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# Socio-Environmental Problematic, End-Purposes, and Strategies Relating to Education for Sustainable Development (ESD) through the Perspectives of Spanish Secondary Education Trainee Teachers

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Received: 14 June 2020; Accepted: 6 July 2020; Published: 9 July 2020



**Abstract:** In this paper, representations of Spanish Secondary Education trainee teachers ( $n = 163$ ) are analyzed with regard to the socio-environmental problematic, end-purposes, and strategies of education for sustainable development (ESD). Likewise, the study seeks to identify the potential influence of sociodemographic variables on those representations and, in particular, possible differences between either the perceptions or the beliefs of trainee teachers of Geography and History and those from other disciplines. The study can be classified as a non-experimental ex post facto investigation based on a questionnaire, yielding results that reflected the commitment of the students towards teaching through the implementation of strategies directed at conflict resolution for social transformation, and towards teaching the development of critical and creative thinking skills for social interventions. Likewise, the study reports the promotion of specific socio-educational actions leading to sustainable development. These results show the absence of differences in terms of the sex, age, institutional affiliation, background discipline or specialism, or previous training in Sustainable Development Goals (SDGs) of the students. Despite the identification of greater tendencies towards the conceptualized development of social awareness and active citizenship among trainee teachers of Geography and History, these results reflected the pertinence and the educational need for ESD in higher education from a holistic and transversal perspective.

**Keywords:** education for sustainable development; social representations; trainee teachers; secondary education; geography and history

## 1. Introduction

In accordance with the Sustainable Development Report 2019 [1] from the Bertelsmann Stiftung Foundation and the Sustainable Development Solutions Network from the UN, there is a high risk of failure over compliance with the sustainable development goals (SDGs) of the 2030 Agenda. According to this report, the countries that are best prepared to comply with the SDGs are Denmark (first place), Sweden (second place), Finland (third place), France (fourth place), and Austria (fifth place). However, Madagascar (158th place), Nigeria (159th place), the Democratic Republic of the Congo (ranked 160th place), Chad (161st place), and the Central African Republic (162nd place) are far from achieving acceptable indicators such as good health and well-being, quality education, gender equality, and poverty reduction [2]. There are wide differences between the indicators in the case of Spain, placed in the first quartile of the ranking with a compliance index of 77.8 (21st place).

The principal differences between countries are centered on such aspects as social inequality and environmental pollution. These countries confront challenges within very specific areas such as climate change, inequality, and education. However, the very poorest countries of the world, situated in the lower part of the classification, face challenges such as an end to extreme poverty and hunger, access to drinking water and sewage systems, energy services, and economic growth. In so far as those indicators are not improved, widespread sustainable development, and with it the well-being of local communities, will not be achieved. In this process, one of the main actions for sustainable change is the promotion of education for critical and responsible citizenship towards the immediate surroundings. Over recent years, national and international educational policies have been insisting on the need to direct their efforts towards social change, the promotion of global citizenship, and sustainability [3]. Nevertheless, [4] situated sustainability is frequently described within a competitive political space, in which the characteristics of the concept are assigned to different areas, without responding to a particular conceptualization. The concept of sustainability is, in fact, clothed in controversial features and is difficult to define [5].

Education for sustainable development (ESD) is founded on the acquisition of knowledge, skills, attitudes, and values directed at shaping a sustainable future [6], considering the local environmental, economic, and social conditions, in order to adjust to the cultural context in which they emerge. This educational proposal must start with the initial and life-long training of the teachers, and specific regulation of the educational system in the field of ESD, through the implementation of fundamental subject matter on sustainable development in teaching–learning processes. The didactic treatment of such content will, in turn, require the incorporation of changes in the methodology that is applied, with a view to developing critical thinking skills, the formulation of hypotheses, and decision-making among students [7].

The 2007 Declaration of Lucerne highlighted the particular association between school geography and sustainable development, on the basis of the integrated relation between nature, economy, and society [8,9]. In this way, Geography was recognized as the science of sustainability, serving as the basis of a geographic curriculum for ESD [10–12]. This relation is, in effect, identified in the SDGs, directed at improving the conditions of life and the conservation of the environment, and implies a reorientation of the study plans towards comprehension and the treatment of social, cultural, economic, and environmental problems [13]. In this sense, the Secretary of Public Education, and the Secretary of the Environment and Natural Resources in Mexico already incorporated the focus on environmental education for sustainability in their high school programs [14]. Likewise, the French curriculum included subject matter linked to the possibilities of sustainable development in Geography classes, and the Basque Government [15] defined specific ESD measures for the promotion of cities and towns as educational environments for sustainability.

Despite these advances, the investigative findings of Guo et al. [16] on the concept of sustainable development in secondary education in China revealed a non-existent curricular content in textbooks, little or no support for its implementation, knowledge gaps among teaching staff, and weak evaluation. These results are consistent with the study of Nguyen [17] on how ESD is conveyed in Geography textbooks from Vietnam. The work demonstrated that, despite the existence of its relative promotion, a unidimensional focus was identified, oriented towards description and indoctrination; this conclusion is almost the same as the one reached from the curricular proposals implemented in La Garriga (Barcelona, Spain), on the lack of uniformity of the subject matter for ESD [18].

The educational promotion of a culture for sustainability will necessarily involve university training. From this perspective, the ACES project (Curriculum Greening of Higher Education) may be highlighted, directed at the diagnostic evaluation and reorientation of ecological subject matter in the university curriculum, and the design and application of strategies for the implementation of the concept of sustainability in higher education [19]. Nevertheless, the conclusions of the recent review of 91 scientific articles on sustainability policies in higher education of Cheeseman et al. [20] underlined the need for a larger volume of investigations centered on understanding practice and

processes to promote the concept of sustainability in the university setting. There is no doubt that the definition of pedagogy, topics, and areas of university action on sustainability continue to be a matter for debate [21,22].

There are still few works centered on the transdisciplinary analysis of contents of sustainability in university study plans within Spain [23] and few initiatives in the strategic plans in this country [24]. The investigations that are available confirm that the concept of sustainability is present in higher education in Spain, though especially scarce in qualifications relating to the educational sciences [25]. They noted a remarkable disparity both in the number of subjects related to the concept and in its level of treatment in the different university institutions [26]. In addition, they demonstrated that the sustainable use of resources and the prevention of negative impacts in the natural and social world constituted the least represented aspect of the study plans [26]. These results are consistent with those obtained in the case study of Coleman and Gould [27], in which only 17% of the university courses on sustainability included the concept of environmental justice.

Considering the diversity and the subjective nature of the thought processes of university teachers on ESD [28], the present investigation is an analysis of the representations, among trainee Secondary Education teachers, of the socio-environmental problematic, the end-purposes, and the teaching strategies for ESD. Likewise, the possible influence of the sociodemographic variables in these representations (sex, age, university institution, background specialism, and previous training in SDGs) will be tested, as will the possible differences between the appreciations of the theoretical dimensions of ESD among trainee Geography and History teachers and those from other specialist disciplines.

## 2. Materials and Methods

The population under study consisted of Spanish students from the Master's in Secondary Education Teacher Training. The participants were selected through intentional or convenience sampling, aligned with the possibilities of the research team to access the students from the field of study and their degree of adjustment with the objectives of the investigation. The sample consisted of 163 future teachers aged between 22 and 56 years old ( $M = 31.14$ ;  $SD = 8.41$ ), of whom 81 were men (50.3%) and 82 were women (47.7%). Their educational disciplines were Geography and History (50.3%), Technology (8.6%), Literature (6.1%), Natural Sciences and Mathematics (4.3%), Humanities (3.7%), and others (25%). The participants were enrolled in 22 Spanish universities (80.8%), and in 18 South American and European universities (9.2%). The remaining students (10%) did not declare their institutional affiliation.

The instrument consisted of the questionnaire designed and validated by Solís-Espallargas and Valderrama-Hernández [29] on education for sustainability in teacher training. A 5-point Likert-type scale from 1 (totally agree) to 5 (totally disagree) was prepared with three different dimensions: (A) the first integrated four questions on the systemic, complex, and critical vision of the socio-environmental problematic; (B) the second was composed of three items, and was centered on the conceptualizations concerning the end-purposes of education for sustainability; and (C) the third was directed at measuring the attitudes on the strategies, in order to move from social thought processes to social action through five items. The scale was completed with six questions of a sociodemographic nature (sex, age, qualification for access, didactic specialty, university institution, and previous training on SDGs), and the assessment of this training for the teacher's professional future.

The reliability and the internal consistency of the questionnaire were evaluated through the calculation of Cronbach's alpha, which yielded a result of 0.760, considered to be an acceptable value [30]. This calculation was applied to each construct. Considering the number of items that integrate each dimension (less than 10), the results report optimal values: (A) 0.630, (B) 0.870, and (C) 0.780.

The study, with a non-experimental ex post facto design, is one in which the independent variables are neither manipulated, influenced, nor affected during the study, because they have already taken place [31].

The questionnaire was administered to the participants via email, through the email contacts provided by the directors or those in charge of the master's courses in the area of Didactics of Social Sciences. throughout the months of February and March 2020. It had the aim of obtaining precise information from the participants, who had no maximum response time. They were informed of the objectives of the investigation, and assured, at all times, that their responses would be processed in complete anonymity.

Quantitative, descriptive, and inferential analyses were completed. The data from the scale were reorganized in order to establish trends, thereby facilitating the descriptive interpretation. The values 1 and 2 were considered at a first level "tending towards disagreement", the value 3 was considered as "non-defined agreement", and the values 4 and 5 were considered at a third level "tending towards agreement".

Confirmation of the normality of the variable parameters was made using the Kolmogorov-Smirnov test ( $n > 50, p < 0.05$ ). Homoscedasticity was verified using Levene's test, and non-parametric inferential analyses (Kruskal-Wallis ANOVA test, Mann-Whitney  $U$  test, Spearman correlations, and Hedges'  $g$  effect sizes) of the data were performed, with the purpose of identifying the existence of statistically significant differences, in accordance with sex, age, university institution of origin, initial training, previous specific training in SDGs, and future teaching speciality. Potential interdependencies between the theoretical dimensions of the instrument were also examined. This combination of analyses was thought to reach an integral understanding of the results. Data processing was performed with SPSS v. 25 software.

### 3. Results

The systemic, complex, and critical aspects of the socio-environmental problematic (Table 1) returned disparate values between the degrees of agreement. The attitudes of trainee teachers differed over the consideration of poverty as an environmental problem and, in consequence, with economic roots. Nevertheless, they presented a clear tendency towards agreement over the teaching objective for the treatment of the sustainability-related subject matter on the need to strengthen conflict-resolution strategies as a tool for social transformation.

**Table 1.** Dimension A. Systemic, complex, and critical vision of the socio-environmental problematic of ESD. TD (%): tendency towards disagreement; NA (%): no defined agreement; TA (%): tendency towards agreement.

		TD	NA	TA
A1	Poverty is an environmental problem.	41.1	20.2	38.7
A2	A teacher must present the subject matter avoiding reflection on personal ideology.	19.6	21.5	58.9
A3	The conscientization of students must be done, but 'without entering into politics'.	34.4	18.4	47.2
A4	Conflict-resolution strategies have to be strengthened for social transformation.	3.7	9.2	87.1

Perceptions on the final purposes of ESD in the school context (Table 2) are, however, quite even. In accordance with the results, the acquisition of competencies through subject matter, social thinking skills, and attitudes towards sustainable development must articulate an education oriented towards critical social action that is responsible and committed to the natural environment.

**Table 2.** Dimension B. End-purposes of ESD in the classroom. TD (%): tendency towards disagreement; NA (%): no defined agreement; TA (%): tendency towards agreement.

		TD	NA	TA
B5	Gain knowledge of nature and learn to enjoy it, to love it, and to conserve it.	5.5	13.5	81
B6	Facilitate development of pro-environmental skills and routines such as how to look after living beings, separate the rubbish, respect and recycle paper, etc.	4.9	12.9	82.2
B7	Develop thought and action in students leading to change in the world in a way that makes it more sustainable.	1.8	9.2	89

Congruent with these results was the high degree of agreement identified with the promotion of methodological proposals directed towards the development of critical and creative thinking skills for social intervention, as opposed to others based on outings to the countryside or the organization of recycling workshops (Table 3).

**Table 3.** Dimension C. Teaching strategies for moving from thought to action in ESD. TD (%): tendency towards disagreement; NA (%): no defined agreement; TA (%): tendency towards agreement.

		TD	NA	TA
C8	Try to persuade and to convince students that they have to respond to the seriousness of the present-day environmental crisis, supporting certain forms of action.	17.8	25.2	57.1
C9	Organize frequent outings to the countryside and recycling workshops.	19.6	38	42.3
C10	Strive to make the students explain and contrast their ideas at all times, so that they become aware of what they think, and so that they apply their conceptualizations to the construction of new knowledge.	6.1	14.1	79.8
C11	Help to construct ethical-critical thought beginning with the analysis of reality.	0.6	10.4	89
C12	Develop complex thought that entails civil, social, and ethical creativity.	3.1	13.5	83.4

Inferential analysis determined that there were no statistically significant differences between the scores obtained as a function of sex, age, institutional origin, specialty, and previous training in ESD, a question that was considered very relevant among 93.3% of participants. However, significant differences between the representations of the third theoretical dimension of ESD among students specializing in Geography and History and the representations of students from other didactic-disciplinary specialisms were confirmed ( $U = -2.066, p = 0.039$ ) (Table 4).

**Table 4.** Average scores (*M*), standard deviations (*SD*), and significance of the values obtained by specialism.

	Geography and History		Other Specialisms		<i>U</i>	<i>p</i>	$\delta$
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Dimension A	3.59	0.75	3.57	0.72	-0.544	0.587	
Dimension B	4.35	0.87	4.41	0.75	0.344	0.731	
Dimension C	4.04	0.81	3.98	0.39	-2.066	0.039 *	0.1

\* Sig.  $\leq 0.05$ .

These differences show a higher general tendency among trainee teachers of Geography and History to work with the concepts of social conscience and active citizenship ( $M = 4.04$ ,  $SD = 0.81$ ). However, it should be clarified that its effect size is low ( $\delta = 0.1$ ), evidence that denies the claim that this difference is due solely to the direct effect of the educational specialty of the student.

The correlational analysis of the data from the students, in addition, confirmed the existence of linear relations of moderate-low dependency between the systemic, complex, and critical vision of the socio-environmental problematic of ESD, its educational end-purposes ( $\rho = 0.518$ ,  $p = 0.000$ ), and its methodological link with the promotion of teaching strategies oriented towards training for active citizenship ( $\rho = 0.366$ ,  $p = 0.001$ ) (Table 5). Likewise, this relation also reached positive moderate levels of interdependence between educational purposes and the teaching strategies for social action ( $\rho = 0.650$ ,  $p = 0.001$ ).

**Table 5.** Correlation between theoretical dimensions by specialist area.

		Dimension B	Dimension C
Geography and History	Dimension A	0.518 **	0.366 **
	Dimension B		0.650 **
Other specialist areas	Dimension A	0.217	0.189
	Dimension B		0.522 **

\*\* Sig.  $\leq 0.01$ .

The students from other specialist areas only obtained significant values with positive moderate correlations between the end-purposes and ESD and the teaching strategies directed towards social action ( $\rho = 0.522$ ,  $p = 0.000$ ).

#### 4. Discussion

The need could be noted in the theoretical representations of trainee Spanish Secondary Education teachers to promote competency-based learning directed towards critical social action, which is responsible and committed to the natural environment. These representations differ from the results obtained in the investigations of Walshe [21] and Perrault and Clark [32], in which the students of Secondary Education and university students expressed their limited understanding of the concept of sustainability founded on the environmental component, as opposed to the social and the economic components.

The methodological promotion of conflict-resolution strategies for social transformation, and the need to develop critical and creative thinking skills for social intervention, with majority support among trainee teachers of Geography and History, constitute the two lines of action voiced by the Secondary Education trainee teachers. These results are consistent with the application of ethical principles related with the values of sustainability in both personal and professional behavior, the most representative competence in Spanish higher education [26].

Pending comparison of the quantitative results obtained with an in-depth qualitative study, these results awaken us to the need to implement specific educational actions, directed at learning values and democratic participation as educational objectives, and at the development of skills of conscientization and social responses to sustainability problems. To speak of education for the active participation of citizens, in effect, implies reflection on the way the teaching is performed, in order, through a committed approach and in a responsible manner, to intervene in socio-environmental problems.

Along these lines, the investigations of Sales de Aguiar and Paterson [33] and Ortega-Sánchez and Jiménez-Eguizábal [34] have reported on the positive results of working with sustainability projects within higher education through the application of real-world problems and dialectic approaches. In accordance with their conclusions, this sort of focus favors democratic and emancipative promotion of the transference of sustainability problems. The results of the investigations of Galán-Casado,

Moraleda, Martínez-Martí and Pérez-Nieto [35] on their university proposal for ESD follow the same lines, oriented towards the development of skills of critical thought, commitment, and social transformation. Nevertheless, despite the advances that have been gained, the design of educational praxis and programs continues to be necessary, specifically directed towards the treatment of social problems and intervention in the community through the lens of active citizenship [36–38].

93.3% of the participants in the present study spoke in favor of the educational relevance of the SDGs, the explanatory conceptual cores of ESD. Congruent with this perception are the recent investigations on the attitudes of trainee teachers towards ESD, which demonstrated that the implementation of training actions on sustainable development improved the self-efficacy of trainee teachers in this area [39], favored the recognition of the curricular relevance of ESD [40], and influenced their ethical and moral perceptions [41]. One of the difficulties for its implementation, however, is found in the generalized absence of trust, knowledge, and professional skill of the teaching staff at integrating specific contents in an “over-populated” school curriculum [42]. In this sense, the analysis of Tuncer and Sahin [43] highlighted the influence of families, and less so the university training in the definition of the thought processes of university students on the concept of sustainability and, in particular, on the sustainable use of natural resources.

Along these lines, the study of Shephard and Furnari [28] identified the existence of different degrees of pertinence and training limitations related to ESD in higher education. Its results were similar to the contributions of the investigation of Cotton et al. [44] where the difficulties over the implementation of ESD in university teaching practice were confirmed, among which were the non-existence of interdisciplinary perspectives and the resistance to change within some scientific disciplines. This aspect coincides with the studies of [45], and Walshe [21] on the special complexity of developing transdisciplinary learning in the field of the ESD. In this sense, the work of Kanyimba and Coetzer [46] on the perspective towards ESD of teacher trainers reported the institutional limitations to its transversal integration in African countries. That conclusion aligned with the study of Thomas and Nicita [47], completed nine years earlier, within the geographical context of Australia.

## 5. Conclusions

From the three theoretical dimensions, correlated in the specialties of Geography and History, a general tendency among trainee Spanish teachers of Geography and History has been noted in the present study concerning the theoretical-practical development of the social conscience of their students, and the promotion of the concept of active citizenship. Nevertheless, the adoption of holistic and interdisciplinary approaches, and collaborative interdisciplinary work is necessary to advance towards sustainability in education [48].

Despite the generalized support of university and non-university teaching staff for the educational integration of sustainability [42,49,50], and despite the evidence of eventual advances for training in different formal educational areas [21,51–53], the experience of various Latin American countries [54] and Spain has shown that primary and secondary education teachers are not sufficiently well prepared to work with sustainable development-related content and competences. Works can be added to this reality from other regional areas that show the scarce participation of university students following sustainability programs offered by the university institutions themselves [55].

It is, in consequence, necessary to establish short- and long-term strategies for teacher training, the inclusion of didactic materials, and opportunities for dialogue. An inter- and multi-disciplinary effort [32] is therefore needed, from both an educational and an institutional perspective and, in particular, from higher education institutions [22,56,57] that can enable the sharing of knowledge, methodologies, and specific experiences, on the basis of proposals for pedagogic innovation [5].

**Author Contributions:** Conceptualization, D.O.-S. and A.A.-C.; data curation, D.O.-S. and M.C.; formal analyses, D.O.-S. and M.C.; funding acquisition D.O.-S.; investigation, resources, supervision and visualization, D.O.-S., A.A.-C. and M.C.; methodology, D.O.-S. and M.C.; project administration, D.O.-S. and A.A.-C.; software, D.O.-S. and M.C.; validation, D.O.-S. and M.C.; writing—original draft, D.O.-S., A.A.-C. and M.C.; writing—review and editing, D.O.-S., A.A.-C. and M.C. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by the Research Group Recognized in Didactics of History and Social Sciences (DHISO) (University of Burgos, Spain). This publication is part of the R&D Project ‘Teach and Learn to interpret contemporary problems and conflicts. What do the Social Sciences contribute to the formation of a critical global citizenship?’, financed by the Ministry of Economy and Competitiveness (Spain) (EDU2016-80145-P).

**Acknowledgments:** This study was completed with the support of the Research Group Recognized in Didactics of History and Social Sciences (DHISO), and the Group for Educational Innovation in Didactics of Social Sciences, Languages and Literatures in Initial Teacher Training of Early Childhood Education and Primary Education (DiCSOL) of the University of Burgos.

**Conflicts of Interest:** The authors declare no conflict of interest.

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