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Reconstructing the professional identity of compulsory secondary education teachers in curricular sustainability

Reconstrucción de la identidad del profesorado de Educación Secundaria Obligatoria en sostenibilidad curricular

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Abstract:

The current situation with its constant uncertainty regarding the new social and planetary challenges that societies face demands commitment and active participation by members of the public to achieve economic, social, and environmental transformations that favour a more sustainable planet. Establishing an alignment with sustainability in all its dimensions in secondary school curricula is necessary so that people can lead social changes in line with the sustainable development goals of the 2030 Agenda. This research seeks to establish whether the specialisation profile of compulsory secondary education teachers at national level interferes with the incorporation of the sustainability approach in the classroom. The sample comprised *n* = 208 participants identified through non-probabilistic sampling using the snowball technique. The results of a descriptive and inferential analysis showed that the participating teachers try to respond to the challenges of the 21st century (such as social inequalities, pollution and degradation of ecosystems, depletion and destruction of vital resources, etc.), but do not approach them from the necessary interdisciplinary and complex perspective, instead largely covering the environmental dimension. This makes it difficult for secondary school students to address global challenges holistically and explore ways of transformation from an approach centred on sustainability. It is therefore necessary for lifelong learning to aid teachers in the reconstruction of their teaching work, overcoming the current outlook, which is fragmented by disciplines or specialisations, in order to promote an interdisciplinary approach through cooperation and collaboration. In this way, true eco-social literacy would be consolidated in order to meet the new demands of the education system in terms of sustainability.

Keywords: global education, compulsory secondary education, curricular sustainability, teacher professionalisation, lifelong learning, environmental sustainability.

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Resumen:

La actual coyuntura contemporánea, en permanente incertidumbre ante los nuevos retos sociales y planetarios a los que se enfrenta la sociedad, demanda a la ciudadanía compromiso y participación activa para lograr transformaciones económicas, sociales y ambientales a favor de un planeta más sostenible. Alinear los planes de estudio de secundaria con la sostenibilidad en todas sus dimensiones resulta necesario para que la ciudadanía sea capaz de liderar cambios sociales alineados con los objetivos de desarrollo sostenible de la Agenda 2030. Esta investigación pretende conocer si el perfil de especialidad del profesorado que ejerce docencia en Educación Secundaria Obligatoria en el ámbito nacional interfiere en la incorporación del enfoque de sostenibilidad en el aula. La muestra, conformada por $n = 208$ participantes, responde a un muestreo no probabilístico mediante la técnica de bola de nieve. Se realizó un análisis descriptivo e inferencial y los resultados evidencian que el profesorado participante trata de dar respuesta a los retos del siglo XXI (por ejemplo: las desigualdades sociales, la contaminación y degradación de los ecosistemas, el agotamiento y la destrucción de recursos vitales, etc.), pero no desde la interdisciplinariedad y la complejidad que estos requieren, sino que desarrollan, en mayor medida, la dimensión ambiental de la sostenibilidad. Esto dificulta que el alumnado de secundaria aborde de forma holística los retos planetarios y explore vías de transformación desde un enfoque sostenible. Por tanto, es necesario que la formación permanente acompañe al profesorado en la reconstrucción de su quehacer docente y supere la actual visión fragmentada por disciplinas o especialidades en aras de promover un abordaje interdisciplinar, mediante la cooperación y colaboración. De esta forma, se consolidaría una verdadera alfabetización ecosocial para dar respuesta a las nuevas demandas del sistema educativo en materia de sostenibilidad.

Palabras clave: educación global, enseñanza secundaria obligatoria, sostenibilidad curricular, profesionalización docente, formación continua, desarrollo sostenible.

1. Introduction

The current situation, with its constant uncertainty regarding the new social and planetary challenges that societies face, demands commitment and active participation by members of the public to achieve economic, social, and green transition changes (European Commission, 2024). Establishing an alignment with sustainability in all its dimensions in secondary school curricula is necessary for citizens to be able to drive social changes that are coherent with the sustainable development goals (SDGs) of the 2030 Agenda. This focus is crucial for educating people to be committed to environmental, social, and economic sustainability.

The evolution of Spain's education system, marked by the passing of a succession of often conflicting pieces of legislation, has created instability that seems to hinder the improvement and consolidation of educational quality (Novella & Cloquell, 2022). Integrating the focus on sustainability into the official curriculum makes it possible to prepare students to face the challenges of the future holistically (Patta & Murga-Menoyo, 2020). In this framework, the Organic Law 2/2006, of 3 May, on Education established as one of its principles and goals the promotion of education for ecological transition with social justice criteria, underlining its contribution to the dimensions of sustainability. In particular, the organisation of the fourth year of compulsory secondary education included the need to foster education for sustainability transversally, which entailed integrating it into all areas of the curriculum. However, these early advances were undone by the Organic Law 8/2013, of 9 December, for improving the quality of education, which focussed more on aspects relating to quality, competitiveness, and improving academic performance, sidelining curriculum sustainability.

The passing of Organic Act 3/2020, of 29 December, Modifying the Organic Education Act 2/2006, of 3 May (LOMLOE in its Spanish acronym), emphasises what humankind must confront, with the urgency of promoting lifestyles that are sustainable and responsible to

our planet (Coll & Martín, 2021; Moya & Luengo, 2021). Consequently, it advocates for the inclusion of education for sustainable development in curricula and educational programmes, developing key competences in the focus on sustainability (critical thinking, systems thinking, collaborative decision making, and responsibility to present and future generations) to contribute with active responsibility and commitment to consolidating sustainable societies (Murga-Menoyo, 2015; Pellín et al., 2021). However, what possibilities does the LOMLOE offer to try to address sustainability in the compulsory secondary education curriculum?

On the one hand, it states that by 2025 practising teachers must be trained in the goals set by Agenda 2030 and will need to have acquired sustainability competences, which should also, in our view, be introduced into training to access the teaching profession. On the other, it makes education in civic and ethical values an obligatory subject that pays special attention to ethical reflection and features content referring to education for sustainable development and global citizenship, among other aspects, so that secondary-school students discover what consequences the actions of humankind have for the planet.

Royal Decree 217/2022, of 29 March, Establishing the Organisation and Minimum Teaching Requirements of Obligatory Secondary Education states that this subject (sustainable development and environmental ethics block) enables students to address essential ethical questions and develop behaviours that reflect the interconnected and eco-dependent character of the environment through meaningful learning situations. These must form part of their reality, inviting them to reflect and cooperate in order to promote a planetary citizenship committed to the challenges of the 21st century, which include social inequalities, pollution and degradation of ecosystems, exhaustion and destruction of vital resources, etc. (Calero et al., 2019; Castro-Zubizarreta et al., 2022; De la Rosa et al., 2022).

The most recent *United Nations sustainable development goals report* [Organización de las Naciones Unidas (ONU), 2023] notes that teachers are aware of the importance of addressing the seriousness of climate change in depth in their classrooms in an attempt to develop holistic strategies that contribute to mitigating these challenges, but it appears that not all of them manage to do so. Students report needing more information and education to understand its complexity, calling for interdisciplinary and action-oriented education. The LOMLOE invites teachers from a variety of obligatory subjects (Physics and Chemistry; Geography and History; Spanish Language and Literature, etc.) and optional subjects to develop basic knowledge that favours the connection between the different branches of knowledge to contextualise learnings and connect them in response to the global challenges of the 21st century. However, what are teaching practices like and how do they interfere in the secondary-school curriculum for the sustainability focus?

1.1. Teaching practices and the curriculum

The holistic focus in sustainability involves addressing the complexity of relations between social, environmental, and economic systems (Collazo & Geli, 2022; Moya & Luengo, 2021). This requires connecting current problems in society, which are still seemingly approached through individual disciplines with a focus on specific questions such as, for example, environmental ones (Solís-Espallargas & Valderrama-Hernández, 2015), sometimes reduced to warning of climate change, recycling, and caring for natural spaces (Madorrán & Almanzán, 2022). In this regard, and with the objective of educating citizens who are committed to the planet, the secondary curriculum cannot be treated as a set of independent and unconnected subjects (Risco & Cebrián, 2018), an approach that seems to be part of the dominant culture, as Morín (1999) already mentioned the need to stop dividing and compartmentalising our knowledge so that we can face complex and global challenges.

If we start from the position that curriculum sustainability does not involve covering content independently in the topics of different subjects, but rather driving global changes in the conception of the educational process (Collazo, 2018), it is important to understand that interdisciplinarity is necessary to confront complex challenges that are closely connected and must be resolved jointly (Vilches & Gil, 2021), generating a culture of sustainability in educational centres.

On this line, the LOMLOE states that educational institutions can teach subjects together that are related to one another, going further to respond to the new culture, deriving from the need to create sustainable ways of life (Moya & Luengo, 2021). There is a need to connect areas, subjects, and fields that make it possible to integrate sustainability competences from different disciplines into the curriculum: critical analysis, systemic reflection, decision making, and sense of responsibility towards present and future generations (UNESCO, 2017).

Completing the basic education stage requires knowing how to use the content acquired to resolve needs that are present in reality. Therefore, as LOMLOE indicates, more than understanding the challenges of the 21st century and believing that this is sufficient to produce changes in the behaviour of students and consequently the public, educational action must promote education for sustainability, establish commitments to action in all of the spheres that comprise society, put them in progress, and monitor the results achieved. This will give a holistic perception of the reality of the world (Vilches & Gil, 2021), reinforcing global citizenship.

On these lines, educational institutions attempt to deal with transformations in an effort to react to the challenges people face. To do so, they have to take teachers into account as key agents in the transformation of the public (UNESCO, 2022) and as facilitators of the learning process to contribute to the new demands of current society (Dubet, 2006; Patta & Murga-Menoyo, 2020).

Along with reciprocal collaboration with their peers and the support of educational institutions in a community oriented towards sustainability, teachers will be able to act as enhancers of new educational ecosystems from a systematic perspective in increasingly complex settings and will be able to set up learning networks (UNESCO, 2022), taking into account the fact that teaching practices tend to follow a single-discipline path and must be reconceptualised to move towards the sustainability focus.

1.2. Reconceptualising the profession

Teachers should play an essential role in the current challenges facing education in the context of a world that is interrelated and constantly changing (Van der Wal et al., 2018), and so they should have a holistic and dynamic vision that enables them to confront the challenges that are present in society (Misad et al., 2022) and integrate them into their professional practice.

Their teaching work results in students, as members of this society (Montané, 2020), being conscious of the impact of human activity on the planet so that they can take conscious decisions to build a sustainable present and future (UNESCO, 2017). With this aim, teachers must analyse and reflect on their teaching performance from a critical outlook to identify areas for improvement and propose actions that make it possible to improve their pedagogical practice in order to meet the needs of the social context (Domínguez & Rojas, 2018; Esquerre & Pérez, 2021; Reis et al., 2020).

Authors such as Rodríguez and Hernández (2018) and Ruíz and Santos (2020) note that teachers who participate in upgrading and lifelong training programmes acquire competences to perform their duties effectively in the classroom, fulfilling their role as educators. This training must favour an attitude that embraces change (Chocarro, 2007) and help them understand the current situation of an emergency of anthropogenic origin that the planet faces (Tomas et al., 2015; Vilches & Gil, 2021) in which the impact of human activities has disrupted the sustenance of life.

Nonetheless, many secondary teachers are currently still anchored to their subject and to their classroom, which can result in students having a partial understanding of the challenges we face in the 21st century and so their response to them is insufficient. The Bonn Declaration, from Germany (UNESCO, 2009), called for teacher training programmes to be redirected. Teachers must respond to the call to action regarding education for sustainable development and recognise their responsibility in the construction of a sustainable future (Brandt et al., 2022; Shepard, 2008).

The fact is that, as agents of change, it appears that they do not tend to make their teaching practice and thinking sustainable, either because they do not consider it to be relevant or because they think it is not related to the subject they teach (Vilches & Gil, 2012). This might be explained by the crisis of professional identity that has hit the profession owing to the decomposition of the transmissive model of teaching (Bolívar et al., 2014; Chocarro, 2007; García-Pérez & Mendia, 2015; Rufinelli, 2021), as the student is now at the centre of learning and

is the figure who must develop competences in sustainability to adapt to demands, changing surroundings, and new realities (Misad et al., 2022; Van der Wal et al., 2018).

What is needed to reconceptualise teaching as a profession in response to this new form of educating and for this to permeate students and so have a positive impact on the challenges society faces? Firstly, bearing in mind that education is at a critical moment (Misad et al., 2022), teachers need to be trained in sustainability as a lack of training about social challenges is an obstacle that has not been overcome. There is also a need for joint coordinated actions between all parties in the educational institution that make it possible to reconceptualise teaching as a profession and strengthen the identity of teachers so that they can manage their own learning and that of the students (Montané, 2020; Risco & Cebrián, 2018), contextualising their teaching in current problems and from there constructing knowledge, helping them to build global citizens through their own know-how and being (Cebrián & Junyent, 2015).

Secondly, teachers at secondary-school level must understand that whichever subject or specialisation they have can contribute to confronting the different problems that affect humankind, generating responsible attitudes and behaviours that lead to taking well-informed decisions (Vilches & Gil, 2011). To do so, it is beneficial to promote interdisciplinary experiences that can interrelate knowledge from a holistic perspective (Imbernón, 2001). So, teachers will be able to comprehend the paradigm of complexity, which, in the words of Collazo (2018), enables "the construction of explanatory models, of an anthropocentric worldview, and strengthens transformative action" (p. 29, own translation), as the transition to sustainability consists of a plurality of essential transitions (towards responsible consumption, economic, energy, demographic, urban, from anthropocentrism to biocentrism, etc.) that are closely connected to one another, as happens with environmental, economic, and social problems. And the fact that teachers and students among other agents involved lack a global vision is an obstacle to being able to adopt effective measures and actions (Vilches & Gil, 2021).

On this line, Imbernón (2022) considers knowledge of the context to be necessary to carry out the role of teacher correctly, with a need for teachers to question their professional and practical knowledge and also to regard teaching as knowledge in construction where collaboration between people for their own personal development is essential.

In light of the above, the research presented leads us to ask the following questions: Do secondary teachers cover concepts from Agenda 2030 in their teaching practice to develop the sustainability focus in class through their subject? And, if so, is the approach to the focus on sustainability holistic? And does it respond to its three dimensions (environmental, social, and economic)?

This purpose of this study is to establish whether the specialism of teachers who teach in compulsory secondary education interferes in the incorporation of the sustainability focus in the classroom, and if so, the extent to which it does so.

2. Hypotheses

This research, which is of a quantitative, transversal, and multicentre nature, was done at a nationwide level and proposes the following hypotheses:

- H1: secondary teachers only cover concepts in their teaching practice that are related to their speciality, contrasting with the holistic sustainability focus.
- H2: the sustainable development concepts that secondary teachers incorporate into their pedagogical practice are worked on through the key competences of the curriculum for this educational stage.

3. Method

3.1. Participants

This research uses purposive non-probability sampling with the snowball chain-referral technique to access a specialist population consisting of secondary teachers and to ensure

representation of the greatest possible number of autonomous communities. The sample comprises a total of 208 participants, distributed among male teachers (*n* = 82, 39.4%) and female teachers (*n* = 124, 59.6%) in compulsory secondary education. The participating teachers are in the following age bands: 20 to 30 years (*n* = 16, 8%), 30 to 40 years (*n* = 50, 24%), 40 to 50 years (*n* = 72, 35%), 50 to 60 years (*n* = 65, 31%), and over 60 years (*n* = 5, 2%). They have been teaching for less than 5 years (*n* = 55, 26%), between 5 and 10 years (*n* = 24, 12%), between 10 and 15 years (*n* = 24, 12%), between 15 and 20 years (*n* = 32, 15%), between 20 and 25 years (*n* = 32, 15%), and more than 25 years (*n* = 40, 19%) in various educational centres in Spain that are publicly owned (*n* = 201, 96.6%), state-funded independent (*n* = 6, 2.9%), and private (*n* = 1, 0.5%), predominantly located in the Valencian Community (*n* = 40, 19.2%), the Community of Madrid (*n* = 36, 17.3%), the Principality of Asturias (*n* = 21, 10.1%), and Galicia (*n* = 15, 7.2%).

Teachers are distributed by speciality as follows: Plastic and Visual Arts (*n* = 12, 5.8%); Biology and Geology (*n* = 43, 20.7%); Economics and Business Administration (*n* = 25; 12%); Physical Education (*n* = 8, 3.8%); Philosophy (*n* = 13, 6.3%), Physics and Chemistry (*n* = 12, 5.8%); Geography and History (*n* = 35, 16.8%); Information and Technology (*n* = 16, 7.7%); Spanish Language and Literature (*n* = 16, 7.7%); English (*n* = 10, 4.8%); French (*n* = 8, 3.8%); Mathematics (*n* = 8, 3.8%); Music (*n* = 2, 1%).

3.2. Variables and instrument

The following variables were studied: relevant concepts for working on sustainability in the classroom, which, owing to their relevance, were taken from *Voces para una alfabetización ecosocial (Voices for eco-social literacy)* by Murga-Menoyo and Bautista-Cerro (2022); curriculum competences; and teaching specialism, with this last one being the dependent variable.

A questionnaire was designed, comprising 17 items with different answer options (single, multiple, or 5-point Likert scale, where 1 corresponded with "I do not know this" and 5 with "I know this well"), to explore the ecosocial literacy of secondary teachers. This was administered anonymously using the Google Forms platform (Table 1). To identify the relationship between the proposed statements and the research objectives, as well as to guarantee comprehension of the questions asked, the questionnaire was validated by ten experts from different fields: two from sustainable development, two secondary teachers, two from the Conferencia de Rectores de las Universidades Españolas (Association of Rectors of Spanish Universities, CRUE), one university expert, two experts in questionnaires, and one from the civil population. Good reliability (Ω = .89) was found for the whole of the instrument.

Table 1. Types of response to the items on the questionnaire.

Questionnaire items	Types of response
A. Gender	Single
B. Age	Single
C. Years of teaching practice	Single
D. Ownership of school	Single
E. Autonomous community where the school is located	Single
1. What is your level of knowledge of the SDGs?	Likert scale
2. How did you find out about the SDGs?	Single

3. What is your level of knowledge of Agenda 2030?	Likert scale
4. Basic sustainability concepts (environmental, social, and economic) that must form part of the OSE curriculum	Single
5. Developing projects and activities in the centre on the importance of SDGs	Single
6. Number of projects implemented in the centre	Single
7. Selection of concepts from Agenda 2030 for working on sustainability in class	Multiple
8. Would you incorporate other concepts?	Open
9. In what subjects do you incorporate the concepts identified?	Multiple
10. If you incorporate the concepts into your teaching, in what curriculum competences do you work on them?	Multiple
11. You develop the selected concepts through...	Multiple
12. Methodologies used for working on sustainability in class	Multiple
13. Didactic experience with regards to sustainability	Open
14. Difficulties implementing the SDGs and Agenda 2030 in class	Single

3.3. Procedure

The first phase of the study involved identifying secondary education centres in Spain's autonomous communities and the potential participants, which would be the heads of these educational centres. In the second phase, we sent an email to them to inform them of the aim of the study and the inclusion criteria for participants, as well as a link to the instrument which we asked them to distribute among their networks of secondary teachers. Finally, the teachers had a period of approximately 3 months to complete the questionnaire voluntarily and anonymously.

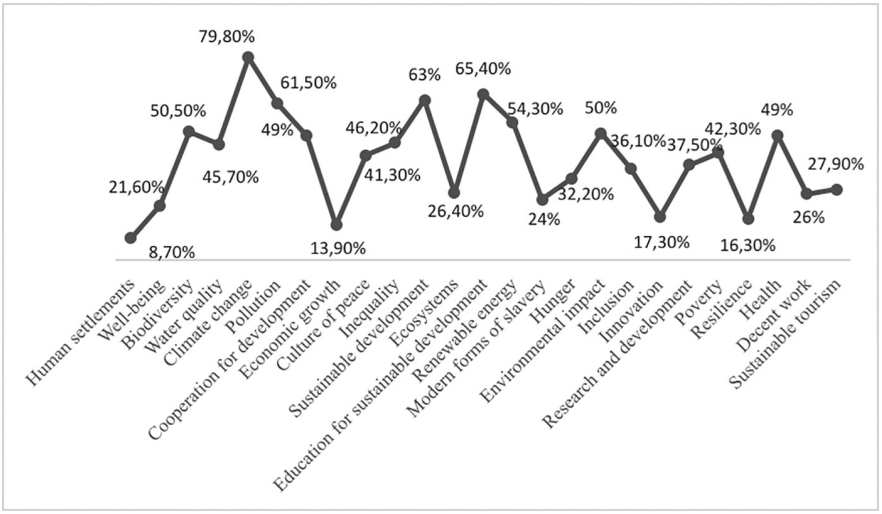
3.4. Data analysis

A descriptive and inferential analysis was performed using Pearson's chi-squared test (p <.05) and Fisher's exact test (p <.05) to identify the relationship between the variables, using the IBM Statistical Package for Social Sciences (SPSS) version 27 software.

4. Results

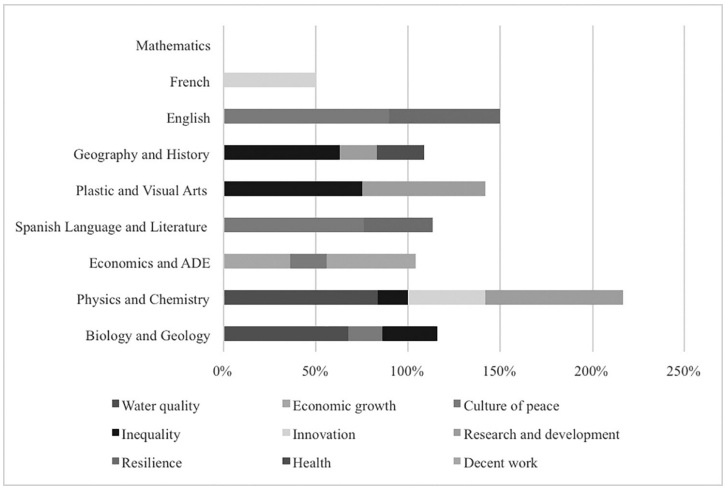
Of the secondary teachers, 97.1% (n = 202) consider that the concepts from Agenda 2030, contemplated in their three dimensions (social, environmental, and economic), must form part of the secondary curriculum. However, in their teaching practice, they tend to cover to a greater extent the ones that are most closely linked to the environmental dimension (Figure 1): climate change (n = 166, 79.8%), pollution (n = 128, 61.5%), renewable energy (n = 113, 54.3%), environmental impact (n = 104, 50%), and biodiversity (n = 105, 50.5%).

FIGURE 1. Distribution of the concepts covered by secondary teachers in their teaching practice.



These results agree with H1, as teachers tend to use sustainable development concepts that are related to the disciplinary content of their specialism. In this sense, a higher response rate is detected from teachers specialising in Biology and Geology (n = 43, 20.7%) and Geography and History (n = 35, 16.8%). Furthermore, Fisher's exact test (F) shows that there is significance (p <.05) between certain teaching specialisms and some concepts which are considered relevant for working on sustainability in the classroom: water quality (p = .00), economic growth (p = .01), culture of peace (p = .00), inequality (p = .00), innovation (p = .00), research and development (p = .00), resilience (p = .01), health (p = .03), and decent work (p = .02). These results lead us to confirm that the concepts on which secondary teachers work in their teaching practice are largely related to their teaching specialism (Figure 2).

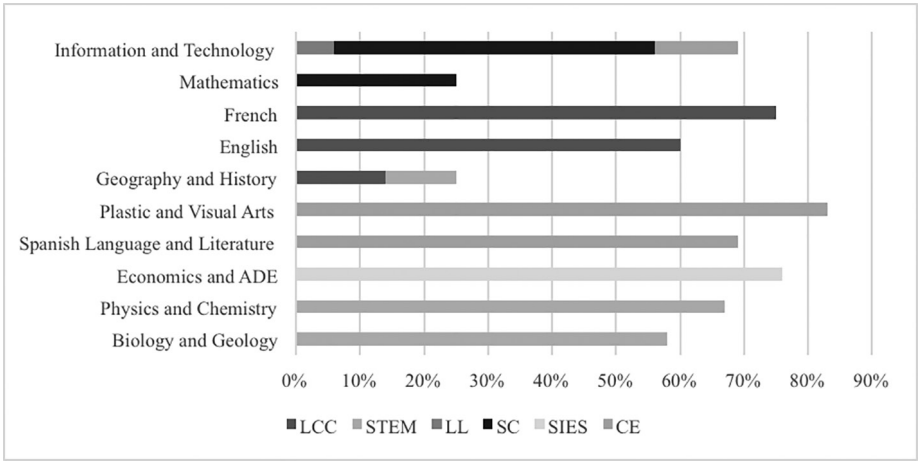
FIGURE 2. Relationship between teaching specialisms and concepts from Agenda 2030 covered by teachers in compulsory secondary education.



Note: BAM = Business Administration and Management.

With regards to H2, it is confirmed that there is a significant relationship between the teaching specialism of secondary teachers and the incorporation of concepts in their teaching practice through the key competences of the secondary curriculum (p <.05), specifically the following ones: linguistic communication competence (p = .00), competence in mathematics and basic science and technology competence (p = .00), learning to learn competence (p = .04), social and civic competence (p =.00), sense of initiative and entrepreneurial spirit competence (p = .01), and competences in cultural conscience and expressions (p = .00) (Figure 3).

FIGURE 3. Relationship between key competences from the secondary curriculum and teaching specialisms of compulsory secondary education teachers.



Note: BAM = Business Administration and Management; LCC = linguistic communicative competence; STEM = mathematical competence and competences in science, technology, and engineering; LL = learning to learn; SC = social and civic; SIES = sense of initiative and entrepreneurial spirit; CE = conscience and expressions.

Finally, it should be noted that the results obtained show that, in their teaching practice, the participating teachers tend to respond to the challenges facing society from the conceptual heart of their discipline, which does not favour a holistic understanding of the problems and realities that secondary students face. For example, participating teachers from Biology and Geology as well as Physics and Chemistry seem to develop concepts (water quality, inequality, etc.) relating to sustainability through STEM competences. Their aim is to explain and make students understand the problems from the natural and social setting by transmitting them a body of knowledge and methodologies that enable them to act and transform such problems. Participating teachers from Economics and Business Administration tend to approach concepts linked to their specialism (such as economic growth or decent work) through the sense of initiative and entrepreneurial spirit competence, providing strategies that make it possible to detect needs and opportunities with the aim of generating results that are of value for other people. In this respect, it appears that secondary teachers seek to respond to problems that are interconnected, but that they approach independently.

5. Discussion

The data found in this research confirm our first hypothesis. Compulsory secondary education teachers incorporate the sustainability focus in class according to the specificity of their teaching specialism, largely focussing on the environmental dimension, which agrees with what Solís-Espallargas y Valderrama-Hernández (2015) found. This way of implementing

sustainability in the classroom prevents the complexity of the planet from being understood and examined through the three systems that comprise sustainability in accordance with the recommendations of authors such as Collazo and Geli (2022), and it prevents students from exploring contextualised pathways for transformation towards sustainability. In this sense, the research presented here proposes a number of key elements that can contribute to moving the teaching culture towards dialogic models in the understanding of the teaching–learning process (Venegas, 2013). It is necessary to offer a global response to the challenges of the 21st century, constructing the professional identity of the teachers by incorporating the sustainability focus.

Teachers regulate, plan, coordinate, and select the content students should learn and how they should do so; as such, the initial and lifelong training processes in which they participate are both fundamental in teachers' professional continuous training. In initial training, university teachers can act as a reference point for future teachers (Jarauta & Pérez, 2017), and so their teaching practice can affect the training of future generations of education professionals (Jiménez et al., 2018; Martínez & Carreño, 2020), replicating a model that is far from current society's needs and demands with regards to education. Therefore, the sustainability focus must be incorporated into the curricula of the Master's programmes in Obligatory Secondary Education and Baccalaureate Teacher Training, Professional Training, and Language Teaching, because these lead to a professional qualification. This incorporation must not only be in each of the subjects that comprise the curriculum but by strengthening new ways of working that require an interdisciplinary approach to create meeting points in the curriculum between the modules for the different specialisms of the master's programmes mentioned above. This is in line with what Risco and Cebrián (2018) point out regarding the incorporation of methodologies such as, for example, learning based on projects, case studies, problem solving (UNESCO, 2017) as generic competences.

The current approach is divided into subjects and develops capacities linked to the key competences, which take as their reference the Recommendation of the European Parliament and of the Council, of 18 December 2006, on key competences for lifelong learning, which does not incorporate any reference to competences in sustainability. This, along with the data obtained in the study, clearly supports the claim made in the second hypothesis of the present study, which leads us to affirm that we are still far from true curriculum sustainability in this educational stage.

Any process of reconstruction of teachers' identities will require refresher training for teachers, also known as continuous professional development, through dynamics of lifelong training. Authors such as Alonso and Vera (2022) identify this as "a process of learning that is developed through the whole of the life of the teacher" (p. 167, own translation) in response to the training needs and issues that teachers display in their teaching practice. The situation of contemporary societies, which are heading towards a need for planetary citizenship, will require a change in processes for continuous training for teachers to make the sustainability focus a reality in classroom teaching practices (García-Ruiz & Castro, 2012; Imbernón, 2007, 2022a), with activities that range from reflective practices shared among teaching staff to student participation in their own process of learning through experimentation, experience, sharing, dialogue, and extrapolation of knowledge (Imbernón, 2022b) from a contextualised didactics. Consequently, as Imbernón (2017) suggests, a new professional culture is needed as is a new style of lifelong training with a holistic and interdisciplinary approach so that it contributes to improving the teaching profession. Lifelong and initial teacher training is, as we believe, the key point from which to react to the gaps relating to sustainability identified in teaching practice throughout our research in order to achieve sustainability in the compulsory secondary education curriculum, as required by the current education act (LOMLOE).

OSE teachers have to be trained to position their teaching actions in a shared framework (Cantón, 2019) that allows them to understand and comprehend the situation of global emergency we face, which, in the words of Vilches and Gil (2021), is characterised by "a set of grave socio-environmental problems of entropic origin that have led to the current stage in the evolution of the planet being called the Anthropocene" (p. 55, own translation), abandoning the idea that teacher professionalism involves undertaking their practice individually (Zabalza, 2022). Therefore, lifelong training must accompany teachers in the reconstruction of their teaching practice, overcoming the fragmented disciplinary perspective and promoting an

interdisciplinary approach to the challenges of the 21st century through cooperation and collaboration between teachers from different specialities so that they can expand it to their classrooms. In this way, through curriculum innovation with the use of active and participatory methodologies that make it possible to approach education from an intersectional outlook on planetary challenges (Collazo & Geli, 2017; Lozano & Figueredo, 2021), the culture of sustainability would be able to contribute to education for global and local development (Opertti, 2023) from the eco-social perspective (Bolarín et al., 2015; González et al., 2021).

6. Conclusions

The aim of this study is to establish whether secondary teachers' specialisms interfere in the incorporation of the sustainability focus in the classroom, which is confirmed. On the one hand, teachers tend to work on concepts that are aligned with their specialism, focussing on ones that are related to the environmental dimension, which prevents a holistic response to the social and planetary challenges facing society. Teacher training curricula should incorporate the focus on sustainability, so that graduating teachers can understand and comprehend societies as a whole, as well as leading their transformation. On the other hand, teachers incorporate the concepts through the key competences of the curriculum, thus responding in their professional practice to the curriculum structure proposed in the LOMLOE. However, the holistic character that the sustainability focus requires appears not to be facilitated. This underlines the need to go beyond the fragmented outlook in secondary teachers' initial and lifelong training, something that would lead to the promotion of a more cohesive education.

6.1. Limitations

Although this study meets its proposed aim, it could be limited by certain data not being collected, such as the participants' origin, precise age, and years of teaching experience.

Authors' contributions

María-Rosario Mendoza-Carretero: Conceptualisation; Data curation; Methodology; Writing (original draft).

Belén Sáenz-Rico-de-Santiago: Conceptualisation; Data curation; Methodology; Supervision; Writing (review and editing).

Artificial Intelligence (AI) Policy

The authors do not claim to have made use of Artificial Intelligence (AI) in the preparation of their articles.

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