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Systematic Review of Factors Limiting the Integration of SDG 15 into the Primary School Curriculum

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ABSTRACT

The integration of SDG 15 in the curriculum of primary schools is limited by some structural obstacles that have not yet been discussed thoroughly in the recent academic literature on the topic. This systematic review will discuss the structural barriers impeding its implementation from the educational perspective around the world, considering all these barriers as an interconnected system of constraints. This systematic review employs the PRISMA methodology and uses a systematic search of academic literature in the relevant specialized databases for the period from 2022 to 2026. In this way, the inclusion criterion was relevance to the topics of interest. As a result, it has become clear that there are three interdependent structural barriers limiting the implementation of SDG 15 at the global level concerning the curricular and pedagogical dimensions: the lack of teachers' preparation needed for the implementation of pedagogical techniques for the achievement of the SDGs; the lack of awareness of educational establishments about the sustainability-related regulatory frameworks; and the presence of the cognitive digital divide as the barrier to traditional pedagogical practices. Differently from the other research related to these barriers, this one considers all of them as the part of the system where integrated curricular solutions are needed.

Keywords: *SDG 15, School curriculum, Elementary education, Teacher training*

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INTRODUCTION

The rapid loss of biological variety in terrestrial ecosystems is one of the most pressing issues of our day. SDG 15, which deals with terrestrial ecosystems, addresses the issue by establishing some targets for conservation, restoration, and sustainable use of terrestrial ecosystems; however, several systematic barriers stand in the way of achieving the goal, as by the end of 2024, a significant portion of the indicators that show the state of this goal were moving in the wrong direction, away from achieving it (Arora & Mishra, 2024). The mismatch between worldwide environmental policy and the actual condition of affairs emphasizes the need to create solutions that would alleviate not only environmental problems but also extend beyond the environment into the area of formal education.

Education for Sustainable Development (ESD) is a vital instrument for achieving SDG 15 at the early stages of schooling. At this point, the training of teachers is crucial, as teachers serve as an important tool in advocacy for knowledge about sustainability (Khalid *et al*., 2023). Yet, the research shows that there is a notable lack of training of teachers on ESD, which leads to their inability to implement ESD in their work. The research conducted by Chang Rundgren and Yamada (2023) proves that teachers trained in ESD face seven times fewer barriers to the implementation of ESD than teachers who have not been through such training. Nevertheless, there is a gap in knowledge about the barriers to the implementation of ESD, taking into account the digital divide.

The findings in this fragmentation analysis are of great importance to the literature. Through the systematic review of pedagogical practices in environmental education between 2015 and 2024, it has been established that textbook-based and teacher-led education is still common, even when technology can be used in its delivery, besides the scarcity of research conducted within the context of elementary education (Ardoin *et al*., 2026). Hence, it is not known why such curriculum barriers still exist despite policies meant to integrate the SDGs. The central research question is: What are the barriers to the incorporation of SDG 15 in the elementary education curriculum?

Considering these barriers within the context of an interactive system creates an integrated solution to the problem, which has not yet been considered in existing literature. While different studies have pointed out a lack of teacher training (Parry & Metzger, 2023), a lack of knowledge of sustainability

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frameworks (Khalid *et al*., 2023), and problems in the process of teacher education (Dittrich, 2024), no study has analyzed all of these barriers in relation to the problem of the cognitive digital deficit. The information collected in this study will assist in taking evidence-based decisions regarding these barriers.

The objective of this systematic review is to investigate the barriers to the implementation of SDG 15 into the elementary school curriculum with the use of the systematic structuring of mutually conditioned variables as the measure of its effect. It is obvious that there is a need to estimate the level of teacher preparedness concerning the topics covered by SDG 15; the significance of the digital cognitive divide for its educational role; and the implications of this interaction for pedagogy.

Theoretical framework

The theoretical framework of the study is grounded on three main fields that constitute the basis of the theoretical framework of this study: environmental stewardship with regard to the SDG 15 and the connection between environmental stewardship and sustainability; environmental conservation as part of primary education; and educational project management. This area of study will add to the development of a suitable theoretical framework for the study of how SDG 15 can be implemented in practice by means of the application of teaching methods.

SDG 15 and its focus on education for the conservation of the natural environment

Sustainable Development Goal 15 entails the conservation, restoration, and sustainable management of terrestrial ecosystems; sustainable forest management; and combating desertification, land degradation, and biodiversity loss (United Nations, 2015). Nevertheless, in addition to necessitating policy interventions for the environment, there is a need for a paradigm shift in the manner in which society educates itself regarding the interdependence between the people and the environment. From this perspective, schools are the places in which an ecological conscience that is both proactive and responsible may be nurtured at an early age (UNESCO, 2024).

It is thus safe to conclude that education for sustainable development (ESD) is the most appropriate educational method in meeting the criteria set by SDG 15. ESD ensures that teachers are well versed in the intricate link between concepts such as climate change, biodiversity, natural disaster risk reduction, and sustainability, giving them the necessary skills to develop an environment that is sustainable and integrated economically and socially (UNESCO, 2024). From this perspective, ESD is more than just an educational process whereby knowledge is passed to learners; it is also a participatory and attitudinal process involving terrestrial ecosystems.

Sustainable education implies the modification of the curriculum to solve the difficulties created by the ecological transition, advocating the development of interdisciplinary learning as well as participative and investigative teaching techniques, and instilling in learners a particular set of values including the sense of responsibility in decision-making in order to develop an environmental ethos among learners (Traversa-Tejero & González, 2022). This approach implies overcoming the paradigm of disciplines that restricted environmental education to the sphere of natural sciences, developing the cross-curriculum approach that includes all disciplines associated with taking care of nature.

The inclusion of SDG 15 at the stage of elementary basic education is especially important in this regard since elementary education plays an especially important role in forming the environmentally oriented thinking of children. The recent research demonstrates that environmental knowledge is influential when it comes to the attitude to the protection of nature among pupils; moreover, activities outdoors and ecological storytelling help people feel themselves as a part of nature and, thus, develop ecologically (Kosta *et al*., 2022). At the same time, it has been demonstrated that environmental education in elementary schools needs improved teacher training and institution projects, which will attract more pupils (Bogarin Sevillano, 2023).

Around the globe, only 47% of nations have made provisions for integrating climate and environmental education into their education curriculum, which demonstrates how ineffective the process of implementing education for sustainability is within the education system (UNESCO, 2024). Therefore, it is evident that integrating SDG 15 into the elementary curriculum has not been a common practice due to the hindrances involved.

Environmental conservation in elementary education

The integration of environmental conservation into the curriculum at the elementary level is crucial in instilling environmental awareness at an early stage. Environmental literacy can be said to be the combination of the knowledge, skills, and attitudes that are required for comprehending the relationship between human beings and their surroundings, along with actively engaging in the resolution of environmental issues (Sanchez *et al*., 2025). The integration of environmental conservation into school curricula requires the incorporation of a number of components **(Figure 1)** that not only contribute toward developing the understanding of the students about natural systems but also instill within them a sense of commitment toward the conservation of the environment.

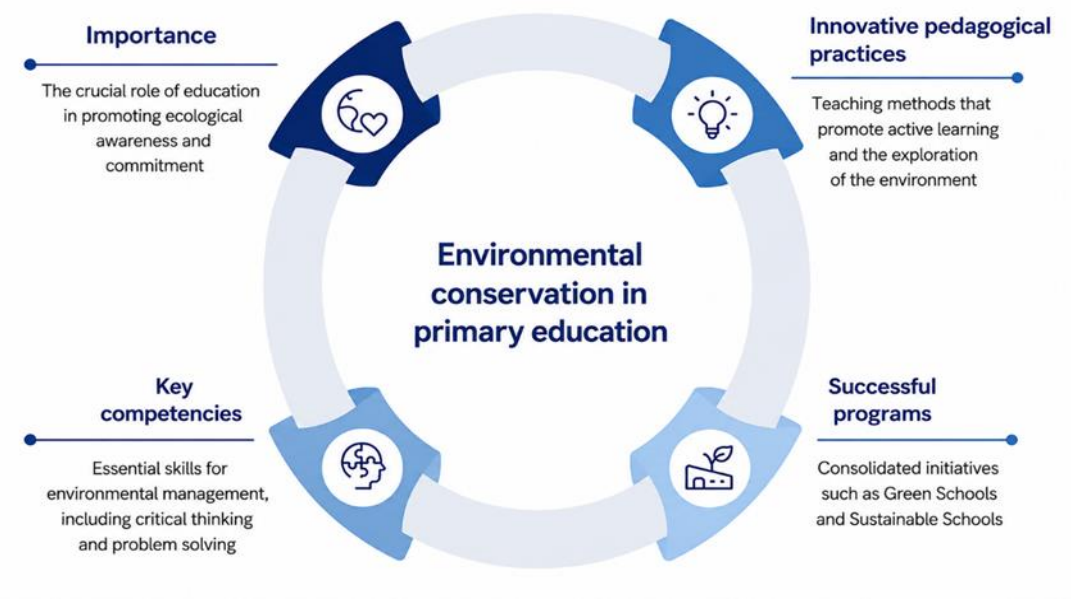


Figure 1. Key Elements for Environmental Conservation in Elementary School Education

Note: It should be emphasized that the above illustration represents the components that are essential for the promotion of environmental conservation in elementary school education.

Innovation in pedagogy is very important for the realization of the concept of conservation and sustainability education in elementary schools. The use of innovative teaching approaches that apply active teaching practices such as project-based learning, outdoor learning, and experiential learning has been effective in inspiring students on environmental matters and helping them gain a critical perspective on environmental challenges (Naila *et al*., 2025). An example of this is through community projects where students could be engaged in the environmental restoration process or biodiversity study (Dunkley, 2016).

Nonetheless, the importance of education in developing environmentally aware citizens cannot be ignored if the sustainability goals are to be achieved. In accordance with Amin *et al*. (2023), environmental education for elementary students needs to be based on the development of specific skills, such as critical thinking, problem solving, and decision-making. Such skills will enable learners to realize the problems in the environment both locally and globally and work on possible solutions and actions in their communities. Additionally, contemporary research demonstrates that integrating environmental education with other academic subjects, such as mathematics and social studies, leads to holistic education (Evans *et al*., 2017).

Successful programs or projects that integrate environmental education into the education curriculum have been found, thus contributing to environmental conservation starting from the early years of education. For instance, the "Green Schools" project in in Sweden and Türkiye has shown how a sustainability program may be beneficial and allow for educational institutions to reduce their ecological footprint and develop sustainable culture (Karaarslan-Semiz & Sund, 2025). The same way, the program "Sustainable Schools" has been successfully run in Latin America, in particular in Chile, which has integrated environmentally sound practices in educational institutions (recycling, water conservation, and gardens in schools), thus creating not only better conditions for learning but also better environmental citizens.

Educational project management methodologies

It is essential for the teacher to keep in mind sustainability and environmental conservation as important elements while dealing with content within the classroom setting. The approach of project management plays a very crucial part in making sustainability a part of the education curriculum in the elementary school **(Figure 2)**. This can include project-based learning, which involves making projects that involve the activity of researching or solving environmental problems by the students (Larmer *et al*., 2015). This technique helps the students learn and become self-directed and develops skills such as collaboration and critical thinking (Naseer *et al*., 2025).



Figure 2. Educational Project Management Methodologies

Note: The figure illustrates the stages that can support the management of educational projects focused on the conservation of the natural environment.

Management of the educational project on sustainability needs to entail proper planning and implementation so as to attain the set goals. The planning process will need to involve the setting up of objectives, the method of operation, as well as the resource allocation for the whole process (Yap *et al*., 2019). Concerning the implementation stage, involvement of all the stakeholders, including the students, teachers, and community in general, will have to be encouraged through cooperation that will ensure learning and sustainability. The evaluation process will involve assessment of both the academic and environmental achievement of the project based on the criteria to fulfill SDG 15 objectives and environmental preservation (Lehtonen *et al*., 2018).

The efficiency of educational project management methodologies is also connected to the capability of such strategies to adjust to various situations and requirements. As was established by several recent researches, it is essential to create flexible strategies for managing educational projects that will be able to react to local conditions, considering the sustainability of the school and even its surrounding area (Chiba *et al*., 2021). To be more precise, the implementation of such methodologies as project-based learning or experiential learning in elementary education has shown to be a very efficient strategy in terms of creating an ecological conscience and attitude towards the environmental issues. Not only do they have significant value when used in the classroom, but these strategies have also shown themselves to be effective for developing citizens' environmental conscience (Evans *et al*., 2017).

MATERIALS AND METHODS

This research is formulated according to the methodology of systematic academic literature review with the goal of examining and summarizing the available scientific literature on barriers that impede the inclusion of SDG 15 into the school curriculum in elementary education. In order to assure strictness, clarity, and transparency of the methodology, PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol guidelines were used, which included 27 elements to be taken into account when conducting systematic reviews (Page *et al*., 2021). The choice of protocol was made because of its significance both in the scientific sphere and in the educational and social spheres.

This process was based on the research question used to search for and select the sources employed: ¿What are the curricular, pedagogical, and structural barriers that prevent the integration of SDG 15 in elementary education? On the basis of this question, the inclusion criteria were set, as they related to the following characteristics: articles published between 2022 and 2026; full-text articles written in English or Spanish; peer-reviewed articles; and articles addressing at least one of the following variables: curricular integration of the SDGs in elementary education, environmental education, teacher training for sustainable development, or the digital divide in the educational setting. As for the exclusion criteria, these were: gray literature; duplicate articles; articles that were not full text; articles only discussing secondary and higher education; and articles mentioning SDG 15 and environmental education but not the above-mentioned variables.

The literature search was done in major databases with great coverage in the field of education and sustainability, which included Scopus, Web of Science, ERIC, and ScienceDirect. In addition to this, the literature search was conducted through Google Scholar in order to widen the literature search for new publications that may have not been indexed in the above-mentioned databases. The Boolean operators AND and OR were

employed to conduct the literature searches and thus allow for widening or narrowing the results. The terms searched in English and Spanish were "SDG 15 AND school curriculum," "ODS 15 AND primary education," "barriers AND ESD AND primary education," "teacher training AND sustainable development," "digital divide AND environmental education," and "curricular integration OR sustainability OR ODS." Thus, 115 sources were found initially.

RESULTS AND DISCUSSION

These findings correspond to the research goals and are divided into two different stages. The first stage is characterized by the acquisition and structuring of the bibliographical corpus, during which the criteria for selecting, including, and excluding documentary sources that have been reviewed were developed. The second stage represents the critical analysis of the bibliographical corpus, during which the conceptual categories, theoretical intersections, and contradictions present in the analyzed literature have been determined.

Phase one results: search for bibliographic sources

The screening process used was according to the four stages of the PRISMA 2020 methodology. First, identification of 115 records, followed by elimination of duplicate records from all databases. In the second step, titles and abstracts were screened using the inclusion and exclusion criteria, where those that did not qualify were eliminated. Thirdly, in the eligibility phase, the articles were read entirely to ensure validity and relevance. Lastly, the fourth inclusion step was carried out, where the corpus comprised 60 articles in this study **(Figure 3)**.

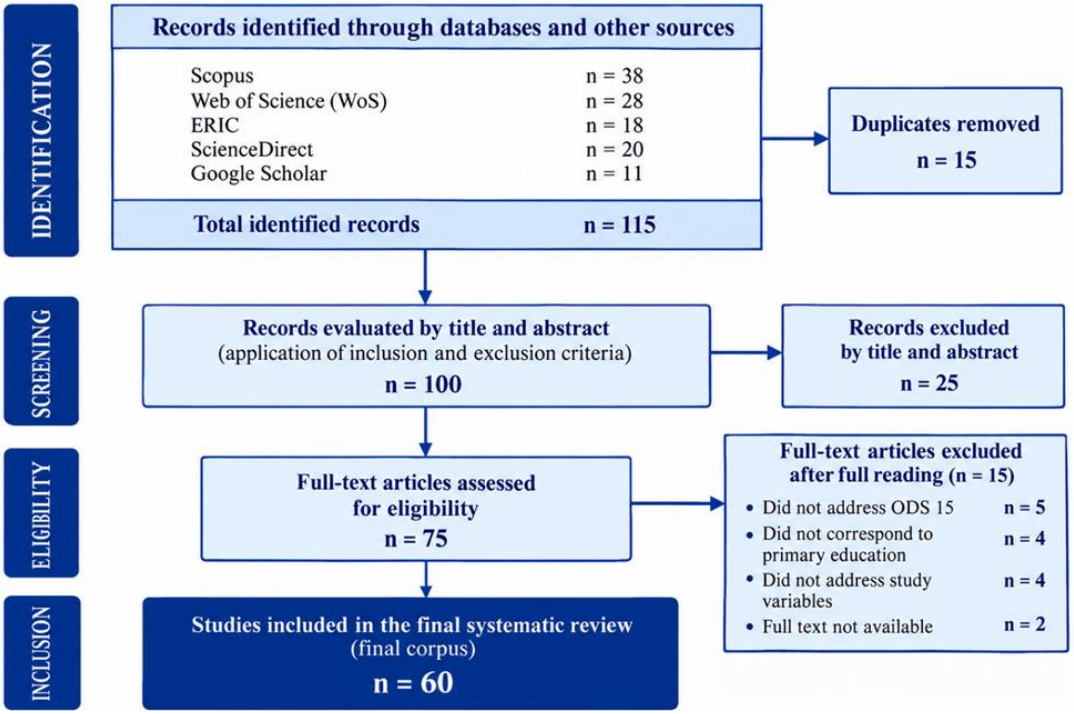


Figure 3. PRISMA flowchart of the literature source selection process

Note: The figure illustrates the four phases of the process of identifying, screening, assessing eligibility, and including the articles selected for the review, in accordance with the guidelines of Page *et al*. (2021).

Out of the total 115 papers retrieved, 15 papers were removed because they were duplicates across different databases. In the screening of titles and abstracts, 25 papers were excluded since they were not related to primary education, while they were dealing with SDG 15 in non-educational issues. The remaining 75 papers were analyzed; 15 papers were removed since they lacked an adequate methodology or had incomplete texts or did not cover the variables of the research, leaving 60 papers, which were analyzed eventually.

The chosen articles were structured under the systematization analysis framework, which systematized the data based on variables such as the year of publication, location of the research, methodology employed, barrier category, and the most important dimension of the discussion, which is teacher training, cognitive digital divide, and curricular integration. Systematization of the data made possible the generation of categories that relate the results with the objective set forth.

Phase Two Results: Analysis of Bibliographic Sources

The analysis of the selected corpus of documents results in the creation of a bibliometric network, which is used to structure and present the conceptual categories obtained during the research. The bibliometric network is presented in **Figure 4**, presenting the themes that were considered to be the most interesting in the discussion of the analyzed literature and are used as a starting point for analyzing curricular obstacles of SDG 15 implementation.

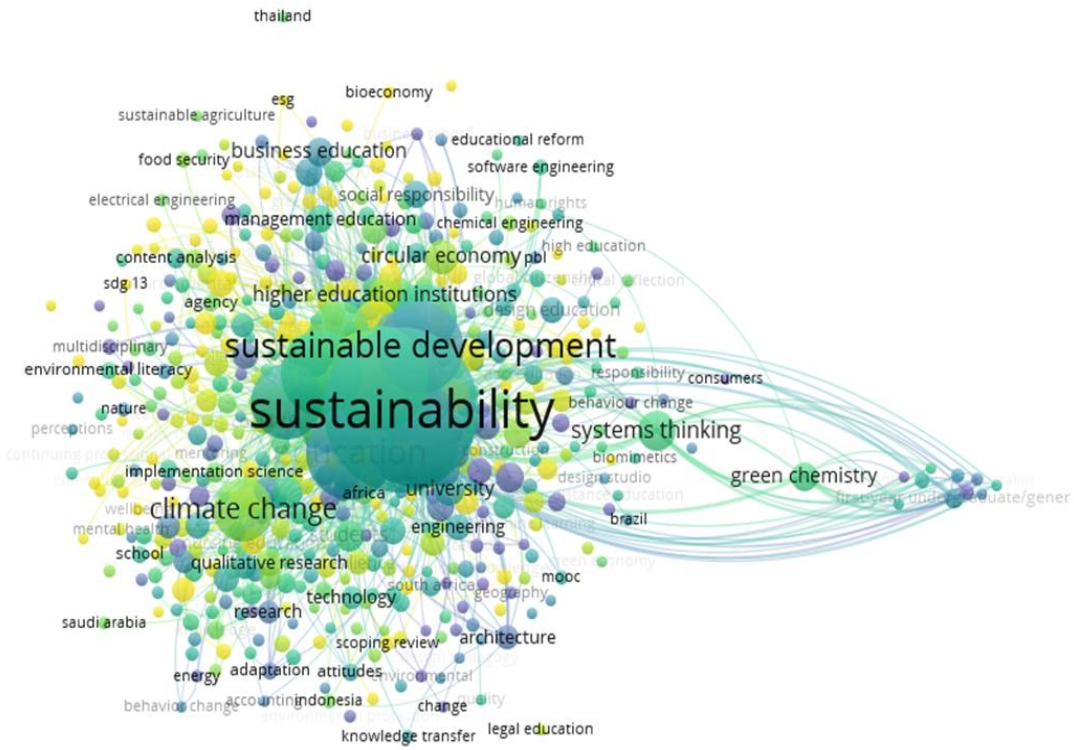


Figure 4. Bibliometric network of emerging categories of analysis
Note: The figure shows the categories of analysis considered during the analysis phase.

Three key elements that sum up the issues mentioned in the literature review are identified by the bibliometric mapping. The first issue is that educators are ill-prepared to incorporate SDG 15 into the curriculum. Teachers cannot teach sustainability if they lack the necessary abilities, yet neither the early nor ongoing stages of teacher preparation offer them. Furthermore, the adoption of creative approaches that achieve sustainability goals is hampered by the cognitive digital divide and the predominance of traditional teaching methods.

Insufficient teacher training for the integration of SDG 15 into the curriculum

The review shows that the unpreparedness of teachers is the main challenge to adopting SDG 15, since many scholars report insufficient knowledge regarding sustainability, biodiversity, and the conservation of terrestrial ecosystems. As stated by Boulhrir and Ait Bouch (2025), elementary schools still encounter difficulties in integrating the Sustainable Development Goals into their curriculum, and according to López Secanell *et al*. (2023), elementary school learners have inadequate knowledge of these goals.

In this sense, Cantó *et al*. (2025) found that university teaching guides still give little importance to the 2030 Agenda in initial teacher education, consistent with Jeronen and Jeronen (2026), who point out that few strategies support the development of competences for sustainable pedagogy in science and biology courses. According to Lorente-Echeverría *et al*. (2022a), training based on competences is not enough to encourage transformative educational practices in elementary education, while Lamanauskas and Malinauskienė (2024) proved that, despite the value teachers place on sustainability, methodological issues persist regarding its implementation in the classroom.

Moreover, there is also proof that in ECE policy, the programs for teachers' professional development do not include aspects of sustainable development. López Secanell *et al*. (2023) say that most teachers experience difficulties with the implementation of the SDGs during their preparation, while Cantó *et al*. (2025) note that the idea of sustainability is viewed as a reductionist one without any consideration of the school setting. Also, Jeronen and Jeronen (2026) emphasize the fact that science education on sustainability has been unidisciplinary in regard to SDG 15.

Other emerging themes include the lack of teachers development programs aimed at environmental sustainability. With regard to this theme, Alsina and Vásquez (2024) regard the continual development of professionals as crucial for reflection and updating of sustainability efforts. Similarly, Ikhlas *et al*. (2025) report that while many teachers hold positive attitudes toward environmental education, they lack conceptual knowledge due to inadequate professional development programs.

The same area of study is addressed by Afandi and Rachmadtullah (2025), who highlight the significance of educating teachers on the SDGs as one of the tools of cultivating the social and environmental awareness of students, despite the fact that teachers struggle to implement these principles in their work. In contrast, according to Olawumi and Mavuso (2024), the practices associated with ESD are not adequate and irrelevant to the context, while Chang Rundgren and Yamada (2023) focus on the significance of teacher training.

According to Corpuz *et al*. (2022), although there are success stories regarding the inclusion of environmental education in initial teacher education, problems remain with respect to

curriculum and organization due to the misconception about sustainability in education and its implementation in schools. In addition, there is found a discrepancy between institution-level rhetoric and practice in the classrooms. Engl *et al*. (2026) suggest that the combination of pedagogical and institutional constraints hinders teachers in their implementation of education for sustainable development. According to Parry and Metzger (2023), the lack of training of teachers, curriculum overload, and lack of institutional support are the major obstacles.

Similarly, as indicated by Allel and McCowan (2025), there are differences in the recommended curriculum for sustainability education and its use in practice. As argued by Lawyer (2025), the approach to sustainability education itself is flawed, which makes reinventing the concept of education even harder. At the same time, Ersando (2026) asserts that the introduction of a sustainable curriculum in various subjects is an extended pedagogic process, and Nanda and Sharma (2026) claim that education can cope with the climate crisis only when teachers are prepared for it.

Regarding teaching competencies, some teachers do not feel adequately equipped to design strategies aligned with the Sustainable Development Goals. As noted by Yli-Panula *et al*. (2025), prospective teachers feel that they lack the competencies for promoting sustainability in the school context, and Karvonen and Ratinen (2025) found gaps in systems thinking, ecological action, and critical environmental education.

In the same manner, Strgaršek and Jenko (2025) claim that teachers possess a knowledge base regarding sustainability but have problems translating it into effective pedagogic experiences. Brandt *et al*. (2022) argue that the professional competence of education for sustainable development should entail knowledge, competences, and a transformative attitude, and Uitto (2026) considers the sustainable action competence of future teachers to be a construct that is still being developed. Similarly, Lorente-Echeverría *et al*. (2022b) highlight the role of sustainability in higher education curricula.

Several findings indicate that teachers value environmental education, although this is not always reflected in the classroom. According to Amézquita-Galindo and Losada-Salgado (2025), teachers are positive towards environmental education but struggle with environmental problems, and Yaacob and Abdullah (2023) argue that sustainable education is effective only if the teacher understands sustainability.

Similarly, Maslamany *et al*. (2025) mention that teachers' sense of efficacy and institutional support favor sustainable teaching practices, and Dittrich *et al*. (2026) showed that professional development helps educators develop such practices. In this regard, Daumiller *et al*. (2025) state that personal attitudes towards the environment favor the incorporation of sustainability in the curriculum, and Xu *et al*. (2025) found that the environmentally responsible behaviors of teachers boost their confidence in teaching for sustainable development.

In general, the findings indicate that the difficulties in implementing SDG 15 stem from inadequate initial teacher education, limited professional development, insufficient pedagogical competences, and poor coordination between educational policy and its implementation. Sustainability is not yet recognized as a transversal theme in teacher training, which is why university curricula need to be strengthened.

The cognitive digital divide as a factor in the persistence of traditional teaching practices

According to the existing literature, the digital divide in elementary education cannot be approached merely from the standpoint of access to technology infrastructure because cognitive and pedagogical barriers make the proper application of technology and learning for sustainability impossible. Some educators simply reproduce the same old patterns because they do not have the necessary digital competence and are reluctant to change their traditional ways of teaching.

According to Li (2024), the disparities between the city teachers and the rural teachers in relation to the TPACK framework and the attitude towards the application of technologies still matter, especially when formal inequalities and institutional constraints do not allow for new learning about sustainability. As Giavrimis (2023) claims, the digital divide is connected with the frameworks and ideas of the teachers which inhibit innovative application of the technologies, while according to Aleksieva *et al*. (2025), despite the proliferation of the technologies in the educational context, their application is still very instrumental.

It is widely recognized that inadequate digital skills of teachers hinder curricula innovation and sustainability at the initial stage of education. As stated by Basilotta-Gómez-Pablos *et al*. (2022), the main challenge for many teachers is the inability to integrate technical, pedagogical, and didactic competencies and, therefore, to conduct an interdisciplinary environmental education. In its turn, Elsayary (2023) says that professional development of teachers is fragmented and insufficiently methodologically oriented which constrains the application of digital technologies for developing ecological consciousness. Additionally, Masoumi and Noroozi (2023) identify problems with technological pedagogy of novice teachers and Orakova *et al*. (2024) mention the impact of poor digital literacy on innovation and contextualization.

In addition, the cognitive digital divide can be seen as being associated with the persistence of a pedagogical paradigm that focuses on content and the prevalence of the textbook as the primary teaching medium. Deacon *et al*. (2025) prove that resistance to educational innovation is common in settings where technology represents a threat to current practice.

The problems associated with the use of technology in education for both teachers and students were made known by Noguera-Fructuoso and Valdivia-Vizarreta (2022) because of the stiff educational methodology which discourages participation and also limits environmental reflection and critical thinking. As pointed out by Fawns (2022), technology cannot be regarded as an aspect of learning since it is embedded within its pedagogy and curriculum, whereas Castañeda and Villar-Onrubia (2023) fault that teacher education normally focuses on practical skills only.

Territorial and contextual inequalities are also an important factor. Li *et al*. (2025) identified organizational restrictions, a lack of administrative support, and insufficient pedagogical training as constraints on the use of digital technologies in elementary teaching and on the active methodologies associated with environmental education. Ayson *et al*. (2024) show that experienced teachers frequently use adaptive strategies to face the digital divide, although these strategies are not sufficient for the transition to sustainable pedagogies. Moreover, Anita *et al*. (2025) reveal how unequal access to and

use of artificial intelligence increase inequality in cognitive and analytical abilities.

The poor engagement of teachers with technologies is another factor that impedes active, reflective, and ecological approaches. As proposed by Chugh (2026), most ideas about sustainable digital education are individual approaches that lack curricular implementation in basic stages and hence hinder the incorporation of SDG 15. As pointed out by Da Silva *et al.* (2023), incorporating digital technologies linked to the SDGs demands a participative and integrative pedagogical approach that many institutions have failed to adopt. Despite this, digital technologies in themselves do not mean innovation where the traditional form of teaching is still prevalent, as indicated by Chitra and Gunasekaran (2025) through their research on hybrid and traditional pedagogies, where both could prompt teachers to adopt the traditional approach.

Resistance to educational technologies is an extensive phenomenon, which consists of structural and cultural dimensions. Moreover, there is not much information about the cognitive aspects that promote the development of traditional pedagogical practices and their effects on environmental education. Although some studies claim that technological innovation fosters innovations, other sources suggest that lack of critical pedagogy leads to the failure of implementing innovative approaches for achieving sustainability. According to Giavrimis (2023), numerous teachers use digital technologies as means of instruction but not as components of transformations. Deacon *et al*. (2025) prove that conservative institutional culture results in the fear of pedagogical changes and memorizing.

According to the studies under review, the deficiency of digital competencies impacts the cross-cutting implementation of SDG 15 in school education, so interdisciplinary approaches and methodologies are needed to help develop critical thinking concerning environmental and biodiversity issues. Most research works pay attention to the technical aspect, but there are some which mention that digital technologies have the potential to increase the awareness about environmental issues from a critical and participative point of view. With this respect, Boulhrir and Ait Bouch (2025) note that incorporating SDGs into elementary education is still problematic due to poor teacher training.

The actual impact of technological innovation on educational transformation remains under discussion. According to Fawns (2022), a holistic and contextually grounded understanding of the connection between pedagogy and technology is needed, while Basilotta-Gómez-Pablos *et al*. (2022) indicate methodological and epistemological gaps in the development of teachers' digital competencies. In addition, Castañeda and Villar-Onrubia (2023) mention that teacher training focuses on technical knowledge rather than on critical competencies for social and environmental transformation. However, Asmayawati *et al*. (2024) indicate that local knowledge and sustainability approaches can produce a more contextualized digital literacy, although this approach is rarely used in traditional school systems distant from environmental education.

On the whole, the cognitive digital divide acts as a structural curricular barrier that hinders the redefinition of learning and the incorporation of environmental stewardship into elementary school education. The lack of digital literacy among teachers, institutional resistance to change, geographical inequalities, and the weak connection between technology, pedagogy, and sustainability continue to limit learning experiences oriented toward environmental stewardship and the transversal integration of Sustainable Development Goal 15. Therefore, the simple integration of digital technologies does not lead to curricular innovation if teaching remains based on the transmission of knowledge without context.

Structural and institutional barriers in curriculum design

According to the literature, a major factor preventing sustainable education in primary schools is the inflexible nature of the curriculum. As stated by Setiawan *et al*. (2025), Walshe and Rushton (2025), Leal *et al*. (2026), and Gugssa (2024), the curriculum remains rigid, based on traditional frameworks and standardized requirements, which leaves little room for designing sustainability activities.

Overload of academics is another challenge in relation to the appropriate implementation of SDG 15 in the learning process. As indicated by the studies performed by Fajri *et al*. (2024), Leal *et al*. (2026), and El Batri *et al*. (2022), educators find it hard to teach environmental issues since they need to teach different materials, thus ignoring biological diversity, sustainable use of natural resources, and biodiversity.

Fragmentation of the disciplinary approach can be considered another significant challenge. According to recent studies conducted by Yuan and Yu (2024), Kosta *et al*. (2025), Holst *et al*. (2024), and Setiawan *et al*. (2025), subjects relevant to sustainable development are considered individually in different disciplines, thus hindering integration and making it impossible to include such aspects of sustainable development goal 15 as ecological, socioeconomic, and sociocultural aspects.

It is also clear from the findings that there exists a gap between the policies regarding sustainable education and their actual execution at the school level. It is shown by Fajri *et al*. (2024), Damoah and Omodan (2022), Dutta *et al*. (2025), and Holst *et al*. (2024) that although sustainability is part of many educational policies, it is not necessarily implemented, depending on the efforts of individual teachers.

Lack of institutional resources is yet another hurdle. According to Leal *et al*. (2026), Fajri *et al*. (2024), Gugssa (2024), El Batri *et al*. (2022), and Dutta *et al*. (2025), some of the problems are lack of proper teacher education, lack of technology, lack of learning materials, and lack of budget for environmental conservation efforts that prevent student engagement in environmental problems.

Teacher education is another significant aspect. According to research conducted by Strgaršek and Jenko (2025), Setiawan *et al*. (2025), Leal *et al*. (2026), Fajri *et al*. (2024), and Damoah and Omodan (2022), it has been found that most of the teachers do not have the required skills for teaching SDGs and thus find it difficult to organize classes that encourage critical thinking and environmental consciousness.

The existing systems of assessment are also one of the hindrances. As mentioned by Leal *et al*. (2026), Walshe and Rushton (2025), and Holst *et al*. (2024), the stress caused by grades and assessments tends to favor the transmission of information to environmental thinking and learning, thus making education related to SDG 15 less appreciated than assessment standards.

In general, the literature suggests that there is a consensus in

regard to the challenges associated with the implementation of SDG 15 in the context of the initial stage of primary education. The rigidity of the curricula, the separation of disciplines, the lack of the link between the policies and the implementation of the curricula, as well as the lack of resources and teachers' training hinder the creation of sustainable educational standards. As a result, the implementation of SDG 15 involves changing the education system.

The systematic review reveals that barriers to the integration of SDG 15 in elementary education are a multifactorial issue. The absence of teacher training, knowledge deficits in the area of information technologies, and curricula limitations are not the isolated issues. These factors form an interconnected system of obstacles to sustainable education integration. Some research works, including the research by Boulhrir and Ait Bouch (2025), Li (2024), and Setiawan *et al*. (2025), suggest that the difficulties in implementing the Sustainable Development Goals are not related only to the way teachers operate in schools. The process is additionally influenced by institutional features.

Among the most important findings of this literature review is that the teachers are inadequately prepared to deliver the concept of sustainability in an all-encompassing fashion. According to López Secanell *et al*. (2023), Cantó *et al*. (2025), and Jeronen and Jeronen (2026), there is a huge disparity regarding the implementation of the 2030 Agenda in teacher education. As reported by Lorente-Echeverría *et al*. (2022a) and Lamanauskas and Malinauskienė (2024), the issue goes beyond the realm of knowledge and pertains to the ability of teachers to make the concept of sustainability applicable. This finding is supported by Yli-Panula *et al*. (2025), Karvonen and Ratinen (2025), and Uitto (2026), who claim that there are some teachers who lack certain competencies such as systemic thinking, environmentally friendly behavior, and environmental criticism in teaching.

Furthermore, the review has shown that the restrictions on training have direct connections with the problems associated with the application of digital technologies within the framework of environmental education. For example, research works by Basilotta-Gómez-Pablos *et al*. (2022), Elsayary (2023), Masoumi and Noroozi (2023), and Orakova *et al*. (2024) indicate that due to the absence of required skills and knowledge of digital competencies, it is hard for teachers to create innovative and sustainable experiences. At the same time, these results support the idea proposed by Giavrimis (2023), who considers that most technological problems have to do with the pedagogical perspective of teachers. In general, the digital divide identified in the discussed research works seems to be more connected with the complexity of technology integration into sustainable education rather than with the absence of technology.

One more important issue arises while considering the issues of continuity of traditional approaches to pedagogical models in education. The study of Deacon *et al*. (2025), Noguera-Fructuoso and Valdivia-Vizarreta (2022), and Castañeda and Villar-Onrubia (2023) reveals that resistance to educational transformation remains a barrier for the implementation of interactive and participatory methods. Even though Fawns (2022) suggests that one should see technologies as the basic element in the educational process, there are still many teachers who use them as tools. This issue is confirmed by the research conducted by Chugh (2026), Da Silva *et al*. (2023), and Chitra and Gunasekaran (2025). It appears that the integration of new technologies does not mean the change of curriculum in the case of a knowledge-oriented approach to education.

From the above results, it can be concluded that the education and training of teachers and the digital divide are affected by the structure of the educational system, acting as a barrier. Studies such as those by Leal *et al*. (2026), Walshe and Rushton (2025), Gugssa (2024), and El Batri *et al*. (2022) demonstrate that the rigidity of curricula and the overload do not provide any scope for educational experience in sustainability; hence, Yuan and Yu (2024), Kosta *et al*. (2025), and Holst *et al*. (2024) conclude that the fragmented nature of disciplines is an obstacle in providing interdisciplinary approaches to the problems associated with biodiversity and ecosystem conservation.

In addition**,** it is necessary to point out an important convergence in the findings from recent studies concerning the discrepancy between the discourses of sustainability promoted in institutions and those elaborated in schools. Namely, Damoah and Omodan (2022), Dutta *et al*. (2025), and Fajri *et al*. (2024) draw attention to the fact that there are certain policies aimed at implementing sustainability within the classroom, while Corpuz *et al*. (2022), Parry and Metzger (2023), and Allel and McCowan (2025) note that the lack of action plan to implement such sustainability discourses can be observed in this regard. The mentioned problem can be explained by the lack of institutional resources noted by Leal *et al*. (2026), Gugssa (2024), and El Batri *et al*. (2022), as well as the educators' problems with obtaining pedagogical support stated by Lawyer (2025) and Ersando (2026). In other words, when put together, the abovementioned evidence shows that the issue under consideration depends more on individual strategies than institutional ones.

Finally, the findings of the analysis prove that the curricular integration of SDG 15 is a systemic problem since it requires a set of measures that have to be implemented simultaneously and relate to teacher training, the crucial usage of digital technologies, and the curricula itself. In this context, the findings of Chang Rundgren and Yamada (2023); Afandi and Rachmadtullah (2025); Strgaršek and Jenko (2025); Setiawan *et al*. (2025); and Holst *et al*. (2024) prove that education for sustainability is interdisciplinary education supported by institutional measures and professional development. Thus, the curricular integration of SDG 15 into elementary education aims to eliminate the fragmented model of education through flexible curricular proposals focused on the critical comprehension of environmental issues.

CONCLUSION

Based on the findings of our systematic review, it is evident that SDG 15 remains inadequately integrated into primary education curricula. Despite global recognition of its vital role in fostering environmental citizenship and fulfilling international commitments outlined in the 2030 Agenda, the analyzed literature indicates a significant discrepancy. Specifically, the educational content addressing biodiversity preservation, terrestrial ecosystem conservation, and the sustainable utilization of natural resources is notably insufficient when compared to the vast scope and urgency of the ecological challenges present in current pedagogical practice.

Teacher training has been one of the main reasons behind the

lack of SDG 15 inclusion within the school curriculum as an essential issue. Research shows that there is an inadequate level of knowledge and even a complete absence of competencies in the field of sustainability from a holistic perspective as well as concerning geographical locations. Besides, there are no special methods of teacher training using sustainable development and environmental education. Therefore, such a lack of teacher training influences pedagogical skills needed for critical thinking and environmental activism.

Therefore, it could be stated that innovative teaching approaches are not implemented properly in such educational institutions. Despite numerous options provided by ICTs to improve the environmental education via interactive, collaborative, and contextual activities, it is apparent that technologies are mostly utilized to deliver the content without addressing the innovative approaches focused on environmental protection. The existing digital illiteracy, problems associated with the process of learning how to use the technologies, and the presence of the traditional approaches hinder the development of ICTs in relation to the promotion of learning relevant to the natural habitat conservation and SDG 15 implementation.

In this regard, it can be stated that the correct implementation of SDG 15 in early childhood education will demand systemic changes that include the flexibility of the curriculum, the training of teachers both before and after their employment, and the use of educational technologies and policies on sustainability at the school level. Hence, the proposal of inclusion of environmental content in the curriculum alone will not be enough. The education process should be based on multidisciplinary methods that are applicable in a socially relevant context and involve practical activities; hence, the school should act as an agent in creating people ready to protect the natural environment and sustainability for future generations.

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