



# Analysis of initiatives to promote education for sustainability and climate action in schools in Madrid and proposals for improvement

## *Análisis de iniciativas para fomentar la educación escolar para la sostenibilidad y la acción climática en Madrid y propuestas de mejora*

**Susana SASTRE-MERINO, PhD.** Associate Professor, Institute of Educational Sciences, Universidad Politécnica de Madrid (*susana.sastre@upm.es*).

**Cristine ZANAROTTI-PRESTES-ROSA.** Project Manager, Atelier itd (*cristinerosa@atelieritd.org*).

**Marvin-Josué IZAGUIRRES-BETANCOURTH.** Project Manager, Fundación ACOES (*mizaguir@ucm.es*).

### Abstract:

As a powerful tool for social change, education is one of the key transversal areas for promoting sustainability and addressing the climate emergency. This is reflected in international guidelines, such as the 2030 Agenda and the European GreenComp framework, and national guidelines, such as the current Spanish education law (LOMLOE). As a result, Spanish formal education has an opportunity to strengthen schools as strategic nodes for social change. However, there are several barriers that inhibit its true incorporation into the curriculum, such as teacher training and the lack of whole-school projects that address the topic, with many initiatives still being run on an occasional basis in isolation from the wider curriculum. To understand the external support available to schools for the integral incorporation of this approach, this study comprises a documentary analysis of the educational programs for sustainability and climate action offered by private, social, and public organisations in the city of Madrid. This analysis is complemented by a discussion group with relevant stakeholders from the ecosystem to assess the challenges and opportunities involved in promoting this approach. The results indicate that external organisations must adapt their offers to the new LOMLOE framework and support schools with training for teachers and management teams. They must also help schools implement programmes with a curricular and whole-school approach that is collaborative and contextualized. The entire educational community should be involved and the integration of these initiatives in public policies fostered.

**Keywords:** education for sustainability, education for climate change, climate action, educational initiatives, LOMLOE, whole school approach, teacher training.

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**Resumen:**

Como herramienta poderosa de cambio social, la educación representa uno de los ámbitos fundamentales y transversales para promover la sostenibilidad y abordar la emergencia climática. Ello queda reflejado en lineamientos internacionales, como la Agenda 2030 y el marco europeo GreenComp, y nacionales, como la actual ley de educación española (LOMLOE). La educación formal española cuenta, por tanto, con la oportunidad de fortalecer los centros educativos como nodos estratégicos para la transformación social. Sin embargo, varias barreras dificultan la verdadera incorporación en el currículo, como la formación del profesorado y la falta de proyectos integrales de centro que aborden la temática, por lo que predomina el carácter puntual y aislado de muchas iniciativas. A fin de conocer los apoyos externos con los que cuentan los centros educativos para incorporar este enfoque de forma integral, este estudio realiza un análisis documental de la oferta de programas educativos para la sostenibilidad y la acción climática con presencia en la ciudad de Madrid, desde el ámbito de organizaciones sociales y privadas y de organismos públicos. El análisis se complementa con un grupo de discusión con actores relevantes del ecosistema que valoran los retos y las oportunidades para favorecer este enfoque. Los resultados señalan que las organizaciones externas deben adaptar sus ofertas al nuevo marco de la LOMLOE, apoyar a los centros escolares con formación al profesorado y al equipo directivo, y promover la implementación de programas con un enfoque curricular e integral, colaborativo y contextualizado que involucre a toda la comunidad educativa y fomente la integración de estas iniciativas en las políticas públicas.

**Palabras clave:** educación para la sostenibilidad, educación para el cambio climático, acción climática, iniciativas educativas, LOMLOE, enfoque escolar integral, formación docente.

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## 1. The importance of a curricular and whole school approach in consolidating education for sustainability and climate action (Efs&CA)

The approach to sustainability and climate change (CC) is being addressed globally through various frameworks, most notably the 17 sustainable development goals (SDGs) of the United Nations' Agenda 2030 (United Nations, 2015). Education has an essential role in this agenda, specifically in goal 4, which calls for quality education, and in target 4.7, which promotes learning that is relevant to global citizenship and sustainable development.

UNESCO, as the United Nations body for education and culture, and other international organisations and States have drawn up directives to incorporate education for sustainable development (ESD) and climate action at a local level (Organización de las Naciones Unidas para la Educación la Ciencia y la Cultura [UNESCO], 2021; Education International, 2021). These directives identify the need to prioritise ESD in policies, in curricula, and in teacher training, as well as to transform schools and learning environments, and to use a science-based approach with a holistic focus. These tendencies are also found at a European level, where the Green Deal (European Commission, 2019) and the European Sustainability Competence Framework (GreenComp) (Bianchi et al., 2022) stress the importance of education to facilitate the transition towards a sustainable future, promoting competences such as critical and systems thinking, futures literacy, promoting nature, and individual, collective, and political action.

In the case of Spain, Organic Law 3/2020 Amending the Organic Education Law 2/2006 (LOMLOE, 2020) and the Action Plan for Environmental Education for Sustainability (PAEAS) 2021-2025 (MITECO et al., 2021) emphasise the integration of sustainability in the education system, promoting education that drives critical participation and the ecological transition.

This support should solve the issues identified by Benayas and Marcén (2019), who observed that in schools, one-off actions relating to environmental celebrations or activities in which a particular group participates are still more common than collective projects.

On these lines, Navarro-Díaz et al. (2020) note that the curricular approach is fundamental for fostering citizen involvement in CC topics. Incorporating the topic into the curriculum highlights its priority and legitimises it as knowledge for students and their families. The LOMLOE (2020) also underscores the need to promote capacities, values, and attitudes aligned with this approach, rather than merely focusing on knowledge, to pursue a fulfilling life and play an active role in resolving problems shared by people all over the world.

Although a major step has been taken in Spain's regulatory framework to consolidate EfS&CA, the challenge of incorporating it effectively in classrooms remains, for which various factors are relevant. Firstly, teacher training is one of the principal levers of change to incorporate these topics truly (Mulà & Tilbury, 2023). This training faces the challenge of overcoming certain barriers, as Oranga et al. (2023) note, specifically for the topic of CC: low levels of eco-literacy and scepticism of scientific evidence (relating to the abundance of erroneous information and disinformation about CC) and of the actions required from citizens.

In relation to eco-literacy, Gómez and Fontao (2022) note that pre-service secondary school teachers display differences in level of knowledge, training, experience, and positive perceptions of the SDGs depending on their specialities, and so fostering training and motivation in these topics in current and future educators is vital to make improvements in transdisciplinary socio-environmental education. Sáenz-Rico de Santiago et al. (2023) also identify the need for training for practising secondary school teachers. In view of this, various studies are being carried out and proposals are being made to improve initial teacher education and continuing training (Marcén et al., 2024; Mulà & Tilbury, 2023; Sáenz-Rico de Santiago et al., 2023).

The scepticism relates to the politicisation of the topic and the moral and behavioural challenges that are proposed as adaptation and mitigation measures. Oranga et al. (2023) note that disinformation makes a major contribution to public polarisation relating to the climate crisis and helps shape public attitudes towards climate science, something that hinders public participation in mitigation policies. In the case of pre-service teachers, Morote and Moreno (2022) also identify the problem of interpreting and critically evaluating information on social networks, which according to these authors is the principal medium of information from which pre-service teachers receive information about CC, and which can contain errors that must be detected.

Another relevant factor is the availability of textbooks with science-based content that address EfS&CA from a broad and global perspective as a complex system. As Serantes-Pazos and Meira-Carda (2016) observe, the content of these books is the most used resource by teachers in classrooms in Spain and they have a significant influence on students' construction of social representations because they are regarded as objective and scientific. Nonetheless, these authors note the need to take into account the fact that as textbooks are mediators of the accepted scientific culture through official curricula, they are vulnerable to the processes of social representation of the culture in question.

Some studies prior to the LOMLOE that analyse the treatment of CC in textbooks, note that its presence has been increasing (Navarro-Díaz et al., 2020), although they encounter that some aspects are absent or subject to reductionist focuses. In the case of secondary education, Navarro-Díaz et al. (2020, p. 957) find "deficiencies and absences [of] certain relevant causes, social and economic consequences, adaptation strategies, and strategies focussed on alternate socioeconomic models. These limitations are unhelpful for students' understanding of the climate crisis and their related actions". Future studies will consider in greater depth whether the new texts created since the LOMLOE have incorporated these topics in a more transdisciplinary way.

A whole-school focus to tackle EfS&CA is another of the relevant factors identified. Various studies have adopted the concept of a whole-school approach to sustainability (Hargis et al.,

2021; Tilbury & Galvin, 2022) or to climate change (Organización de las Naciones Unidas para la Educación la Ciencia y la Cultura [UNESCO], 2017) to refer to the involvement of the educational institution to incorporate sustainability and CC reduction measures into every aspect of school life, including school governance, teaching content and methodology, facilities management and functioning, and community partnerships. Section 121.1 of the LOMLOE echoes this and includes transversal coverage of sustainability in institutional educational projects.

To achieve this focus, it is fundamental that management teams assume active leadership in favour of sustainability, facilitating the transition to more humanistic educational models, sharing a clear vision of a sustainable future, and fostering innovative processes that promote sustainability in curricula (Sáenz-Rico de Santiago et al., 2023; López & Sánchez, 2023). This enables teachers to have a greater degree of knowledge of Agenda 2030 and better consciousness and awareness to promote sustainable development in the classroom.

As stated above, one aspect of the whole-school approach that transcends the curriculum is relations with the school's surroundings. This is another of the relevant factors for incorporating ESD into the curriculum, as stated in section 110 of the LOMLOE and in other studies (Sáenz-Rico de Santiago et al. 2023; López & Sánchez, 2023; Hargis et al., 2021; Tilbury & Galvin, 2022). Although teachers have to be trained in how to accompany students, and require science-based knowledge of the topic, the whole educational community must be conscious of the importance of ESD to achieve the multiplying effect of education (López & Sánchez, 2023) and transcend the classroom. This focus goes beyond knowledge transfer and promotes behavioural changes. As Allen and Crowley (2017) observe, behavioural changes are created when collective efficacy is fostered, in other words, the sense that one's own actions can have an impact when combined with those of one's community. This can be achieved by incorporating into students' learning experiences participation in activities from their surroundings, in relevant topics to each student, and interconnecting learnings across different subjects.

Relations with the surroundings can happen in the context of the school itself, through an exemplary infrastructure regarding measures relating to CC (Organización de las Naciones Unidas para la Educación la Ciencia y la Cultura [UNESCO], 2017), and through participation in the school's environmental management. The school, according to Benayas and Marcén (2019), should be a setting for ESD as long as the work is consistent with the methodology, the content, and the school's surroundings. Interactions can also take place within the community around the school and in a broader sense, as well as with other schools and networks of teachers (López & Sánchez, 2023). As for methodologies, relations with the surroundings can be favoured through techniques such as project-based learning and service learning (Marcén et al., 2024).

In view of the above, this study focusses on the city of Madrid and tries to answer the following research question "What aspects can enrich the different educational offers that promote EfS&CA at a curricular level throughout the different school levels?"

To answer this question, two research aims were proposed: (1) to describe and analyse the current offer of educational initiatives for fostering EfS&CA in the city of Madrid and (2) to identify the perception of the key stakeholders involved in EfS&CA initiatives about the current offer and its challenges and opportunities.

## 2. Methodology

### 2.1. Design

This study's methodology is framed within an interpretative paradigm, employing a qualitative approach. Specifically, a case study was selected to gain an in-depth understanding of the current offer of external initiatives to promote EfS&CA in schools in the city of Madrid, and to explore the perspectives on challenges and opportunities expressed by key stakeholders involved in these initiatives.

The geographical context is determined by the scope of the project in which the research is framed, defined with the funding body. Madrid is considered to be a demonstrator city for various innovative processes of urban change towards climate neutrality (Alméstár et al., 2022), and the body funds studies and actions to make these transitions fair. In this sense, improving EfS&CA could contribute to this mission.

The study has a sequential two-phase design. The first used documentary analysis to characterise the curriculum-based initiatives offered by external organisations to schools in Madrid. In the second, a discussion group contrasted the findings of the characterisation and debated about the related challenges and opportunities to advance an EfS&CA. The results of the first and second phases enabled the research team to identify and consolidate elements for enriching this offer.

## 2.2. Sample

In the first phase, characterising the offer, an initial process of exploration of initiatives was performed to establish a series of inclusion and exclusion criteria to shape the sample (Table 1). The fundamental criterion established on the basis of the bibliographic review was the curricular component. This focussed the sampling solely on programmes, resources, and initiatives, offered to schools in the city of Madrid, that are intended to work in line with the curriculum and connected to the study plans. Only initiatives from external organisations were selected owing to their scalability and the greater ease of access to information about their design.

TABLE 1. Inclusion criteria for characterising initiatives.

Criteria	Inclusion
Geographical scope	Presence in the city of Madrid
Connection to the curriculum	Initiatives with a link to the curriculum
Educational stage	Pre-university education
Promoter	Public, private, or social bodies external to the schools
Current availability	Active at the moment of the research
Source	Published online

Non-probability chain or network sampling was used (Hernández-Sampieri et al., 2014), as the initiatives were identified using the snowballing system starting from key actors already known to the researchers. Among the offer, 92 initiatives were identified of which 41 met the criteria for being systematised in accordance with Table 1.

The main ground for exclusion was that initiatives lacked a clear link with or intention to influence or be integrated in some way with the schools' study plans and curricula, despite being thematically related to sustainability or climate action. This would be the case of a programme that is dedicated to fostering more sustainable practices in the school dining room or that proposes renaturing the school's grounds but does not present a proposal to address this in the classroom as well. As a result, a varied sample of bodies and initiatives was obtained, which supports the relevance of the results and the representativity of the phenomenon studied. In the second phase, a discussion group was held using convenience sampling. To

provide different perspectives, 19 social organisations and from the public sector, identified as relevant actors in the ecosystem, were invited. Of the 19 organisations invited, 10 took part with a total of 11 people, as well as representatives of the research team of the “Clim-Action: Educational Alliance for Climate Action (Clim-Acción)” project, of which this study forms part. The participants comprised six women and five men, representing three public organisations (council, autonomous region, and university), three foundations from the educational sector with extensive experience in the subject, one representative of an Erasmus+ European educational project, and three organisations that represent social networks or laboratories relating to climate action. The different profiles present a diversity of perspectives, increasing the credibility of the study.

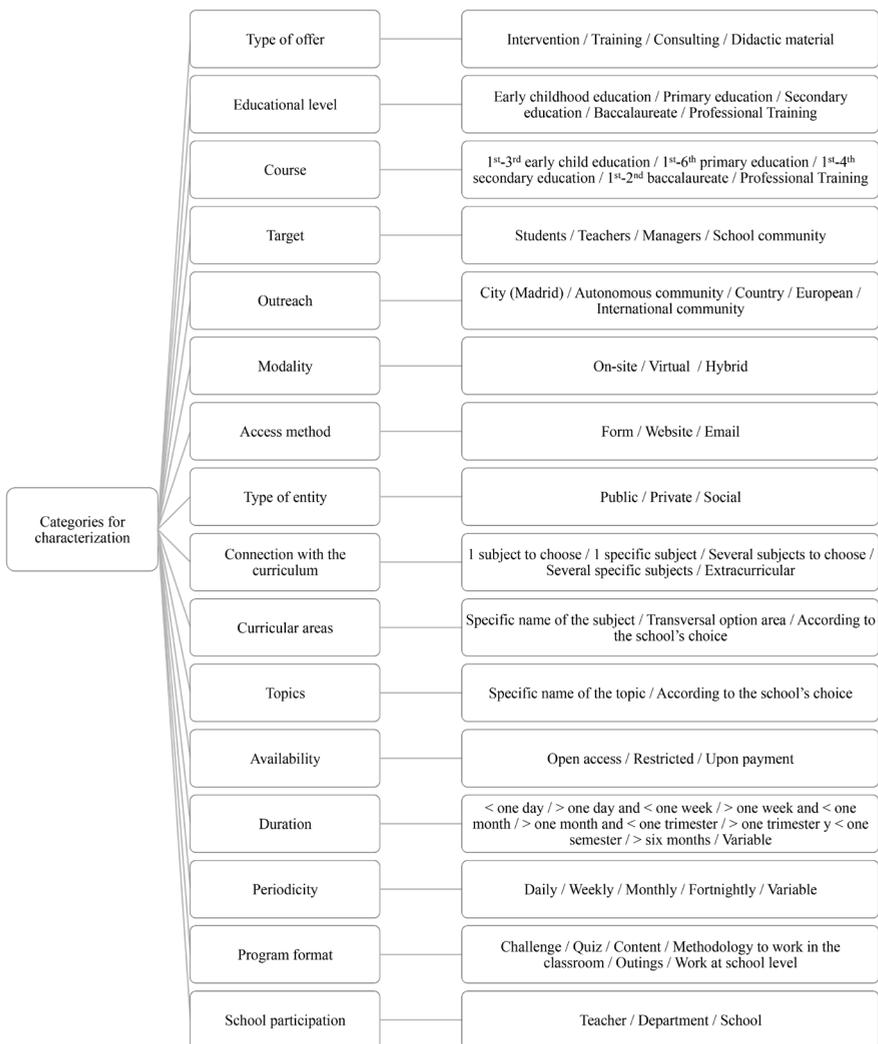
### 2.3. Instruments

A content analysis sheet was designed through an inductive process to characterise each initiative. The initial focus of the research was to identify the offers labelled as intervention programmes, but the sampling process identified the need to recognise the existence of a range of offers and to expand the categorisation of the offer. Therefore, a principal category relating to the type of educational offer was defined (Table 2). This was subsequently supplemented with other categories and subcategories to complete the coding (Figure 1).

TABLE 2. Principal category for characterisation of initiatives.

Tipo de oferta	Descripción
Didactic materials	Didactic guides and resources (learning situations, content, methodologies, etc.) created for the specific purpose of supporting the incorporation of sustainability and climate action into teaching and learning in the classroom. Given the profusion of materials, the organisations or programmes that offer this type of resources are categorised, many of which offer collections of materials, and not each separate material.
Intervention programmes	These involve implementing activities to cover content, methodologies, or educational actions with a specific objective. They can be provided directly (implemented by the offering organisation) or tutored (facilitating implementation by the school stakeholders themselves, e.g. teachers). These can include training activities and have supporting didactic materials.
Training	Training programmes solely for school management and teachers on how to incorporate sustainability in the classroom. Generic training about sustainability or CC that does not display a clear link with teaching or the educational context was not included.
Guidance	Personalised orientation based on an integral analysis of the situation of the school, including the curricular area.

FIGURE 1. Content analysis sheet with categories and subcategories for characterising initiatives.



As for the discussion group, this was structured using a four-stage script:

1. Introduction of the project framework and participants.
2. Presentation of the repository of characterised initiatives and its results.
3. Individual work and work in two groups to discuss the guiding question, designed in accordance with the research question: “Considering your experience and the results shown in the repository, what opportunities, possible synergies, challenges and needs do we identify for education aimed at climate action and sustainability?”. The two groups were formed to give the maximum possible heterogeneity and the moderators previously agreed on the procedures of the dynamic and data collection to be homogeneous and avoid biases.
4. Plenary.

## 2.4. Procedure

### 2.4.1. Data collection

In the first phase, the following data collection stages were established:

1. Defining initial inclusion and exclusion criteria, in accordance with the theoretical framework and the research question.
2. Exploratory and inductive process of initial review of key initiatives in the city of Madrid in order to define a code book with the principal category (type of offer) and secondary categories (rest of Figure 1) and subcategories. This was done by two researchers and was subsequently reviewed by another researcher from the team to validate the categories and their descriptions and discuss possible biases.
3. Coding by means of documentary analysis of the websites of the programmes and analysis to categorise them. This process was carried out by two researchers and then meetings were held with the whole research team to validate the results.
4. External verification of the characterisation of each initiative. We asked the promoter organisations of the 41 initiatives, either solely by post or by post and telephone, to review the content of the sheets. Responses were obtained from 27 of them, representing two thirds of the sample, with general agreement on the categorisation carried out on the type of offer and only some minor comments on other categories. This process made it possible to reinforce the credibility of the systematised data.
5. Expansion of the sample by snowballing.

After the repository had been published and its initial data had been consolidated, an in-person discussion group with the name “The state of the art of educational initiatives for the climate” was held on 25 October 2023. The aim was to analyse the results obtained in the documentary phase and answer the research question from the perspective of the organisations. In line with the script for the discussion group, the results of the repository were presented and the guiding question on challenges and opportunities was asked. The participants wrote their answers individually on sticky notes and then were divided into two groups, each moderated by two researchers. During the group debates, the research team also collected the group interventions on pieces of paper, at all times asking the group to confirm the fidelity of the ideas written. All of the written material was collected for analysis, along with notes and summaries done by the research team.

### 2.4.2. Data analysis

Once the sample of initiatives had been saturated by the snowballing procedure, a comprehensive analysis of the offer as a whole was performed, by calculating the frequencies of the categories and subcategories identified. Given the initial interest in intervention programmes owing to their practical component, a more detailed analysis of this type of offer was performed.

As for the discussion group, the summaries and written material were processed through manual content analysis by two experts who summarised the information on concept maps to extract the main conclusions. The experts subsequently reached agreement on these conclusions. To ensure impartiality in the analysis, all data were treated as equally relevant.

## 3. Results

### 3.1. Characterisation of educational initiatives for sustainability and climate action in the city of Madrid

The result of the sampling and characterisation of the offer of EfS&CA programmes was organised in a repository open to public consultation (Repositorio Clim-Acción, 2023). This

can be accessed in a database format, which allows the use of a search tool and filtration by categories, and a detailed sheet for each initiative can also be accessed.

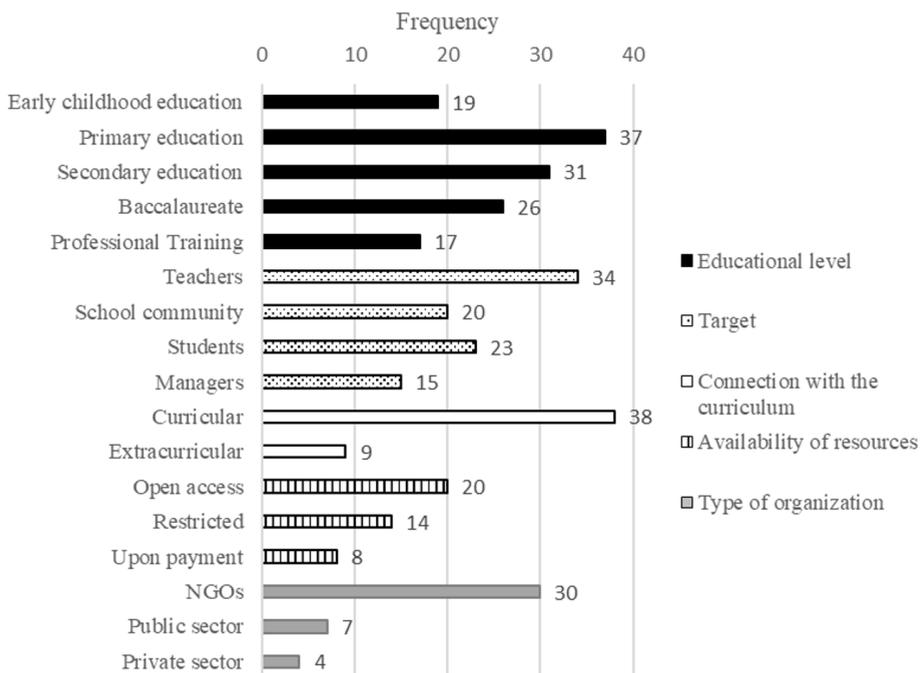
Figure 2 shows the results from several categories of analysis. As of 17 June 2024, the largest offer of the 41 initiatives systematised relates to didactic materials (44%). However, as has been mentioned, this represents the existence of far more didactic material, given that the project focussed on identifying organisations or programmes that offer these resources and not on systematising each of the existing contents. In fact, many initiatives provide a collection of didactic materials.

Intervention programmes are the second most offered category (31%), followed by training (20%), and guidance programmes (5%). Considering all the initiatives, most are offered by NGOs (73%). The public sector offers 17% of the initiatives and the private sector 10%.

Most of the resources (81%) are free to access, with 20% being open access, and 14% restricted (for example, they require signing up). Only 8 require payment. One organisation offers both paid resources and free access ones.

In relation to educational level, most offers are aimed at primary education, followed by secondary and baccalaureate. There are fewer offers for early childhood education and professional training. Some initiatives cover more than one level with the same programme or resource.

FIGURE 2. Characterisation of the offer of Efs&CA initiatives with a curricular approach in the city of Madrid by educational level, audience, connection to the curriculum, availability of resources, and type of organisation.



Note: some programmes cover more than one category, and so the data in each category will not always add up to the total number of programmes listed.

Most of the initiatives are aimed at teachers with fewer aimed at managers. And they present a proposal that is primarily for the obligatory curriculum rather than extracurricular activities.

The main topics offered include sustainable development, environmental protection, responsible consumption, sustainable development goals, food, and renaturing. These topics encompass other more specific ones, such as the climate, although this one does not particularly stand out, indicating the opportunity to address CC more directly.

The characteristics of the intervention programmes are different. Of the 13 initiatives mapped, 6 are offered by NGOs, 6 by the public administration, and 1 by the private sector. More than half (7) are specifically offered for the city of Madrid. The others comprise 1 international programme, 1 at the autonomous region level, and 4 nationwide programmes. Regarding form of access, most are free (85%) but with access restricted, given that they require participation by invitation, registration, or a specific agreement about the implementation of the programme.

In relation to educational level, most of the offers are also aimed at primary (12), followed by secondary (10). However, the trend then changes, as early years education is in third place (7), followed by baccalaureate (6) and professional training (5). Equally, some programmes cover more than one level with the same initiative. Most of the programmes offer a specific plan (85%), and two programmes permit some choice of topic.

Most of the initiatives are aimed at students (12), although some also involve or are aimed at teachers (10). Slightly less than half (6) involve the management team and the school community (5). The fact that students are the principal target audience, and that not all of these programmes explicitly involve teachers indicates that some of these programmes directly implement the initiatives with an external team, without actively implicating or training teachers. Furthermore, less than half (46%) involve the management team.

Regarding their continuity, it was also observed that these programmes are constrained by funding, which is often sporadic or short-term. To cope with intermittent funding, many organisations systematise their intervention programmes on websites or in didactic guides to inspire and support schools' ability to implement the programmes independently, thus turning the intervention programme into a didactic resource.

Finally, it has not been possible to identify the extent to which different initiatives are evaluated in relation to their results and their transformational potential. The sampling of educational initiatives and contact with the respective organisations suggest limited or non-existent follow-up and evaluation.

### **3.2. Key stakeholders' perception of the current educational offer and its challenges and opportunities**

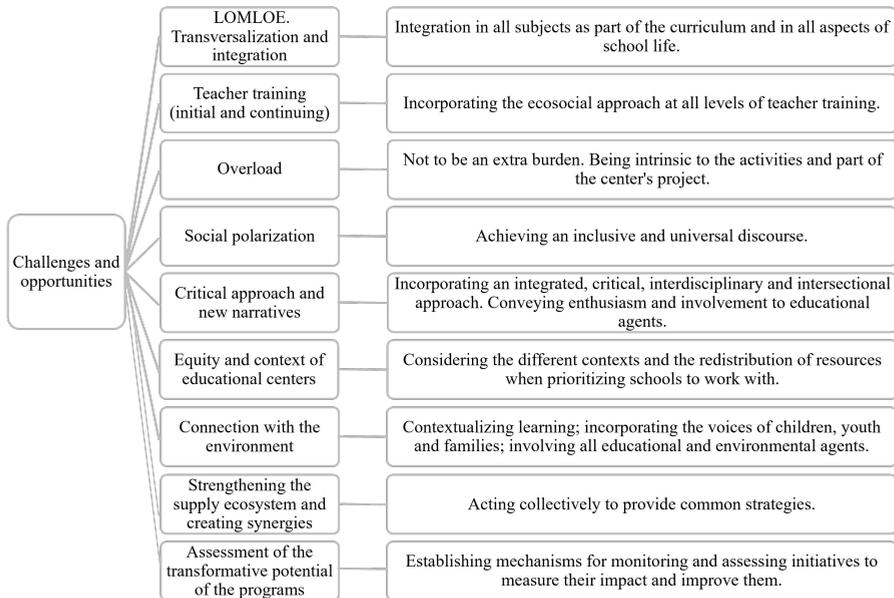
In relation to the results presented on the characterisation of educational initiatives for sustainability and climate action in the city of Madrid, the discussion group (DG) stated that "what has been said represents educational reality well" and expressed surprise about the "multitude of initiatives". There was consensus on the value of this resource because of "all of the information it contains" and recognition of "the wide repertory contained in the repository, its classification and systematisation".

Thereafter, the group identified challenges and opportunities for strengthening EfS&CA in schools. Figure 3 summarises the principal topics covered and agreed in the workshop and descriptions of them.

The DG recognised the LOMLOE as one of the principal current opportunities for EfS&CA in the Spanish context, and as well as being an opportunity it is a mandate, which as such requires "adaptation to regulations", as various participants noted. Similarly, the whole group recognised that to ensure appropriate compliance with the LOMLOE, suitable training and accompaniment must be provided for teaching and management teams. On this line, they identified a need to promote «methodological integration that cross-cuts the content and does not make teachers feel it is an additional burden». They observed that the above is fundamental

both “to make [Efs&CA] reach students as a topic that they will frequently encounter in daily life”, and so that “teachers do not feel burdened in the application of programmes”. This is even more relevant given the acknowledged current situation of «increasing saturation (bureaucracy and emotional instability)» of teachers, which the DG identified as a significant problem that must be considered when proposing new programmes.

FIGURE 3. Challenges and opportunities of Efs&CA detected in the discussion group.



As well as support for making Efs&CA transversal, the DG identified other challenges to address through training and other types of educational offer. Firstly, they shared the perception that teachers usually have “less knowledge than they believe”. Secondly, it was noted that the current discourse on sustainability is presented in a worn-out and politicised way and has become “boring” for students. Social polarisation is already apparent in classrooms and represents a further challenge for teachers, including for their emotional state.

However, some members of the DG suggested that the context of the climate emergency, with increasingly palpable evidence recognised by society, is an opportunity for Efs&CA to have greater acceptance among different ideological strands. Consequently, the topic can generate ever more receptivity and at the same time be more attractive than the notion of sustainability itself.

Therefore, all the participants underlined the need for Efs&CA training to be addressed from an interdisciplinary perspective and to be capable of prompting empowerment and action, of “inspiring enthusiasm or engagement” among educational stakeholders through new narratives that are more positive, inclusive, and universal. Some stakeholders placed more emphasis on the need to evade superficialities and reductionism and promote more intersectional and critical reflection on the structural causes of and interrelation between environmental and socio-economic problems, transcending individual responsibility.

With regards to how to enrich the programmes and materials, the discussion group emphasised two aspects. On the one hand, a need for organisations to consider “different educational contexts (socio-economic, ethnic-racial segregation)” and for the redistribution of resources when prioritising which schools to work with. And on the other, a need to contextualise learning and to connect it with the surroundings. To do so, the importance of

“mapping, incorporating, and informing any strategy from the voices of learners (children, adolescents, young people, and families)” and involving all educational stakeholders and the ones from the surrounding community was identified. Programmes would also be strengthened if they promoted relationships and exchange among schools by “involving most of the educational community, so that the neighbourhood community knows about the school’s climate action initiatives” and promoting the “collective of schools working towards shared objectives”.

Interchange between organisations that offer educational initiatives was also identified as an opportunity to reinforce the ecosystem of stakeholders, acting “collectively to increase shared strategic topics” and achieving greater connection and creation of synergies. The group therefore affirmed the importance of “meetings like this one” and recognised that “there are nodes of will and interest (multiple initiatives) that have already been created” and that it is necessary to “take advantage of them”.

Finally, the discussion group confirmed what the research team had identified regarding the absence of adequate follow-up and evaluation mechanisms by the programmes.

## 4. Discussion

The process of developing the repository and cross-checking the results with stakeholders has facilitated the organisation of the offer and provided an overview of educational initiatives and resources, currently offered in Madrid by external organisations, to support schools in their task of educating for climate action and sustainability (research aim 1).

These results, combined with the different perspectives provided by stakeholders from the EfS&CA ecosystem in the city (research aim 2), has made it possible to identify the main challenges and opportunities for educating in favour of EfS&CA in curricular contexts. Particularly to indicate which aspects can enrich the different educational offers at a curriculum level from these external stakeholders to promote EfS&CA throughout the different levels of education, responding to the central question of this research.

Firstly, in relation to the type of educational offer and how it is accessed, it has been found that didactic materials that are free to access are the most available resource type. These can contribute to teachers’ eco-literacy and support the available text books. In this sense, by consolidating the sources of these materials into a standardised and accessible tool, the repository seeks to meet one of the challenges that faces teachers, which is the spread of this type of material.

However, in isolation these resources are not usually sufficient to produce a change of attitude. While a variety of curriculum resources are available, they require interest and prior training or support to enable generic materials to be turned into ones that are more contextualised and relevant for teachers and students, thus increasing collective efficacy, according to Allen and Crowley (2017).

Intervention programmes seek to fill this gap through their practical component. This is especially true if they are tutored, facilitating implementation of the programme by the educational stakeholders themselves, especially teachers. However, it has previously been identified that not all of these initiatives do so and that less than half involve school management teams.

This prevents teachers and management teams from being key players in the initiative, hindering their ability to integrate and to give continuity to the programme. This is an especially relevant point because the sampling has identified that one of the greatest challenges of the intervention programmes relates to their continuity and their potential to be integrated as a whole-school project (and not as a one-off activity or an activity of one particular teacher).

Another challenge relates to openness to co-creation and adaptation. Many proposals feature closed projects, but it has been found that it is crucial to prioritise programmes that can adapt to the specific context of the institution and actively involve educational stakeholders.

Giving school stakeholders a central role is fundamental for permanently incorporating context-based classroom activities that drive behavioural change among students. Behavioural change is closely tied to the emotional impact of the topic and the methods used to address it, as noted by González-Muñoz et al. (2024). Intervention programmes should provide teachers with training and practical demonstrations of strategies that foster deep learning, such as cognitive conflicts, critical analyses of controversial situations, or creative processes (Bengston et al., 2024; Pérez-Bueno et al., 2024).

Another limitation of the current offerings lies in the lack of oversight regarding their use and the evaluation of their quality. The repository does not include an evaluation of the content of the resources provided and there is no evidence of external evaluations or reviews conducted by the offering organisations themselves on their materials and initiatives. Establishing monitoring and evaluation mechanisms is essential for promoting continuous improvement and creating truly impactful and transformative initiatives. Adequate evaluation would also support educational stakeholders in selecting the most suitable existing initiatives.

The lack of evaluation becomes particularly significant given that other studies highlight absences and reductionist approaches in the treatment of climate change within textbooks, which hinders understanding and action regarding the climate crisis (Navarro-Díaz et al., 2020). This point, which was also emphasised by the discussion group, underlines the need for these resources to avoid superficiality and instead be approached from an integral, interdisciplinary, intersectional, and critical perspective. They should aim to inspire empowerment and action. These impressions of the stakeholders align with the findings of Mulà et al. (2022).

Given that teacher training in these fields remains insufficient (Gómez & Fontao, 2022; Sáenz-Rico de Santiago et al., 2023), this hinders interest, appropriate selection, and effective use of such resources. This again reinforces the imperative for greater efforts for quality initial education and continuing training relating to EfS&CA (Mulà & Tilbury, 2023). Therefore, it is recommended that the key aspects of CC and sustainability be integrated into teacher training all over the world alongside policies aimed at addressing scepticism and misinformation about climate change facts (Oranga et al., 2023). Those in charge of designing training at different levels could benefit from the accumulated knowledge of organisations specializing in this field. Similarly, there is also an opportunity for organisations to strengthen the educational component of their offerings, such as intervention programs. This opportunity is boosted by the context of Spain's new education law, which offers a legislative framework that facilitates and promotes EfS&CA, as Gavari-Starkie et al. (2021) note, while at the same time generating a need for training and backing for teachers and managers to comply with it (Marcén et al., 2024).

The need to consider training, programs, educational actions and materials with new, more critical, in-depth and attractive approaches and narratives is also reinforced. The discussion group underlined the need to move beyond individual responsibility and foster a more critical reflection on the structural causes and interconnectedness of environmental and socioeconomic issues. These topics should be approached critically and scientifically (Education International, 2021), but without resorting to catastrophic narratives. It is necessary to confront polarisation by creating an inclusive discourse that avoids associating sustainability and climate action with specific ideologies or political parties, focusing instead on their universal nature. At the same time, it is necessary to inspire imagination and collective construction of more desirable futures, capable of generating enthusiasm and commitment among educational stakeholders. This perspective is also highlighted by the European Commission (Bianchi et al., 2022).

Among the new approaches to EfS&CA, the emphasis on experiential and everyday learning stands out. In this sense, connecting the classroom with its broader school environment and community is essential (Sáenz-Rico de Santiago et al. 2023; López & Sánchez, 2023; Hargis et al., 2021; Tilbury & Galvin, 2022) as it makes learning meaningful and encourages students to become active change agents.

The importance of working in a way that is consistent with the methodology, content, and school environment (Benayas & Marcén, 2019) was previously identified, and also underlined

by the discussion group. This connection is strengthened when the initiatives incorporate the voices of the educational community and when the EfS&CA actions promoted by the school are also linked to a broader, real-world context. For example, these actions can connect to other schools, or the climate agenda and the public policies of cities or regions. In addition to representing a pedagogical improvement, this enables the school to contribute to a broader transformation by strengthening the social fabric and acting as a node for transformation of its surrounding environment.

All of the above is only possible if management and teaching teams assume an active leadership role in favour of more humanistic and innovative educational models, sharing a clear vision of a sustainable future (Sáenz-Rico de Santiago et al. 2023; López & Sánchez, 2023). In this sense, guidance, although it is the least commonly offered type of support (5%), can add significant value, as they aim to engage school management team and adapt more closely to the realities of the schools.

## 5. Conclusions

Given the opportunity and challenges that Spain's new education law provides to consolidate EfS&CA at a curricular level, this study focussed on two aims. First, to analyse the educational offer with a curricular focus from external organisations that support schools. And secondly, to analyse challenges and opportunities from this offer, jointly with organisations from this ecosystem, to identify elements for improving the offer. The curricular focus is considered essential for fostering citizen engagement, making visible and legitimising the precedence given to sustainability and climate action, and achieving a whole-school approach. Recommendations for organisations that want to enrich their actions and resources to support schools on their journey towards EfS&CA are given below.

To start, some of the programmes offered were not designed within the framework of the new education law. Accordingly, one challenge and opportunity for organisations is to be able to contribute to schools, both through new resources that help with adaptation to the new law and by modifying pre-existing programmes and resources to the new context. This would facilitate the work of teachers and management teams and increase the appeal of these materials, initiatives, and services.

Moreover, there is a clear need for training for teachers and management teams as this is one of the principal levers of change to truly make this focus permeate schools. Therefore, training organisations and institutions can and must assume an active role to facilitate ownership of new approaches, methodologies, and contents. It is recommended that any action that seeks to promote EfS&CA presents a clear contribution to the curriculum and to classroom work through learning situations and schools' pedagogical projects. Also, work with tangible elements and demonstrative and applied experiences should be fostered whenever possible. Furthermore, initiatives and training should also support a more integrated collective vision of school life, avoiding individual-teacher focuses and supporting EfS&CA reaching the whole educational community, connecting schools with their neighbourhood, territory, or city, and acting as nodes for change in their surroundings. In this sense, designing actions and strategies to support and involve management teams is essential and offers of guidance can be a good complement to the other types of offer, owing to their more personalised and contextualised character, but also the processes of listening to the voices and perspectives of learners, educational stakeholders, families, and the community, to incorporate them into whole-school projects.

Another challenge for organisations, as has been observed, is the incorporation of systems for evaluating programmes and assessing whether they reach schools in a contextualised and equitable way. This is also a relevant point for the organisations that fund the programmes. Their role is essential for promoting innovation and generating model experiences, but they often centre on occasional investments that do not make it possible to generate experiences at a sufficient scale, nor do they allow adequate evaluation of impacts, which require longer time

frames. Among the impacts of the transformational capacity of these initiatives, the potential to integrate initiatives in schools and in public policies must be considered.

In addition, the overview that the repository permits can facilitate cross learning between organisations, which can take other actions into account as an input to improve programmes and even strengthen collaborative work and work in partnership. Work on EfS&CA in Madrid is already well established, so there are consolidated programmes and expert and experienced knowledge that can be used to boost the current offer and have an impact on public policies. Similarly, in line with the proposals of Oranga et al. (2023), broad coordination of the efforts of stakeholders is recommended (private sector, government, universities and training and research centres, members of the community, families and civil society) to promote EfS&CA, as well as the adoption of a transformational learning that results in a change of perspective and behaviour.

The study has some limitations, which at the same time suggest future lines of research. Firstly, organisations' dependence on funding to keep their initiatives active means that their stability over time varies, and so the repository is a living concept and constantly under construction. As a result, we have not taken into account the historical path and antecedents of the initiatives, but instead only their availability at the moment of the study.

Moreover, the scope of these initiatives with regards to the number of beneficiaries, the type of schools involved, and the short, medium, and long-term impact of each type of action was not evaluated. This information, along with a quantitative focus, would complete the analysis and show relations between variables that enable improved decision making about how to reinforce initiatives, which ones are most suitable for promoting EfS&CA, and even establishing inferences with independent variables such as the type of initiative (public, private, social) or the degree of dependence or autonomy of the teachers when implementing the educational interventions.

Finally, although the discussion group featured a variety of perspectives, it did not contemplate all of the diversity in relation to the initiatives offered, as private-sector voices were not included, and so the study could be complemented with more voices from other entities. Furthermore, this study's focus, centred on the perspective of organisations with initiatives, only represents a vision of the offer, which must be complemented by the perspectives of schools, teachers, and students, given that they face varied challenges and they also develop their own proposals and resources. Obtaining an overview of the initiatives that schools develop is a potent source of inspiration to other schools because they show initiatives tested by their peers.

There is an opportunity to foster communication and interchange between peers (teachers, management teams, and inter-school), an aspect that can be reinforced by public and private organisations. Indeed, the repository shows some pre-existing examples, such as the case of the *Tiempo de actuar [Time to act]* blog (FUHEM, n. d.). These networks, as Fernández and Gutiérrez (2014) and Sáenz-Rico de Santiago et al. (2023) observe, can foster the creation or strengthening of inter-school collaboration networks with a vocation to grow and project themselves towards state and international networks. In these spaces, schools could interact with external organisations to enrich the debate and progress in the incorporation of EfS&CA at a curricular level and with a whole-school approach, so as to increase its impact as a driver of social transformation.

The recommendations made in this study show some ways to enrich EfS&CA initiatives in the city of Madrid, but they can also be extrapolated to other contexts, given that the common national context put in place by Spain's new education law and the challenges identified in the bibliographic review are similar across different geographic areas.

## Note

<sup>1</sup> The repository will continue to be updated until the end of the project if the team identifies new initiatives. Accordingly, the figures might be updated.

## Authors' contributions

**Susana Sastre-Merino:** Conceptualization; Data curation; Formal analysis; Funding acquisition; Methodology, Writing (original draft); Writing (review and editing).

**Cristine Zanarotti-Prestes-Rosa:** Conceptualization; Research; Writing (original draft); Writing (review and editing).

**Marvin-Josué Izaguirres-Betancourth:** Data curation; Research; Writing (original draft).

## 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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## Authors' biographies

**Susana Sastre-Merino.** Doctor of Engineering and associate professor at the Instituto de Ciencias de la Educación (ICE) at the Universidad Politécnica de Madrid (UPM). Her teaching

focuses principally on teacher training. She is a member of the ForPROFE research group and the EduCyT educational innovation group. Her research interests centre on teacher training, teacher competences, and education for sustainable development. She currently coordinates the Erasmus+ “Open and collaborative mapping for pupils-led projects in Secondary Schools through innovative teaching methodology and fostering STEAM education and environmental engagement (EUthMappers)” project and also the Clim-Action: educational alliance for climate action project (with Fundación Montemadrid, itdUPM, and Atelier itd). She is the author of more than 15 articles in impact journals and more than 30 papers at national and international conferences.

 <https://orcid.org/0000-0001-9511-3793>

**Cristine Zanarotti-Prestes-Rosa.** Master's in Development Strategies and Technologies from the Universidad Complutense and the Universidad Politécnica de Madrid. Master's in Sustainability Management and a Bachelor's degree in Public Administration from the Fundação Getúlio Vargas, Brazil. She has completed an international exchange at the University of Texas at Austin and has specialised in process facilitation and social innovation. She is currently a project manager at Atelier itd, a foundation that designs and facilitates contexts for collaboration to encourage fair transitions towards sustainability, including projects in the educational sphere, where she coordinates the “Clim-Action: educational alliance for climate action” project (with Fundación Montemadrid, ICE-UPM, and itdUPM). She has more than fifteen years' experience in social and private organisations, in which she has collaborated closely with universities such as Harvard University, Columbia University, IE University, and the Universidad Politécnica de Madrid.

 <https://orcid.org/0000-0001-5641-4155>

**Marvin Josué Izaguirres-Betancourth.** Primary school teacher. Qualified educationalist from the Universidad Nacional Autónoma de Honduras (UNAH) and development project specialist. Master's in Development Strategies and Technologies from the Universidad Complutense and the Universidad Politécnica de Madrid. He also has training in youth leadership and formulation and management of social projects from the Universidad Tecnológica Centroamericana (UNITEC). He has worked as a specialist on educational projects for the Fundación Acoes in Honduras, and as a trainer in social programmes with Real Ledge Honduras. He is part of the “Clim-Action: educational alliance for climate action” project promoted by the ICE-UPM, itdUPM, Atelier itd and Fundación Montemadrid.

 <https://orcid.org/0009-0009-9453-3089>