

MAKING THE CHANGE POSSIBLE. INCLUSION OF ESD IN THE TRAINING OF SECONDARY SCHOOL TEACHERS

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The research presented here focuses on Education for Sustainability into action. It is part of a larger research project with an ultimate goal of catalysing the process of curriculum change towards Sustainability.

A first stage of the project was based on a collaborative study of the teaching guides of the specializations of experimental science (Biology-Geology and Physics-Chemistry) from the Master's Degree in Secondary Education Teaching at the Universitat de València (Spain). An analysis, searching for terms related to Sustainable Development/Sustainability, as well as for those competences identified by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and for the 17 Goals of Sustainable Development (GSDs) in the United Nations 2030 Agenda was carried out from an Action/Research methodological approach searching for deficiencies and opportunities to improve the teaching guides by including Sustainability issues.

This paper shows the results of these analyses and secondly focuses on the positive changes that have been carried out thanks to this collaborative work. During the 2017-18 academic year the number of references to Sustainability in the teaching guides increased: as a result of the reflections of the teachers involved and the research team of the project, the teaching guides were modified, including, among other things, the explicit mention to the GSDs 2030, in both specializations. It is also worth mentioning the involvement of pre-service teachers of experimental sciences in research in the field of Education for Sustainable Development (ESD), as well as in designing, testing and evaluating activities to include attention to Sustainability in Secondary school. Part of the interest arisen among students is increasingly reflected in some Master's Degree Thesis developing research and educational proposals focused on ESD.

Keywords: Education for Sustainability, Teacher Preparation, Secondary School.

INTRODUCTION

Since the end of the 20th century, many social movements and the scientific and educational community have insisted on the need and urgency of addressing socio-environmental problems and urgently implementing specific measures (Hodson, 2003; Gil Pérez et al., 2003; Colucci-Gray et al., 2006).

Education for Sustainability

The celebration of The United Nations Conference on Environment and Development (UNCED) of Rio de Janeiro in June 1992 was a turning point in recognizing the role of education, and in particular, of university education, to help solve the global problems that affect us and move forward towards.

Given the severity of the situation and responding to the increasing concern from different areas, many universities decided to promote Sustainability from their institutions. After the Decade of Education for Sustainable Development 2005-2014 (DESD), proclaimed by the United Nations and considered one of the main global efforts in this regard, we must put the focus on 2015. In this year, the document "Transforming our world: the 2030 Agenda for Sustainable Development", articulated through 17 Sustainable Development Goals (SDGs) and 169 targets to be implemented in the 2016-2030 period was approved.

SDG 4 (Quality education), in target 4.7, refers to the acquisition of the knowledge and competences necessary to promote Sustainable Development by students. In this sense, the role to be played by the initial and continuous teacher training is obvious.

Education for Sustainability in teacher training in Spain

The post-DESD initiatives promoted the inclusion of Sustainability in the curriculum of the different educational levels and especially in teacher training (Junyent and Geli de Ciurana, 2010; Aznar et al., 2011; Vilches & Gil Pérez, 2013; Aznar et al., 2018).

Regarding Higher Education, the Copernicus Network - made up of more than 300 European universities - approved in 2005 the document "Sustainable Bologna: Recommendations for Sustainable Development", a plan with concrete proposals to advance in the processes of curricular Sustainability of university Degrees.

In that same year, UNESCO highlighted as an innovative method to integrate Sustainability in the initial and continuing teacher training "the competence model", according to which all disciplines and teachers can and should contribute to Education for Sustainability. These are goals that UNESCO continues to promote through the Global Action Programme (GAP) on Education for Sustainable Development.

However, despite these and other initiatives, we are still far from achieving the necessary reorientation of the curriculum for teacher training to contribute to the transition to sustainable societies.

This research aims to answer, the following questions:

- To what extent do the specializations of Biology and Geology and Physics and Chemistry pay attention to Sustainability in the Master's Degree in Secondary School Teacher Training?
- What opportunities do the teaching guides offer for the inclusion of Education for Sustainability?
- To what extent does the participation of teachers of the Master's Degree in the analysis of the teaching guides can favour their involvement in ESD?

METHOD

A participatory Action/Research approach was carried out during course 2017-18 as a methodological proposal for the change towards the inclusion of Sustainability in the teaching-learning processes. In particular, a representative sample of the teaching guides was analysed by collaborative groups of teachers in the Master's Degree program. The following categories of analysis were selected from the teaching guides:

1. Explicit mention to Sustainable Development/Sustainability or related terms
2. Reference to the four competences for Sustainability recommended by UNESCO in 2014: Systemic reflection; Critical analysis; Intergenerational responsibility; and Collaborative decision-making.
3. Reference to the Sustainable Development Goals within the 2030 Agenda framework.

After this process, a period of group reflection was carried in order to seek for opportunities to include Sustainability in the subsequent revision of the teaching guides- *i.e.*, in the reality of pre-service Secondary teachers during their training period in the Master's Degree.

RESULTS

As most outstanding result, an explicit reference to the terms related to ESD was found in the Specific Competence CE 5 of the Master's Degree, present in all the teaching guides.

It is also worth highlighting the inclusion of a specific topic devoted to Sustainability in the subject "Learning and Teaching of the subject" of the specializations of Physics and Chemistry: Topic 7 (Education for Sustainability) includes aspects as the holistic vision of problems and challenges that humanity must face or scientific education and Sustainability Science.

Regarding the four UNESCO competences for Sustainability, several references were found. In some cases, such as in the subject "Learning and Teaching of Physics and Chemistry", these references appear in all the sections of the teaching guide: in the competences, in the learning outcomes, contents, methodology and

bibliographic references. Some of the allusions found were: promoting critical citizens, problem-based learning or cooperative learning, all related to critical analysis.

The results of the analysis of the references to the 17 SDGs and the 2030 Agenda showed no explicit references to ODS/2030. The teaching guides analysed were from June 2016 and at that time the approval of the ODS was very recent.

All these analyses, carried out with the coordinators of both specializations, permitted coming into action and improving some contents of the teaching guides. The teaching guides were modified, including, among other things, the explicit mention to the GSDs 2030, in both specializations. The collaborative work methodology carried out by teachers was transferred to the classrooms with pre-service teachers. In fact, one of the most significant results of the study is the involvement of future teachers of experimental sciences in research in the field of ESD. In this sense, they designed, tested and evaluated activities to include attention to Sustainability in Secondary school in different subjects of experimental science; e.g.- they investigated the attention given in the teaching of physics and chemistry to the SDGs and to Sustainability through the analysis of the physics and chemistry curriculum, teaching materials and student conceptions. In particular, 60 exams (with more than 300 questions) from 15 different educational centres were analysed in order to test to what extent ESD was considered and was therefore recognized in the proposals of evaluation.

It is also worth mentioning the interest arisen among students, reflected in some Master's Degree Thesis developing research and educational proposals that include issues related to Education for Sustainable Development (ESD). Examples of Master's Degree Thesis on Sustainability in the specializations of Physics and Chemistry are: "Some ideas of secondary school students about climate change" or "The attention given to environmental education in Secondary Education". In the specializations of Biology and Geology, we can highlight "Proposal to educate in a sustained and sustainable scientific culture" and "Food from a *glocal* and sustainable perspective".

The results found in these and other studies carried out by pre-service teachers confirm the little attention that is generally given to ESD in Secondary education (in the case of the exams and tests analysed, only two issues of the most important ones could be linked to ESD). All this confirms the urgency and need to be involved as teachers and researchers in the attention to the socio-environmental problems in science education.

CONCLUSION

The results of the ongoing project are positive, showing that collaborative teamwork can be of great help for the involvement of teachers and ultimately for including the principles and values of Sustainability in their teaching practice and research. We are aware of the difficulties of involving a greater number of teachers and even other specializations but we are convinced that the effort is worth it. On the one hand, the work carried out thanks to this project has been concretized in the incorporation of aspects related to Sustainability and the SDGs in the new edition of the teaching guides. On the other, we must highlight the involvement of pre-service teachers by the inclusion of thematic proposals on ESD into investigations and teaching proposals of their Master's Degree Thesis. Currently we are in the process of evaluating the progress made.

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