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**ATTITUDINAL DIFFERENCES ON EDUCATION FOR**  
**SUSTAINABILITY IN UNIVERSITY STUDENTS**

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*Abstract*

Various public and private entities are currently making efforts to render the higher education curriculum more environmentally friendly, and in this regard knowledge of students' pro-environmental attitudes is relevant in order to know how best to direct these efforts. In view of this, this research aims to examine whether university students have differences in attitudes towards sustainability, both in the total score of the instrument used (Questionnaire on Education for Sustainability, CEPS, Spanish acronym) and in the general principles of educational, economic-environmental and socio-environmental sustainability, according to gender, year of study, degree and branches of knowledge (Social and Legal Sciences, Health Sciences). To this end, we have studied a sample of undergraduate students (n=428) from different degree courses at the University of Granada. In the analysis, mean comparisons were made for independent samples (Mann-Whitney U) and analysis of variances (Kruskal-Wallis). The results indicate that female students have a better environmental attitude, except in economic-environmental aspects. In the same way, differences have been identified between some degree courses, with the trend being towards a better pro-environmental attitude in the Social Education students with respect to the other degrees. Thus, we conclude that women and those in degrees related to social education or physical activity seem to be more sensitive to the actions proposed by Education for Sustainability.

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**Keywords:** Attitude, education for sustainability, environmental education, higher education, sustainable development.



## 1. Introduction

Sustainable development requires a revision of our way of thinking and acting in order to have a clear understanding of how to apply it in all areas of our lives (Casanueva, 2005), understanding it as a process of comprehending new ways of relating to the environment, the economy and society rather than a set of goals (Barkin, 1998).

Educating society with regard to the environment is fundamental in order to drive this process and one of the key contexts for this is Higher Education, not as social pressure, but rather as an intervention that anticipates responses to new demands and plays a leadership role as a driving force that satisfies the needs of society (Alba, 2017; Aznar, Ull, Piñero, & Martínez, 2014; Bilodeau, Podger, & Abd-El-Aziz, 2014). The educational community is being encouraged to become involved in this by various forums and public and private entities, such as the Conference of Rectors of Spanish Universities (2005), the 7th World Conference on Higher Education (2009) and the UNESCO World Conference on Education for Sustainable Development (2014), through the approval of the guidelines for curricular sustainability (Aznar et al., 2014; Borderías, 2015).

The responsibility of universities in environmental matters has produced actions aimed at making the curriculum more environmentally friendly as well as environmental management and social responsibility, made tangible and identified as key issues in methodological changes in teaching, relations within the educational community, institution management, and research (Alba, 2017; Alghamdi, Den Heijer, & De Jonge, 2017; Aznar et al., 2014; Segalás, 2015; Zhao and Zou, 2015). There are multiple studies aimed at showing the interventions being developed by university managers or by teachers on various university degree courses. They reflect aspects such as the need for a trans-disciplinary and holistic approach i.e. carried out in the different centres and subjects of the university (Barnard and Van der Merwe, 2016; Benavides, 2006; Salite, Drelinga, Ilisko, Olehnovica, & Zarina, 2016). However, one negative point of all this is the institutional isomorphism that emerges from the reports issued from higher education due to the pressures exerted on them, and which gives rise to four profiles where practices in the area of sustainability are homogenized (Chatelain-Ponroy and Morin-Delerm, 2016).

Universities are making big efforts to integrate these principles into university dynamics and new study plans through the development of competencies (Aznar et al., 2014). This focus on sustainable skills should be specified in the profile of university degrees taking into account the development of values, attitudes, behaviours, concepts, capacities and skills that will enable professionals in initial training to reflect on its various dimensions and so acquire knowledge that will enable them to make decisions through a practical understanding in any context, including the professional exercise of their activity (Aznar and Ull, 2009; Gonzalo, Sobrino, Benítez, & Coronado, 2017; Perales, 2017; Rodríguez and Guerra, 2009).

Competencies models for sustainability are giving rise to a complex situation due to the difficulty of converging the new system of competencies and learning outcomes with the development of sustainable awareness (Ibareda-Tiana and Gonzalvo-Cirac, 2013; Sivapalan, 2015). That is to say, in one sense, students should be trained in their field of specialization following sustainability criteria and values in order to know how to transfer this perspective in their future professional activity (Aznar), but factors must be found through the new learning system that can improve the development of competencies related to sustainability, such as contextual ones (Atmaca, 2017) or those inherent to students.

Questions may arise in relation to whether the profile of graduate students has common characteristics regarding sustainability, whether their way of thinking changes along with the dynamics with which the faculty where they study coexists, and whether their conception of sustainability is influenced by the knowledge imparted by their teaching staff, among others. Thus, factors such as gender, course, degree or area of knowledge can be objects of study, as they are interesting – in relation to attitudes – in order to perceive some possible aspects to consider in the “environmentalization” of university and curricular management.

## **2. Problem Statement**

Education for Sustainability proposes a series of learning opportunities that must be acquired by society to benefit the environment, one of the main recipients being students in higher education. That is why education in this subject is proposed in the university context. However, due to the common characteristics of students enrolled in the same university degree and the influence of the context in which the educational community of a faculty is immersed, either because of the contents provided by the teaching staff in their classrooms or because of the different spaces in which they all live together, there may be specific differences between the different groups of university students. Thus, gender, year of study, degree or area of knowledge of the degree can be influential variables. The interest in Education for Sustainability lies in knowing how to intervene in education according to students’ level of environmental attitude and develop common strategies for all students, but also individually differentiated.

## **3. Research Questions**

The educational or management interventions proposed at the university level, whether by the teaching staff or the governing bodies, must be based on the characteristics of the students in order to generate a more effective impact. Although it is true that there are a series of criteria that serve as a planning and intervention framework for all universities, a further step is recommended that takes into account the characteristics of the students, including their attitude towards education for sustainability proposals. Thus, certain questions arise: are there any differences based on certain intrinsic or extrinsic student characteristics? Are gender, level of studies in the same degree, the speciality being studied or the area of knowledge of the degree in which students are being trained included in these characteristics? If so, who are more pro-environmental? And around what sustainability issues? These are the questions that the present study seeks to answer.

## **4. Purpose of the Study**

The objective of the study is to corroborate that there are differences in attitude towards sustainable development among university students according to gender, course, area of knowledge and degree level, as well as to identify those groups with a greater or lesser level of pro-environmental attitude.

The working hypothesis is that there are significant differences across students according to gender, year of study, area of knowledge and degree level.

## 5. Research Methods

### 5.1. Sample

The sample included 428 undergraduate students enrolled at the University of Granada, 62.3% female and 37.7% male. The Medicine and Pharmacy students – in the same proportion (23.4%) – made up 46.8% of the sample from the Health Sciences area. The remaining 53.2% of students, from the area of Social and Legal Sciences, were made up of the Social Education students (22.6%), followed by Political and Administrative Sciences (21.3%) and Sports and Activity Sciences (9.3%). The proportions of the year of study of those in the sample are: 1<sup>st</sup> 26.4%, 2<sup>nd</sup> 21.3%, 3<sup>rd</sup> 27.8% and 4<sup>th</sup> 24.5%.

### 5.2. Instrument

The "Questionnaire on Education for Sustainability (CEPS)" allows for the collecting of information on the knowledge and attitudes that people present towards the fundamental themes proposed by Education for Sustainability (Estrada-Vidal and Tójar-Hurtado, 2017). In the case of the present study, only the part that measures the attitude of students towards sustainable development, the general principles that underpin Education for Sustainability (14 items), the economic-environmental aspects (9 items) and the social-environmental aspects (12 items) were used. This part is answered with a Likert scale of five answers ranging from 1 (no agreement) to 5 (full agreement), depending on the degree of agreement with the corresponding statement. Its psychometric characteristics are adequate as the Cronbach's Alpha coefficient is .95 and the validity of the construct explains 51.1% of the total variance ( $KMO=.954$ ;  $\chi = 7116.07$ ;  $df = 595$ ;  $p < .001$ ), according to the data shown with the Principal Component Analysis.

### 5.3. Procedure

The survey design was used to collect information using non-probabilistic snowball techniques (requesting student participation through the teacher) and incidental techniques (requesting student participation on campus). The response time was between 5 and 10 minutes, with the questionnaire being completed in paper format.

### 5.4. Analysis techniques

The Mann-Whitney nonparametric U test was used to carry out mean comparisons for independent samples in the gender and knowledge area variables, as well as in the post-hoc tests of those groups in which significant differences were found after the analysis of variances carried out with the Kruskal-Wallis nonparametric test in the year of study and degree variables.

## 6. Findings

### 6.1. Gender differences in student attitudes

Female students have a better attitude than male students towards sustainable development in general, with the exception of the economic-environmental aspects, where there are no significant differences (Table 2).

**Table 01.** Gender differences in student attitudes <sup>(1)</sup>

Attitude towards	Gender	N	Mean range	Sum of ranges	Mann-Whitney U test	Z	p
General Principles	Fem.	266	226.93	60363.50	17973.500	-2.785	.005
	Male	161	192.64	31014.50			
Economic-environmental	Fem.	266	221.48	58913.00	19424.000	-1.611	.107
	Male	161	201.65	32465.00			
Socio-environmental	Fem.	266	224.67	59763.50	18573.500	-2.299	.022
	Male	161	196.36	31614.50			
Total	Fem.	266	225.38	59951.00	18386.000	-2.449	.014
	Male	161	195.20	31427.00			

Note:<sup>(1)</sup> Mann-Whitney U test

Specifically, female students have a higher mean range than male students in their attitude towards sustainable development (U= 18386.000; Z= -2.449;  $p<.05$ ), general principles of sustainable development (U= 17973.500; Z= -2.785;  $p<.01$ ) and aspects related to the socio-environmental area (U= 18573.500; Z= -2.299;  $p<.05$ ).

## 6.2. Differences in the attitude of students by year of study

It is true that there being a tendency in the values of the different mean ranges, the results may suggest a more positive attitude in 2<sup>nd</sup> year students and a less positive one in 4<sup>th</sup> year students in all the dimensions of the study (1<sup>st</sup> and 3<sup>rd</sup> year students have similar levels). Specifically, they seem to start their university studies with a pro-environmental attitude, which increases in the 2<sup>nd</sup> year, only to decrease in 3<sup>rd</sup> year (matching their entry level), to continue decreasing in the final years, thus showing a deterioration of their pro-environmental attitude after finishing their studies compared to when they started university. This could raise the question of whether higher education is a context that hinders the development of pro-environmental attitudes, or what kind of experiences and evolutionary development students experience in order to obtain a slightly inferior attitude than when they were adolescents. However, none of the differences are significant, all being  $p>.05$  (Table3).

**Table 02.** Differences by year of study<sup>(1)</sup>

Attitude towards	Year of study	N	Mean range	X <sup>2</sup>	GI	p
General principles	1 <sup>st</sup>	113	210.56	2.985	3	.394
	2 <sup>nd</sup>	91	234.15			
	3 <sup>rd</sup>	119	210.13			
	4 <sup>th</sup>	105	206.66			
Economic or environmental	1 <sup>st</sup>	113	209.23	4.135	3	.247
	2 <sup>nd</sup>	91	237.70			

	3 <sup>rd</sup>	119	209.52			
	4 <sup>th</sup>	105	205.72			
Socio-environmental	1 <sup>st</sup>	113	214.01	6.171	3	.104
	2 <sup>nd</sup>	91	240.07			
	3 <sup>rd</sup>	119	211.16			
	4 <sup>th</sup>	105	196.65			
Total	1 <sup>st</sup>	113	211.31	4.816	3	.186
	2 <sup>nd</sup>	91	238.69			
	3 <sup>rd</sup>	119	210.34			
	4 <sup>th</sup>	105	201.69			

Note: <sup>(1)</sup> Kruskal Wallis test

### 6.3. Differences in students' attitude by area of knowledge

The trend in the mean range suggests that there is a better pro-environmental attitude towards sustainable development, its general principles and the socio-environmental aspects in students in the area of Social and Legal sciences, in contrast to students in Health Sciences, who have a better attitude towards economic and environmental aspects. However, none of these differences have levels of significance lower than .05 (Table 4).

**Table 03.** Differences in students' attitude by area of knowledge<sup>(1)</sup>

Attitude towards	Area <sup>(2)</sup>	N	Mean range	Sum of ranges	Mann-Whitney U test	Z	p
General principles	CCSJ	228	221.48	50497.50	21208.500	-1.247	-1.247
	CCS	200	206.54	41308.50			
Economic or environmental	CCSJ	228	213.68	48718.50	22612.500	-.147	.883
	CCS	200	215.44	43087.50			
Socio-environmental	CCSJ	228	223.20	50889.50	20816.500	-1.554	.120
	CCS	200	204.58	40916.50			
Total	CCSJ	228	221.48	50497.50	21470.500	-1.041	.298
	CCS	200	206.54	41308.50			

Note: <sup>(1)</sup> Mann-Whitney U test. <sup>(2)</sup> CCSJ = Social and Legal Sciences CCS = Health Sciences

### 6.4. Differences in students' attitude by degree

The Kruskal Wallis test shows significant differences across degrees in relation to students' attitude towards sustainable development ( $X^2= 15.699$ ;  $df= 4$ ;  $p=.003$ ), general principles ( $X^2= 12.426$ ;  $df= 4$ ;  $p=.014$ ), economic and environmental aspects ( $X^2= 10.548$ ;  $df= 4$ ;  $p=.032$ ) and social and environmental aspects ( $X^2= 19.056$ ;  $df= 4$ ;  $p=.001$ ). These students come from five university degrees: 97 from Social Education (SE), 91 from Political Science and Administration (PSA), 40 from Physical Activity and Sport Sciences (PASS), 100 from Medicine (M) and 100 from Pharmacy (P).

Specifically, the attitudes towards sustainable development among Social Education students are better than those of students in other degree programs. See here, ES students compared to PSA students ( $Rg_{SE}= 107.72$  vs  $Rg_{PSA}= 80.41$ ;  $U= 3131.000$ ;  $Z= -3.440$ ;  $p= .001$ ), with M ( $Rg_{SE}= 108.65$  vs  $Rg_M= 89.64$ ;  $U= 3914.000$ ;  $Z= -2.340$ ;  $p= .019$ ) and P ( $Rg_{SE}= 107.44$  vs  $Rg_P= 90.82$ ;  $U= 4031.500$ ;  $Z= -2.046$ ;  $p= .041$ ).

In the same way, PASS students have a better attitude than PSA students ( $Rg_{PASS} = 79.23$  vs  $Rg_{PSA} = 60.19$ ;  $U = 1291.000$ ;  $Z = -2.644$ ;  $p = .008$ ).

The attitude towards the principles that are proposed in sustainability education is better in the SE or PASS students. Significant differences have only been found between SE and PSA students ( $Rg_{SE} = 105.93$  vs  $Rg_{PSA} = 82.32$ ;  $U = 3305.000$ ;  $Z = -2.976$ ;  $p = .003$ ) and with M ( $Rg_{SE} = 109.86$  vs  $Rg_M = 88.47$ ;  $U = 3797.000$ ;  $Z = -2.635$ ;  $p = .008$ ), as well as PASS students with PSA ( $Rg_{PASS} = 76.48$  vs  $Rg_{PSA} = 61.40$ ;  $U = 1401.000$ ;  $Z = -2.096$ ;  $p = .036$ ).

In terms of attitudes towards economic-environmental aspects, PSA students have the lowest levels. Thus, significant differences have been found in favour of SE ( $Rg_{SE} = 106.21$  vs  $Rg_{PSA} = 82.02$ ;  $U = 3277.500$ ;  $Z = -3.049$ ;  $p = .002$ ), PASS ( $Rg_{PASS} = 76.16$  vs  $Rg_{PSA} = 61.53$ ;  $U = 1413.500$ ;  $Z = -2.034$ ;  $p = .042$ ), and M students ( $Rg_M = 103.74$  vs  $Rg_{PSA} = 87.49$ ;  $U = 3776.000$ ;  $Z = -2.030$ ;  $p = .042$ ).

Finally, in terms of attitude towards the socio-environmental aspects, students in SE and PASS have the best levels. The level of SE students is higher than PSA ones ( $Rg_{SE} = 108.81$  vs  $Rg_{PSA} = 79.25$ ;  $U = 3025.500$ ;  $Z = -3.726$ ;  $p = .000$ ), de M ( $Rg_{SE} = 109.74$  vs  $Rg_M = 88.59$ ;  $U = 3808.500$ ;  $Z = -2.606$ ;  $p = .009$ ), and PA ( $Rg_{SE} = 110.21$  vs  $Rg_P = 88.13$ ;  $U = 3763.000$ ;  $Z = -2.719$ ;  $p = .007$ ). The attitude of PASS students is better than that of PSA ones ( $Rg_{PASS} = 79.85$  vs  $Rg_{PSA} = 59.91$ ;  $U = 1266.000$ ;  $Z = -2.770$ ;  $p = .006$ ) and also of P students ( $Rg_{PASS} = 81.36$  vs  $Rg_P = 66.16$ ;  $U = 1565.500$ ;  $Z = -2.005$ ;  $p = .045$ ).

## 7. Conclusion

Universities are making great efforts to integrate the principles of sustainability into university dynamics and new curricula by developing competencies in university degrees profiles (Aznar et al., 2014), with attitudes being a relevant factor in understanding ways of relating them to each other. Although it is true that universities follow the guidelines set by public and private international entities, they need to know their students in order to plan more effective interventions, with actions aimed at making the curriculum more attractive and managing the campus in environmental matters (Alba, 2017; Alghamdi, Den Heijer, & De Jonge, 2017; Aznar et al., 2014; Segalás, 2015; Zhao and Zou, 2015).

This focus on sustainable skills must be specified in university degrees profiles taking into account, among other things, the attitudes of professionals in initial training to acquiring knowledge, reflecting and understanding in order to make decisions during their professional activity (Aznar and Ull, 2009; Gonzalo et al., 2017; Perales, 2017; Rodríguez and Guerra, 2009). Furthermore, personal or degree-specific factors may result in differences in the perception of environmental problems, and therefore, in students' attitudes, which must be taken into consideration by the teaching staff in order to develop sustainability skills in them.

University students seem to have pro-environmental attitudes, although not so much in terms of economic-environmental aspects (Estrada-Vidal and Tójar-Hurtado, 2017). But are there differences across students? This study has shown that there are differences in some sustainability aspects according to gender and degree course, although not between years of study or areas of knowledge.

There seems to be a greater sensitivity among female students when compared to male students in environmental matters, and also in terms of the generally advocated principles and the socio-environmental aspects, but there are no differences in the economic-environmental aspects. Therefore, planned interventions should consider the inclusion of activities that improve student awareness, and focus

especially on male students when it comes to general and socio-environmental aspects, such as the way our lifestyle affects the environment, or the promotion of environmental practices in the workplace. On the other hand, economic-environmental aspects such as the promotion of local products consumption should be oriented both to female and male students.

In relation to degree course, the results show that Social Education students seem to have the best pro-environmental attitude, followed by Physical Activity and Sports students. In contrast, Political Science and Administration students have the worst environmental attitudes compared to other degrees. These qualifications are within the same branch of knowledge, so it is possible that this is the reason why there are no differences by area of knowledge.

Specifically, Social Education students have a better attitude than Political Science and Administration ones in every aspect (overall score, general principles, economic-environmental and socio-environmental aspects); they come out ahead of medical students in general principles, socio-environmental aspects and overall, and of pharmacy students in socio-environmental aspects and overall. Physical education and sports students have better pro-environmental attitudes than Political Science and Administration ones and a better socio-environmental attitude than pharmacy ones. Students of Medicine have better pro-environmental attitude in economic and environmental aspects than Political Science and Administration students.

The results obtained here suggest that further studies should examine which of the specific aspects of each variable show discrepancies in relation to the differences found and continue to further examine whether there are differences by year of study within the same degree.

## References

- Alba, D. (2017). Hacia una fundamentación de la sostenibilidad en la educación superior. *Revista Iberoamericana de Educación*, 73, 15-34.
- Alghamdi, N., Den Heijer, A., & De Jonge, H. (2017). Assessment tools' indicators for sustainability in universities: an analytical overview. *International Journal of Sustainability in Higher Education*, 18(1), 84-115.
- Atmaca, C. (2017). Effects of Contextual Factors on ESD in Teacher Education. *Discourse and Communication for Sustainable Education*, 8(2), 77-93. DOI: 10.1515/dcse-2017-0017
- Aznar, P., & Ull, M.A. (2009). Education in basic competences for sustainable development. The role of University. *Revista de Educación, Núm. Extraordinario*, 1(1), 219-237.
- Aznar, P., Ull, M.A., Piñero, A., & Martínez, M.P. (2014). La sostenibilidad en la formación universitaria: Desafíos y oportunidades. *Educación XXI*, 17(1), 131-158. doi: 10.5944/educxx1.17.1.10708.
- Barkin, D. (1998). Riqueza, pobreza y desarrollo sustentable. México: Editorial Jus y Centro de ecología y Desarrollo.
- Barnard, Z., & Van der Merwe, D. (2016). Innovative management for organizational sustainability in higher education. *International Journal of Sustainability in Higher Education*, 17 (2), 208-227.
- Benavides, J. (2006). El desarrollo con calidad de vida es un desarrollo sostenible. *Revista de enseñanza universitaria*, Núm. Extraordinario, 157-174
- Bilodeau, L., Podger, J., & Abd-El-Aziz, A. (2014). Advancing campus and community sustainability: strategic alliances in action. *International Journal of Sustainability in Higher Education*, 15(2), 157-168.
- Borderías, M.P. (2015). Reflections at the end of the 'united nations decade of education for sustainable development 2005–2014': environmental references in the degree of UNED and contribution of geography to EDS. *Espacio, tiempo y forma*. 6(6–7), 19–31. DOI: <http://dx.doi.org/10.5944/etfvi.6-7.0.14846>

- Casanueva, H. (2005). Desarrollo sostenible: una plataforma necesaria en el currículo de las carreras de ingeniería. Ingeniería. *Revista de la Universidad de Costa Rica*, 15(1, 2), 53-66.
- Chatelain-Ponroy, S., & Morin-Delerm, S. (2016). Adoption of sustainable development reporting by universities: An analysis of French first-time reporters. *Accounting, Auditing & Accountability Journal*, 29(5), 887-918.
- Estrada-Vidal, L.I., & Tójar-Hurtado, J.C. (2017). College Student Knowledge and Attitudes Related to Sustainability Education and Environmental Health. *Procedia - Social and Behavioral Sciences*, 237, 386-392
- Gonzalo, V., Sobrino, M.R., Benítez, L., & Coronado, A. (2017). Revisión sistemática sobre competencias en desarrollo sostenible en educación superior. *Revista Iberoamericana de Educación*, 73, 85-108.
- Ibareda-Tiana, S., & Gonzalvo-Cirac, M. (2013). Competencias genéricas en sostenibilidad en la educación superior. revisión y compilación. *Revista de Comunicación de la SEECI*, 25 (32), 141-159. DOI: <http://dx.doi.org/10.15198/seeci.2013.32.141-159>
- Perales, F.J. (2017). Educación Ambiental y Educación Social: el punto de vista de los estudiantes. *ReiDoCrea*, 6, 1-15.
- Rodríguez, H., & Guerra, Y.M. (2009). Propuesta de educación para el desarrollo sostenible: perspectiva pedagógica para la Universidad Militar Nueva Granada. *Revista Educación y Desarrollo Social*, 3 (2), 272-85.
- Salite, I., Drelinga, E., Ilisko, D., Olehnovica, E., & Zarina, S. (2016). Sustainability from the Transdisciplinary Perspective: An Action Research Strategy for Continuing Education Program Development. *Journal of Teacher Education for Sustainability*, 18(2), 135-152.
- Segalás, J. (2015). Educando para qué y para quién. El cambio de paradigma que el desarrollo sostenible demanda a la educación superior. *Lan Harremanak*, 32, 18-36. DOI: 10.1387/lan-harremanak.15389.
- Sivapalan, S. (2015). *Engineering education for sustainable development (EESD) for undergraduate engineering programmes in Malaysia: A stakeholder defined framework*. The University of Nottingham (United Kingdom), Nottingham.
- Zhao, W., & Zou, Y. (2015). Green university initiatives in China: a case of Tsinghua University. *International Journal of Sustainability in Higher Education*, 16(4), 491-506.