

Knowledge, Attitudes and Behaviours Concerning Sustainable Development: A Study among Prospective Elementary Teachers

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Abstract

The aim of this study consisted in assessing knowledge, attitudes and behaviours concerning various aspects of sustainable development in a group of Portuguese university students and measure the influence of area of study for admission to higher education on this dimensions. The collection of data was undertaken via the completion of a questionnaire, which was designed to include the following dimensions: knowledge, attitudes and behaviours. This initiative took place in the 2016/2017 academic year and the focus/target group for was constituted by 168 prospective elementary teachers. The validation procedures of the questionnaire confirmed its three-dimensional structure. The results obtained showed the existence of very favourable knowledge and attitudes regarding sustainable development. Behaviours proved less favourable than the other two dimensions. In addition, the results show that respondents' area of study for admission to higher education has no influence regarding knowledge, attitudes and behaviours concerning sustainable development. Finally some implications for teachers and students are raised and discussed.

Keywords: sustainable development, knowledge, attitudes, behaviours, higher education

1. Introduction

Firmly rooted in environmental education (EE), the concept of sustainable development (SD), popularized in 1987 by the Brundtland Commission Report, arose in response to questions raised about the need to redefine the notion of "development" with regard to persistent degradation of environmental quality ten years after Tbilisi, 1977 (Scoulos & Malotidi, 2004).

The challenges posed by incorporation of the concept of sustainable development (SD) in EE were discussed at the 1992 United Nations Conference on Environment and Development, held in Rio de Janeiro, leading to the establishment of Agenda 21 (UNCED, 1993) which aimed at reorienting the EE towards sustainability (Tilbury, 1995). This program was a milestone in support for introducing SD into curricula at all levels of education. However, the practical results of Agenda 21 in the field of education did not live up to the expectations generated and in 2002 the World Conference on Sustainable Development, held in Johannesburg, reaffirmed the need for integration of SD at all levels of the education system and recommended the United Nations Educational, Scientific and Cultural Organization (UNESCO) to adopt the Decade of Education for Sustainable Development (Scoulos & Malotidi, 2004).

If, on the one hand, the Decade of Education for Sustainable Development (UNESCO, 2003) resulted internationally in a shift from discourse on environmental education to education for sustainable development (ESD); on the other hand, the question remains whether the change in discourse and language was accompanied by a real change in educational practice (Robottom, 2013). Reflecting on educational policies in EE/ESD, Stevenson (2013) draws attention to the separation that exists between the formulation of educational policies, which often emanate from supranational organizations, implicitly adopting the top-down model, and their actual implementation in educational practice.

Robottom (2013) considers how best to respond to a situation wherein educators find themselves facing a contextual shift from the discourse of EE to that of ESD, yet with no clear definition of the practical changes arising from this transition. He questions how educators may "develop a greater understanding of the complexity of their own professional circumstances" (p.158). The way in which teachers and students conceptualize SD can

have consequences for the way that they incorporate it into their teaching and learning, respectively (Borg, Gericke, Höglund & Bergman, 2012; Singer-Brodowski, 2017).

In the particular case of higher education, Singer-Brodowski (2017) claims that, unlike in other fields, little research has been conducted on students' conceptions about SD and the same needs towards teachers was expressed by Cotton, Warren, Maiboroda, and Bailey (2007), who claimed that little research exists on lecturers' understanding of and attitudes towards SD. As far as Portugal is concerned, the research in the field of SD/ESD has experienced a considerable growth, in particular under the influence of the UNESCO Decade of Education for Sustainable Development 2005-2014 (Borges & Benayas, 2019). We can highlight, for example, recent studies about new educational strategies (Azeiteiro, Nicolau, Caetano & Caeiro, 2015) and about the implementation of SD/EDS in higher education (Torres, Vieira, Rodrigues, Sá & Moreira, 2017; Aleixo, Azeiteiro & Leal, 2018). However, little research has been conducted on students or lecturers' understandings, attitudes or behaviours concerning SD. The present study aims to produce knowledge on this regard.

On this regard, we can mention some studies that focus on factors associated with teaching, such as: Borg et al. (2012; 2014), who have examined the influence of teachers' subject area and their pedagogical experience in the ESD approach according to the holistic model; Burmeister and Eilks (2013) who attempt to highlight the understanding of sustainability and education for sustainable development among German student teachers and trainee teachers of chemistry; Ull, Piñero, Martínez-Agut and Minguet (2014), who have analysed the perceptions and attitudes of primary teachers with regard to the incorporation of sustainability in their subjects; Ambusaidi and Washahi (2016), who have studied how prospective teachers in Oman perceive the concept of SD and Keles (2017) investigated the pre-service science teachers' attitudes towards sustainable environmental education in terms of gender and grade level.

Other studies have focused their research on factors more directly related to students, including measuring knowledge, attitudes and behaviours concerning ESD/SD among both adults and primary and secondary school students (Michalos, Creech, McDonald & Kahlke, 2011) and 10th grade students (Michalos et al., 2012); evaluating attitudes regarding SD in Italian university students (Biasutti & Frate, 2017); assessing the attitudes and behaviours of university students in Cyprus (Gündüz, 2017); evaluating the effect of ESD teaching on the environmental awareness of Swedish elementary school students (Olsson, Gericke & Chang Rundgren, 2016); and investigate United Arab Emirates University students' knowledge, attitudes and behaviors toward education for sustainable development and the environment (Al-Naqbi & Alshannag, 2018).

The present study seeks to evaluate knowledge, attitudes and behaviours concerning SD among a group of Portuguese university students, prospective teachers in elementary education. More specifically, it aims to evaluate knowledge regarding the relevance of SD-specific themes; behaviours with respect to SD themes, understood as "the self-reported intentions to act associated with those themes"; and attitudes toward SD themes defined here according to Eagly and Chaiken (2005) as: "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (p.745). In addition, it investigates whether the students' education profile prior to entering the university has any influence regarding the above dimensions. After reviewing the literature for research instruments that could help fulfil this purpose, a questionnaire was selected used by Michalos et al. (2011) in their exploratory study with adults in the Canadian province of Manitoba.

This instrument was used to measure levels of knowledge, attitudes and behaviours concerning ESD/SD and the themes that it included were chosen based on the strategic outlook outlined by UNESCO (2006), namely: human rights, peace and human security, gender equality, cultural diversity and intercultural understanding, health, HIV/AIDS, governance, natural resources, climate change, rural development, sustainable urbanisation, disaster prevention and mitigation, poverty reduction, corporate responsibility and accountability, and the market economy (Michalos et al., 2011).

1.1 Research Aims

- a) to assess knowledge, attitudes and behaviours concerning various aspects of sustainable development among a group of prospective elementary educators.
- b) to measure the influence of the area of study for admission to higher education, on knowledge, attitudes and behaviours concerning sustainable development.

2. Method

2.1 The Subjects

A group of 168 students from a public Portuguese university participated in this study. This number amounts to

73.3% of the total of 229 students attending the following degrees in the 2016/2017 academic year: Bachelor's Degree in Elementary Education, Master's Degree in Pre-school and 1st Cycle of Elementary Education, Master's in Pre-school Education. The respondents' ages ranged from 18 to 33, and the majority (78.6%) were under 23. The group was predominantly comprised of females (95.8%) with only seven respondents being male (4.2%).

The degrees/year attended by the 168 students participating in the study are distributed as follows – Bachelor's degree: 27.4% from the 1st year, 19% from the 2nd year, and 21.4% from the 3rd year; Master's degree in Preschool Education and Elementary School Teaching: 12.5% from the 1st year, 11.3% from the 2nd year; Master's in Preschool Education: 8.3% from the 1st year.

As regards area of study for admission to higher education, 45.7% of respondents surveyed came from the fields of science and technology, 37.2% from languages and humanities, 8.5% from the vocational education sector, 4.3% from the arts, and another 4.3% from the field of socioeconomic sciences.

2.2 The Questionnaire

The translated version of the original questionnaire by Michalos et al. (2011), which included assessment of the dimensions of knowledge, attitudes and behaviours, was given to a small group of subjects with similar characteristics to the individuals in the main study. This preliminary study resulted in several changes affecting the items included in the knowledge and behaviours dimensions, namely, the exclusion of some items and the addition of others. The "attitudes" dimension remained unaltered vis-à-vis the initial version.

These changes were mainly intended to adjust the content of items to the specific group of subjects surveyed in the present study and they were carried out taking the original number of items and their relevance to the UNESCO perspective on SD into account. The following are examples of excluded items: "*Canada's overall energy is improving*", from the knowledge dimension; "*I do not use chemical fertilisers or pesticides on my lawn*", from the behaviours dimension. In turn, the following are examples of new items: "*economic development emphasises international cooperation*", from the knowledge dimension; "*I have already participated in activities related to sustainable development*", from the behaviours dimension.

Content validity of the items resulting from this preliminary study was accomplished through the opinion of a panel of experts composed of three professors who commented on the ambiguity of the items, on their appropriateness to the subject group in question and on the respective formulation.

The answer format chosen for the items in the knowledge and attitudes dimensions was a five-point Likert scale, ranging from Strongly Disagree (sd, coded 1), corresponding to the least favourable answer, through Disagree (d, coded 2), Neither agree nor disagree (nand, coded 3), and Agree (a, coded 4) to Strongly Agree (sa, coded 5), corresponding to the most favourable answer.

Regarding the behaviours dimension, a 5-point frequency scale was used, which ranged between the following points: Never (n, coded 1), corresponding to the least favourable answer, Rarely (r, coded 2), Regularly (re, coded 3), Often (o, coded 4) and Very Often (vo, coded 5), corresponding to the most favourable answer.

As for the items which refuted the construct, the scores were reversed. The items were numbered and arranged on the questionnaire according to their respective dimensions. The following notation was used: knowledge - K followed by item number, attitudes - A followed by item number, and behaviours - B followed by item number.

The questionnaires were handed out in person by the researcher in the 2016/2017 academic year, and the subjects participated on a voluntary and anonymous basis.

The questionnaire that resulted from the procedures described hitherto was composed of 41 items distributed by dimension, as follows: knowledge (14); attitudes (15) and behaviours (12).

2.3 Questionnaire Dimensionality

Given the specificities of the participating subjects, as well as the differences resulting from the amendments made to the original instrument, we decided to proceed with an assessment of the instrument's factor structure and the internal consistency of the items in each dimension. Assessment of the dimensional structure of the questionnaire was conducted through factor analysis (Table 1) as recommended by DeVellis (2012).

Table 1. Rotated factor matrix

Items	Factor 1	Factor 2	Factor 3
K4 Ensuring a long and healthy life for all contributes to sustainable development.	.758		
K6 Sustainable development requires quality education for all.	.727		
K3 Sustainable development emphasises respect for human rights.	.571		
A6 Poverty alleviation is an important topic in education for sustainable development.	.568		.256
K8 Sustainable development entails a reflection on the meaning of quality of life.	.509		.362
K1 Helping people out of poverty is an essential condition for Portugal to become more sustainable.	.491		
K5 Building appropriate infrastructures contributes to sustainable development.	.472		.207
K7 Sustainable development emphasises gender equality.	.421		
K12 Food safety is one aim of sustainable development.	.373		
K13 Estimating the monetary value of the service our ecosystems provide (such as: neutralising air pollutants) is important for sustainable development.	.361		.307
K14 Sustainable development emphasises international cooperation.	.381		.382
B2 I have taken a course in which sustainable development was discussed.		.704	
B8 I have already participated in activities related to environmental sustainability.		.701	
B4 I have been thinking about what it means to live in a sustainable manner.		.679	.207
B12 I have already looked up information about the new sustainable development goals of the United Nations.		.643	
B6 I often look for signs of ecosystem deterioration.		.618	
B3 I talk to others about how to help people living in poverty.		.614	
B11 I have already looked up information about the environment or sustainability of the university on the respective website.		.604	
B10 I usually look at problems from different angles.		.435	
B1 I walk or bike to places instead of going by car.		.390	
B7 I volunteer to work with local charities.		.387	
B9 I try to avoid purchasing goods from companies with poor track records on corporate social responsibility.		.368	
B5 The household tasks in my home are equally shared among family members regardless of gender.		.311	
A5 We need stricter laws and regulations to protect the environment.	.220		.696
A10 Governments should encourage greater use of fuel-efficient vehicles.			.629
A11 Adopting sustainable development as a national priority is key to maintaining Portugal's status as one of the most liveable countries in the world.	.386		.613
A9 The teaching of sustainability principles should be integrated into the curriculum in all disciplines and at all levels of schooling.	.259		.591
A12 Citizenship education is an important component of education for sustainable development.	.307		.548
A1 Every girl or boy should receive education that teaches the knowledge, perspectives, values, issues and skills for sustainable living in a community.	.370		.487
A4 Overuse of our natural resources is a serious threat for the health and welfare of future generations.			.459
A2 The present generation should ensure that the next generation inherits a community at least as healthy, diverse and productive as it is today.	.355		.442
A7 Sustainable development will not be possible until wealthier nations stop exploiting the labour and natural resources of poorer countries.			.418
A3 Manufacturers should discourage the use of disposables.			.364
A13 Taxes on polluters should be increased to pay for damage to communities and the environment.	.212		.325
Eigenvalue	7.08	3.99	2.19
% of total variation	19.03	9.75	5.35

It was crucial to obtain information on the dimensional structure of the instrument in order to guarantee the possibility of working with collections of combined items within a composite (dimension).

All items which displayed loaded values greater than 0.30 have been highlighted in bold and kept for further

analysis. Whenever an item was loaded on more than one factor, the highest value was considered, such as, for example, in the case of item A6.

As can be seen in Table 1, the questionnaire maintained its three-dimensional structure. The factors account for 34.1% of total variance and they are distributed as follows: factor 1 (knowledge), factor 2 (behaviours), and factor 3 (attitudes).

The items associated with each factor were subjected to an internal consistency and reliability assessment, based on Cronbach's alpha coefficient (Table 2).

Table 2. Cronbach's alpha reliability coefficient for each factor, scale mean and standard deviation

Factor1 (knowledge)		Factor 2 (behaviours)		Factor 3 (attitudes)	
α Cronbach 0.84 (N = 167)		α Cronbach 0.83 (N = 160)		α Cronbach 0.82 (N = 167)	
Scale mean: 45.4* (\pm 5.0)		Scale mean: 35.1** (\pm 7.9)		Scale mean: 43.7*** (\pm 4.2)	
Items	Item-total correlation	Items	Item-total correlation	Items	Item-total correlation
K4	.68	B8	.66	A5	.70
K6	.62	B4	.63	A11	.67
K8	.59	B2	.62	A10	.62
K3	.57	B12	.59	A9	.59
A6 ^a	.56	B11	.55	A12	.58
K14	.48	B6	.54	A1	.56
K5	.47	B3	.54	A2	.48
K1	.46	B10	.41	A7	.43
K12	.44	B1	.39	A13	.37
K13	.44	B9	.38	A4	.30
K7	.42	B7	.33	A3 ^b	
		B5	.31		

Note. *max. 55; **max. 60; *** max. 50; ^a item added to the scale; ^b item eliminated from the scale.

As shown in the table above, all the dimensions have high α coefficients. High alpha (α) values, i.e. equal to or higher than .80, indicate that the items are strongly correlated (DeVellis, 2012).

Analysis of the correlation coefficients obtained for each item shows that they take on values equal to or higher than .30.

With respect to the scales of both attitudes and behaviours, we tested the effect of eliminating the items with the lowest correlation coefficients (below .40). We observed that when these items were retained, coefficient α either remained unaltered or increased, except for item A3, which, if retained, caused the coefficient value to decrease, and for that reason it was discarded. Regarding item A6, calculation of the α value confirmed that by including it in the knowledge scale, the value of the respective coefficient increased, for which reason it was included in the knowledge dimension, with the designation K15.

As a result of the validation procedures described above, 33 items were selected for further analysis. The elimination of some items during the validation processes led, on the one hand, to the loss of the information associated with those items, thus causing a limitation to this study. However, it afforded greater confidence in the consistency of the instrument.

For statistical procedures, we chose to keep the designations of the items in the order in which they appeared in the questionnaire.

2.4 Data Analysis

Analysis of the data pertaining to the sociodemographic characterisation of the subjects who participated in the study was based on the calculation of frequency and percentage values.

As regards the data from the remainder of the questionnaire, the following procedures were used: calculation of frequency and percentage values of the answers given to each item and mean and standard deviation for each dimension. Furthermore, correlations among dimensions were calculated through Pearson bivariate correlation coefficient.

The influence of the variable area of study for admission to higher education, in the dimensions under study, was

calculated with analysis of variance (ANOVA) for multiple comparisons. For the purposes of this test, the distribution of the respondents' area of study for admission to higher education was changed, since this independent variable did not meet the normality criteria. Thus, taking into account the reduced percentage of students coming from the areas of socio-economics, arts and vocational training, we decided to merge these into a single variable designated as "Other". Therefore, the revised distribution of the subjects across the different areas was as follows: science and technology (45.7%), languages and humanities (37.2 %); other (17.1%).

All statistical procedures were carried out with the data analysis software "Statistical Package for Social Sciences" (SPSS), version 24. The statistical significance level was set at 0.05.

3. Results

3.1 Knowledge

Table 3 shows, in percentage form, the distribution of students' responses to the 11 items pertaining to the knowledge dimension. In order to clarify the results, the responses are each associated with Likert scale points corresponding either to a low level of agreement (sd+d), or to a high level of agreement with the content of the respective item (sa+a) while indecisive responses (nand) are shown in a column of their own. The table also displays the number of respondents (N) for each item.

Table 3. Knowledge regarding sustainable development. Agreement and indecision with regard to content of items expressed in percentage

Items	sd + d	sa + a	nand	N
K1. Helping people out of poverty is an essential condition for Portugal to become more sustainable.	3	87.5	9.5	168
K3. Sustainable development emphasises respect for human rights.	4.2	80.2	15.6	167
K4. Ensuring a long and healthy life for all contributes to sustainable development.	0.6	89.9	9.5	168
K5. Building appropriate infrastructures contributes to sustainable development.	0.6	83.3	16.1	168
K6. Sustainable development requires quality education for all.	3	94	3	168
K7. Sustainable development emphasises gender equality.	11.3	49.4	39.3	168
K8. Sustainable development entails a reflection on the meaning of quality of life.	1.8	94.6	3.6	168
K12. Food safety is one aim of sustainable development.	1.2	71.4	27.4	168
K13. Estimating the monetary value of the service our ecosystems provide (such as: neutralising air pollutants) is important for sustainable development.	0.6	87.5	11.9	168
K14. Sustainable development emphasises international cooperation	1.2	86.9	11.9	168
K15. Poverty alleviation is an important topic in education for sustainable development.	1.8	78.5	19.7	168

An examination of the table shows that in only one case did a respondent not respond to one of the items (K3). It also reveals that the majority of items have an agreement level of over 80%, which is consistent with the mean scale value of 45.4 ± 5.0 (maximum 55). The item K8, "*sustainable development entails a reflection on the meaning of quality of life*", which lies at the heart of the SD concept itself, in the sense that it relates to human well-being (present and future generations) with environmental sustainability, attained the higher agreement level (94.6%), whereas the item K7, "*sustainable development emphasises gender equality*", attained the lowest agreement level (49.4%) and the highest percentage of undecided responses (39.3%), suggesting uncertainty about their positioning within this subject.

3.2 Attitudes

Table 4 summarizes, in percentage form, the distribution of respondents' responses to the 10 items constituting the attitude's scale. Results are presented by following the same procedure used in the previous table.

Table 4. Attitudes toward sustainable development. Agreement and indecision with regard to content of items expressed in percentage

Itens	sd + d	sa + a	nand	N
A1. Every girl or boy should receive education that teaches the knowledge, perspectives, values, issues and skills for sustainable living in a community.	0.0	98.8	1.2	168
A2. The present generation should ensure that the next generation inherits a community at least as healthy, diverse and productive as it is today.	0.6	94.1	5.3	168
A4. Overuse of our natural resources is a serious threat for the health and welfare of future generations.	6.6	90.4	3	168
A5. We need stricter laws and regulations to protect the environment.	0.6	97	2.4	168
A7. Sustainable development will not be possible until wealthier nations stop exploiting the labour and natural resources of poorer countries.	1.8	86.9	11.3	168
A9. The teaching of sustainability principles should be integrated into the curriculum in all disciplines and at all levels of schooling.	1.8	89.9	8.3	168
A10. Governments should encourage greater use of fuel-efficient vehicles.	0.0	91.1	8.9	168
A11. Adopting sustainable development as a national priority is key to maintaining Portugal's status as one of the most liveable countries in the world.	1.2	90.5	8.3	168
A12. Citizenship education is an important component of education for sustainable development	0.6	95.8	3.6	168
A13. Taxes on polluters should be increased to pay for damage to communities and the environment.	3.6	77.8	18.6	167

The table shows that in only one case did a respondent not respond to one of the items (A13). Overall, respondents' attitude towards SD is very favourable, and most items produced responses with an agreement level of over 90%. The mean scale value of 43.7 ± 4.2 (maximum 50) confirms the respondents' very favourable evaluation of attitudes towards SD.

Two items meriting special attention, the item A1 – *every girl or boy should receive education that teaches the knowledge, perspectives, values, issues and skills for sustainable living in a community* – which obtained an agreement level of 98.8% and only 2.1% of undecided responses. This level of approval for an item whose content emphasizes the importance of education for sustainable living is in line with the knowledge dimension (Table 1) where respondents also expressed high recognition of the role of education in SD. However, the item A13, which appeals to a more contentious position on sustainable development, received the lowest, yet also a considerable, level of agreement (77,8%).

3.3 Behaviours

In order to facilitate analysis of the results obtained, it was decided to group, on the one hand, data related to less favourable responses to SD according to the scale points *never* (**n**) and *rarely* (**r**), while, on the other hand, grouping the more favourable responses corresponding to the remaining scale points, *regularly* (**re**), *often* (**o**), and *very often* (**vo**) (Table 5). The table also shows the number of respondents (N) for each item.

As indicated in Table 5, the N value shows slight fluctuations with only five items answered by all respondents with a maximum of three responses lacking in item B 6. This lack of responses may be attributed to the fact that the response format does not include a neutral category, an option that was intended to “force” respondents' choice. In any case, the format chosen has no influence on the distribution of responses at the negative and positive poles of the scale but may cause some respondents to avoid responding (Saris & Gallhofer, 2007).

Table 5. Behaviours relative to sustainable development. Levels of commitments expressed in percentage

Itens	n + r	re + o + vo	N
B 1. I walk or bike to places instead of going by car.	32.2	67.2	167
B 2. I have taken a course in which sustainable development was discussed.	54.8	45.2	168
B 3. I talk to others about how to help people living in poverty.	18.5	80.1	167
B 4. I have been thinking about what it means to live in a sustainable manner.	23.8	76.2	168
B. 5. The household tasks in my home are equally shared among family members regardless of gender.	25	73.8	166
B. 6. I often look for signs of ecosystem deterioration.	38.1	60.1	165
B. 7. I volunteer to work with local charities.	40.5	58.9	167
B. 8 I have already participated in activities related to environmental sustainability.	52.9	47.1	168
B 9. I try to avoid purchasing goods from companies with poor track records on corporate social responsibility.	42.2	57.2	167
B 10. I usually look at problems from different angles.	10.7	88.7	167
B 11. I have already looked up information about the environment or sustainability of the university on the respective website.	53	47	168
B 12. I have already looked up information about the new sustainable development goals of the United Nations.	63.6	36.4	168

The students' responses show that overall there is a relative balance between the most and least committed responses to SD as is indicated by the mean scale value of 35.1 ± 7.9 (maximum 60).

The responses obtained by items B10, B 3, B 4 and B 5 showed the highest levels of commitment to SD. The behaviours underlying the statements contained in these items convoke critical thinking (B10); responsibility regarding poverty (B 3); human needs and natural resources (B 4) and gender equality (B 5).

As regards the responses showing least support, the percentage responses to four items show a lower level of commitment to SD: B12; B 2; B 8 and B11. The behaviours underlying the statements contained in these items are more or less directly related to participation in SD activities or to an active search for training or information linked to SD.

A Pearson correlation analysis was performed with the following results: The knowledge and attitudes dimensions have the higher correlation value ($r = 0.589$, $p = 0,000$); the knowledge and behaviours dimensions have a relatively lower correlation ($r = 0.251$, $p = 0,001$) and the lowest correlation value was obtained by the attitudes and behaviours' dimensions ($r = 0.154$, $p = 0,053$). These results also show that correlations between knowledge and attitudes and between knowledge and behaviours are statistically significant at the 0.01 level.

3.4 Area of Study for Admission to Higher Education

Influence of the variable area of study for admission to higher education, sub-groups Science and Technology (75), Languages and Humanities (61) and Other (28), in the dimensions under analysis was determined using an analysis of variance (Table 7).

Table 7. ANOVA Knowledge Attitudes and Behaviours

	Source of variance	Sum of Squares	df	Mean Square	F	P*
knowledge	Between groups	92.934	2	46.467	1.795	0.169
	Within groups	4141.937	160	25.887		
	total	4234.871	162			
attitudes	Between groups	1,940	2	0,970	0.053	0.948
	Within groups	2922.713	161	18.153		
	total	2924.652	163			
behaviours	Between groups	71.555	2	35.778	0.569	0.567
	Within groups	9623.438	153	62.898		
	total	9694.994	155			

Note. * Statistically significant differences below 0.05

The analysis shows that there are no statistically significant differences between the subgroups of students concerning knowledge ($p = 0.169$); attitudes ($p = 0.948$); and behaviours ($p = 0.567$), leading to the conclusion

that the independent variable is not very influential.

4. Discussion

The instrument used in the study has shown to have a three-dimensional structure allowing measurement of knowledge, attitudes and behaviours related to various SD themes. With reference to the topics included in the items of the questionnaire, it is clear that the subject group studied have knowledge and attitudes that are largely favourable to the majority of the selected themes relevant to SD. As far as behaviours are concerned, the group were not overall as favourable to SD as with the other two dimensions, further, it was found that the stronger correlation was established between knowledge and attitudes and the weaker one between attitudes and behaviours. With regard to student's academic background, the area of study for admission to higher education have shown not to be influential in the responses given by this group of students.

The high level of agreement obtained on the knowledge dimension indicates that students are aware of the relevance to SD of such themes as sustainable living, education, health, ecosystems, poverty; international cooperation, infrastructure; human rights and food security. However, only half of the respondents acknowledged the importance of gender equality for sustainable development, which is in line with Michalos et al. (2011), who obtained a similar result in their study. The relative lack of support regarding the importance to this issue could result from the fact that respondents perceived that equal rights and opportunities between men and women are already a reality in key areas of their social life and/or because they do not understand their relevance to SD. In this regard, more investigation is therefore needed about people's actual conceptions about this SD theme. As regards the attitudes dimension, the high level of agreement with the items of the scale and the low levels of uncertainty showed a strongly positive attitude towards SD. Positive attitudes towards SD among university students were also reported in studies such as Biassuti (2017), Gündüz (2017), Keles (2017) and Al-Naqbi and Alshannag (2018). As we said before, the behaviours' dimension got a more modest score. The contrast with the high scores obtained in the knowledge and attitudes dimensions seems to indicate that there is a gap between the support that those dimensions merited and the adoption of certain pro-SD behaviours. This seems to bring evidence to the idea that, in addition of knowledge and attitudes, other factors contribute to pro-SD behaviours (Too & Bajracharya, 2015). In the field of EE, the relationships that exist between knowledge-attitudes-behaviours have been intensively studied and it is now generally accepted that the adoption of pro-environmental behaviours is a complex issue involving multiple variables, both external and internal (Kollmuss & Agyeman, 2002; Heimlich, Mony & Yocco, 2013). Since the concept of SD is even more complex than that of environment, it is legitimate to assume that the factors that determine pro-SD behaviours are equally complex and multiple.

The results of the present research suggest that certain obstacles affect adoption of some pro-SD behaviours underlying the items under analysis. This study cannot identify the causes of these obstacles but it can be argued that at least two types of factors are involved, some being of a personal nature, such as lack of available time or lack of motivation, while others may be related to social and institutional factors, such as the lack of supply or dissemination of activities specifically directed to SD. One of the educational implications regards the nature of institutional initiatives aiming to promote and increase the visibility of training and education in SD, such as the dynamization of extracurricular activities related to sustainability on campus, which could play a positive role in overcoming these barriers and help students to get more involved. In a more sustainable future perspective, it is fundamental that higher education contributes to amplify information and learning opportunities in this field, both in formal and informal contexts. The results have also shown that the participating subjects have shown to be sensitized and committed to knowledge pertaining to the area of SD. A further educational implication, therefore, concerns the contribution of the study to a better understanding of prospective teachers' approaches to SD, which, in turn, contributes to a better framing of professional development in this field.

Leaving aside the above-mentioned limitation inherent to the process of questionnaire validation, it is important to stress that a major limitation of this study lies in the small size and cultural homogeneity of the group that was studied, making the results obtained not generalizable to other situations.

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