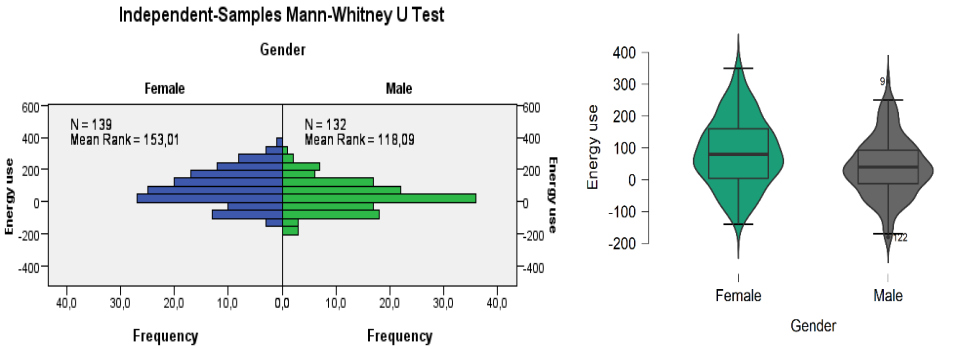
Mann-Whitney U test. Differences by gender

	W	p -value
Water	9454.000	0.663
Food	8504.000	0.298
Transport	9073.000	0.876
Housing	8872.500	0.637
Energy use	6810.000	< .001
Clothing	7463.500	0.008
Waste	8952.500	0.732
Leisure	11331.000	< .001

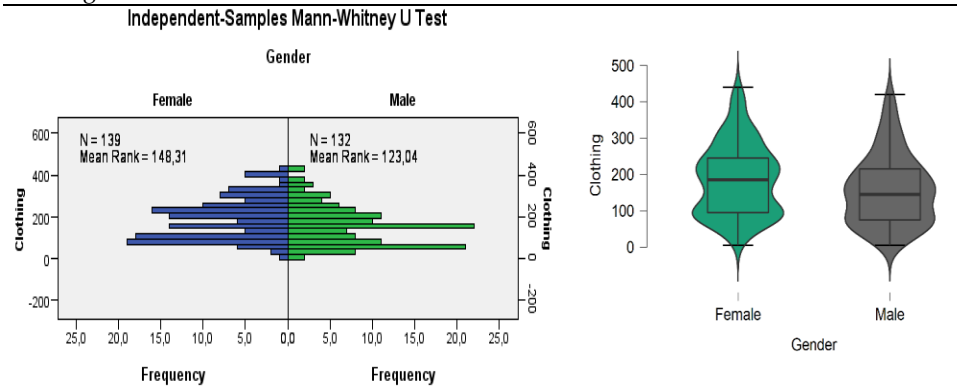
Note. Mann-Whitney U test. Source: Research results.

In the graphs concerning the impact of the different types of expenditure (Figure 4), it can be observed that the energy consumption for the women shows a significantly higher mean than for the men. Similarly, in clothing, we found a significantly higher impact for the women. As for leisure, here the impact of the women's consumer habits seems to be less harmful, on average, than that associated with the men.

Energy.



Clothing



Leisure

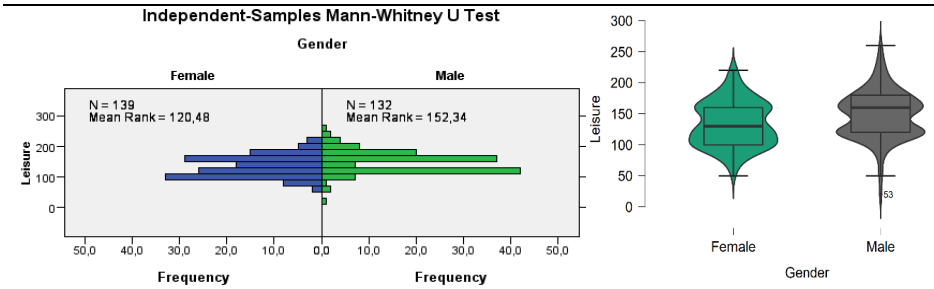


Figure 4. *Differences by gender. (Mann-Whitney U test).* Source: Research results.

Table 5 shows the differences observed in the groups constructed based on where the students live. That is, we have estimated the consumer habits of a group of students living in urban areas, as opposed to another group living in rural areas. In this case, the results of the tests only offer significant behavioral differences for the consumption related to housing. Living in the city or the country does not seem to affect consumer habits beyond those directly related to housing. In the consumption associated with the use of water, expenditure on food, transport, energy consumption, clothing, leisure, or the waste generated, we have not found differentiated habits in these two groups.

Table 5.

Mann-Whitney U test. Differences due to rural or urban origin.

	W	**p**
Water	8034.000	0.119
Food	9029.500	0.998
Transport	8961.000	0.918
Housing	7207.000	0.004
Energy use	8490.500	0.402
Clothing	10026.500	0.118
Waste	10097.000	0.094
Leisure	7973.000	0.094

Note. Mann-Whitney U test.

The graphic information offered in Figure 5 indicates that the expenditure associated to housing supposes a higher environmental impact when the family home is situated in a rural area.

Housing

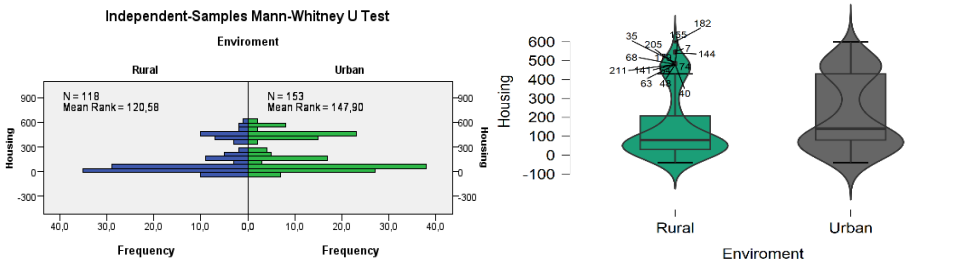


Figure 5: *Differences by rural or urban origin. (Mann-Whitney U test).* Source: Research results.

Discussion

The empirical literature offers examples of explicative variables of attitudes towards the environment, from one's socioeconomic status (Bordieu & Passeron, 1970; Chanda, 1999; Uyeki & Holland, 2000) to age (Collado & Corraliza, 2016; Wright et al., 2003), country of residence (Franzen, 2003; Franzen & Meyer, 2010; Inglehart, 1995; Sarigöllü, 2009), city versus country (Lutz et al., 1999; Rauwald & Moore, 2002), or ideology and religion (Arp III & Kenny, 1996). So, what results does our research provide from our survey with the sample of Spanish university students? In the light of the results obtained in the analysis concerning urban or rural and gender, the variable gender explains a great part of the differences in the environmental impact observed between the different groups of students. These results, in so far as the fact that the generality of the expenditure shows no significant difference in the environmental impact, are contrary to those found by Bjerke and Kaltenborn (1999) or Rauwald and Moore (2002), who found a greater environmental concern in individuals living in rural areas. Our results do, however, coincide with those of Bogner and Wiseman (1997) or Lutz et al. (1999), who found no significant differences between these groups.

The results obtained in our analysis show that gender can explain the greater impact of the consumer habits of the students of education, as it is the group in which women make up 76% of the total, as opposed to 50% in economics and 17% in engineering. This result confirms the evidence of other works, such as that of Kaur (2003), who found differences in attitudes with respect to the environment based on gender. The significant differences are based on some components of the consumer basket, in particular data concerning the use of energy and expenditure in clothing and leisure. However, no differences were found in the remaining categories. The environmental impact of energy consumption, clothing and, to a lesser extent, leisure is significantly higher for women.

Hunter et al. (2004), as in our study, points out that there seems to be different environmental behaviors between men and women, at least in relation to some types of consumption. However, contrary to our results, they found that women are more committed to pro-environmental behaviors, such as recycling. Similar findings are shown in Blocker and Eckberg (1997); Milfont and Duckitt (2004); Vaske et al. (2001). On the contrary, other works are cautious when mentioning the differences between gender in relation to Eco local behavior (Galli et al. (2013); Larson et al. (2010). However, the empirical evidence from the literature mainly sustains a greater environmental concern among women (for instance, in Blocker and Eckberg (1997); Chen et al. (2011); Raudsepp (2001); Tikka et al. (2000); Tindall et al. (2003); Zelezny et al. (2000)).

Nevertheless, the literature also shows examples of evidence such as ours, in the sense that the group of women shows less sustainable habits (for example, in Gambro and Switzky (1999)). In Gifford and Sussman (2012), various examples can be found of results with a different sign and explanations based on a better or worse knowledge of the environmental implications of one's consumer habits. Additionally, it is worth noting that most of the studies that found a more positive attitude among women were conducted with adult samples.

Regarding the analysis of the syllabuses of the degrees, the review has shown a scarce introduction of competences in sustainability. Specifically, in the economics curricula, there are no specific subjects that deal directly with environmental issues. Among the competences that are defined in the economics degree, only one is referenced, as a transversal competence, which is generically named "*Social and environmental issues sensitivity*". Moreover, in the Sociology course, there is a section that specifically refers to the issue of sustainability. This is the last section of the program, called "*Current Trends in Business Sociology: Gender and the Environment*", which includes the headings "*Environment and Business*" *and* "*Business Social Responsibility: Concept and Indicators*". Obviously, the consideration given to the subject of individual sustainable behaviors seems insufficient, even though concepts related to sustainability are included in other related degrees and in other subjects, such as, for example, social responsibility in the corporate or circular economy.

Regarding the engineering degree, among its competences, several are referenced in direct relation to the sustainability concept. Specifically, among the so-called general competences, the following is included: "*Ability to analyze and assess the social and environmental impact of technical solutions*". Specific competences are also included *("Basic knowledge and application of environmental technologies and sustainability*" and "*Applied knowledge about renewable energies*") and, as a transversal competence, "*Having an ethical and responsible attitude of respect for people and the environment*". Moreover, it is found that the definition of competences related to sustainability and the environment is broader than in the economics degree. In addition, they are reflected in different subjects of the syllabus:

- Industrial and commercial installations I and II
- Electric power generation from renewable energies
- Electrical installations
- Power plants

However, the definition of sustainability competences in the above subjects has a strong technical component and can hardly be considered as competences aimed at directly promoting sustainable consumption and living habits in students. The knowledge and skills acquired in these subjects are oriented towards facilitating a reduction in the environmental impact, mainly through the reduction of energy consumption from non-renewable sources or energy savings through efficiency improvements.

Finally, regarding the degree in education, there are also variations in the definition of competences in the syllabus, which includes the following:

- To assess individual and collective responsibility in the achievement of a sustainable future (general c.).
- To link education with the environment and to cooperate with families and the community (general c.).
- To critically analyze and incorporate the most relevant issues of contemporary society that affect the family and school education: social and educational impact of audio-visual languages and screens, gender relation and intergenerational changes, multiculturalism and interculturalism, discrimination and social inclusion, and sustainable development (specific c.).
- To recognize the mutual influence between science, society, and technological development, as well as the relevant citizen behavior, to ensure a sustainable future

(specific c.).

The subjects in the Education degree that directly include references to the environmental or sustainability issue are:

- Knowledge of the natural environment in primary education. In Unit 3, it includes the section "*Contents of scientific education for the Primary Education stage. Projects and didactic units on the Natural Environment Knowledge curriculum in Primary Education. Teaching materials and resources*". It includes the following sub-sections: Teaching-learning activities concerning the environment and its conservation, the diversity of living beings, health and personal development, matter and energy, technology, objects, and machines.
- Earth and Life Science Education: Unit 3 in this subject is called "Teaching Ecology and Environment Conservation" and includes the following items: ecology and environmental education, introduction to the study of ecosystems and their dynamics, the flow of energy and cycling of matter, the impact of human interaction with ecosystems, the educational use of the environment in Primary Education, the natural environment in different landscapes in Extremadura.

It can be observed that, although competences appear in the syllabus and there are specific subjects on the environmental problem, there is no clear approach to the problem of unsustainable consumption patterns, even though it is a central theme in the environmental issue. The curriculum programs do not focus on consumer habits that affect the environment, but rather on the definition of the problem.

Conclusion

Our current lifestyle, based on unlimited and compulsive consumption, would seem to have overwhelmed Planet Earth's sustainability limits some time ago (Heyl et al., 2013). In this work, we have examined the environmental impact of the consumer habits of a group of young university students, analyzing the differences that may exist between them. In our analysis, we have detected significant differences in consumption. These differences may be associated, first, to the orientation of their studies and, additionally, to other variables such as gender or where they have their home.

The subject is especially relevant, as one of the groups analyzed (students taking a degree in primary education) is made up of individuals who will participate in the environmental awareness-raising of the next generations. It is precisely the students of education who present the least sustainable consumer habits associated to certain concrete types of expenditure. The in-depth analysis of the characteristics of the groups has allowed us to find the origin of the said differences, which seem to be caused by the existence of consumer habits associated to the variable gender. To be more precise, the group of women has shown less sustainable consumer habits in some specific types of consumption, concretely in the expenditure associated to clothing. The greater percentage of women among the students in the education degree could therefore explain our results.

Never has there been such a wide agreement in the scientific and educational spheres concerning the necessity and urgency of encouraging environmental awareness-raising

among the new generations. Even so, to face this challenge, the educational institutions must necessarily start from a position of the student's attitudes, behavior patterns and consumer habits (Le Hebel et al., 2014; Liefländer & Bogner, 2014; Schreiner & Sjøberg, 2005; Soleimanpour, 2014). As some authors have recently argued, traditional curricula and methods of teaching are not able to form responsible consumers and engaged citizens (Soleimanpour, 2014).

A more up-to-date curriculum, a more constructionist and meaningful methodological perspective must start from an adequate knowledge of ideas and pre-concepts, the behavior patterns and consumer habits of those we are trying to educate (Biasutti, 2015; Scoullos, 2013). It is not just a question of increasing the quantity and rigor of the information received by the university students, but to foster a more active and meaningful education, much closer to the identity and lifestyle of the groups and sectors involved; an education that must start from the current consumer habits and behavior of the college students, so as to connect once more the micro and the macro, the local and the global, the present and the future, without forgetting in this entire process a footprint that is both harmful and noxious to the environment.

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Appendices

Appendix 1: Descriptive statistics by each sociodemographic variable.

Table A1.1

Descriptive Statistics by gender

	Water		Food		Transport		Housing		Energy use		Clothing		Waste		Leisure	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Obs .	132	139	132	139	132	139	132	139	132	139	132	139	132	139	132	139
Mean	140.076	136.331	269.773	288.129	415.530	408.741	179.242	188.417	39.697	85.971	157.614	186.223	35.720	40.540	148.485	133.453
Std. Deviation	47.366	44.918	110.595	115.987	290.767	272.216	184.617	198.422	93.441	105.808	95.979	97.633	65.987	70.665	37.731	36.190
Minimum	70.000	50.000	60.000	60.000	40.000	30.000	-40.000	-40.000	-180.000	-140.000	5.000	5.000	-60.000	-60.000	20.000	50.000
Maximum	280.000	260.000	510.000	510.000	1040.000	970.000	600.000	600.000	310.000	350.000	420.000	440.000	236.000	340.000	260.000	220.000

Where M means male and F means female. Source: Research results.

Table A1.2:

Descriptive Statistics by environment.

	Water		Food		Transport		Housing		Energy use		Clothing		Waste		Leisure	
	R	**U**	**R**	**U**	**R**	**U**	**R**	**U**	**R**	**U**	**R**	**U**	**R**	**U**	**R**	**U**
Obs .	118	153	118	153	118	153	118	153	118	153	118	153	118	153	118	153
Mean	134.153	141.242	276.356	281.373	406.568	416.275	146.525	212.810	58.729	67.059	184.237	163.072	44.966	32.967	137.458	143.333
Std. Deviation ING	47.759	44.652	108.026	117.949	276.137	285.354	176.104	198.393	110.751	95.765	105.015	90.956	68.353	68.097	37.603	37.592
Minimum	50.000	50.000	60.000	60.000	80.000	30.000	-40.000	-40.000	-170.000	-180.000	5.000	5.000	-60.000	-60.000	60.000	20.000
Maximum	260.000	280.000	510.000	510.000	1040.000	970.000	600.000	600.000	320.000	350.000	420.000	440.000	340.000	320.000	260.000	220.000

Where R means rural, and U means urban. Source: Research results.

Table A1.3:

Descriptive Statistics by branch of studies

	Food			**Transport**			**Housing**			**Energy use**			**Clothing**			**Waste**			**Leisure**		
	ECO	**EDU**	**ENG**	**ECO**	**EDU**	**ENG**	**ECO**	**EDU**	**ENG**	**ECO**	**EDU**	**ENG**	**ECO**	**EDU**	**ENG**	**ECO**	**EDU**	**ENG**	**ECO**	**EDU**	**ENG**
Obs.	99	101	71	99	101	71	99	101	71	99	101	71	99	101	71	99	101	71	99	101	71
Mean	287.879	285.842	257.606	445.606	395.594	388.662	174.949	175.347	208.732	38.788	100.792	44.648	172.374	186.089	152.535	32.232	52.297	26.437	142.727	137.327	142.958
Std. Deviation	121.280	111.931	102.977	284.849	261.888	300.400	191.979	185.465	199.756	94.310	103.457	97.509	95.880	94.830	102.155	62.449	79.811	54.576	35.994	36.630	41.314
Minimum	60.000	80.000	60.000	30.000	65.000	40.000	-40.000	-40.000	-40.000	-180.000	-140.000	-170.000	20.000	5.000	5.000	-60.000	-60.000	-60.000	70.000	50.000	20.000
Maximum	510.000	510.000	510.000	1040.000	910.000	970.000	550.000	600.000	540.000	310.000	350.000	250.000	440.000	415.000	420.000	180.000	340.000	166.000	240.000	260.000	220.000

Where ECO means economics, EDU means education and ENG means technical industrial engineering. Source: Research results.

Appendix 2: Spearman's Correlations between the dependent variables.

Table A2:

Spearman's Correlations between the dependent variables:

Variable		Water		Food	Transport		Housing	Energy use		Clothing		Waste		Leisure
Water	Spearman's rho	—												
	p-value	—												
Food	Spearman's rho	0.005		—										
	p-value	0.931		—										
Transport	Spearman's rho	0.310	***	-0.028	—									
	p-value	< .001		0.609	—									
Housing	Spearman's rho	0.049		-0.024	0.052		—							
	p-value	0.360		0.658	0.336		—							
Energy use	Spearman's rho	0.206	***	0.067	0.045		0.039	—						
	p-value	< .001		0.211	0.408		0.469	—						
Clothing	Spearman's rho	0.136	*	0.026	0.069		0.067	0.214	***	—				
	p-value	0.011		0.635	0.198		0.216	< .001		—				
Waste	Spearman's rho	0.157	**	-2.307e -4	0.161	**	0.072	0.219	***	0.274	***	—		
	p-value	0.003		0.997	0.003		0.181	< .001		< .001		—		
Leisure	Spearman's rho	0.227	***	-0.035	0.055		0.071	0.008		0.030		0.150	**	—
	p-value	< .001		0.518	0.311		0.185	0.885		0.583		0.005		—

* p < .05, ** p < .01, *** p < .001

Source: Research results.