

Review

Education for Sustainable Development Through the Arts as a Driver of Educational Innovation: A Scoping Review in the Context of the SDGs

Nerea Rodríguez-Suárez *, Carla Álvarez-Barrio , Juan Luis Lorenzo-Otero , Guillermo Calviño-Santos 
and José María Mesías-Lema

Department of Specific Teaching Training and Research and Diagnosis Methods in Education,
Faculty of Educational Studies, Universidade da Coruña, 15071 A Coruña, Spain;
carla.alvarez.barrio@udc.es (C.Á.-B.); juan.lorenzo.otero@udc.es (J.L.L.-O.);
guillermo.calvino@udc.es (G.C.-S.); jose.mesias@udc.es (J.M.M.-L.)

* Correspondence: n.rodriguezs@udc.es

Abstract

This article addresses the need to rethink educational innovation as a transformative driver for sustainability within the framework of the Sustainable Development Goals (SDGs), particularly SDG4. Its aim is to analyze the role of arts education as a catalyst for this innovation, with creativity as its primary strategy. To this end, a Scoping Review methodology following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol. A review of Open Access (OA) publications indexed in Web of Science (WoS) and Scopus between 2000 and 2025 is conducted. The results of this analysis show that most studies ($n = 19$) are developed in higher education contexts, with a strong emphasis on publications labeled as innovative and grounded in creativity, as well as a frequent association between innovation and the use of new technologies or digital tools. These publications also explicitly link their proposals to the SDGs, highlighting the central role of arts education in sustainability. However, there is a limited presence of studies at earlier or compulsory educational levels—such as early childhood, primary, or secondary education—as well as in museum contexts, which are closely connected to the arts. The article concludes that arts education holds significant transformative potential to foster engagement with sustainability in the pursuit of critical and creative generations for a more sustainable world.

Keywords: innovation; sustainable education; arts education; creativity; scoping review; Sustainable Development Goals; quality education



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1. Introduction

“Here my idea is to declare that art is the only possibility for evolution, the only possibility to change the situation in the world. But then you have to enlarge the idea of art to include the whole creativity. And if you do that, it follows logically that every living being is an artist—an artist in the sense that he can develop his own capacity. And therefore it’s necessary at first that society cares about the educational system, that equality of opportunity for self-realization is guaranteed.” [1] (pp. 5–7).

As early as the 1970s, the renowned artist and educator Joseph Beuys emphasised in his university lectures that creativity is a powerful force for educational transformation and for fostering social and ecological care for the world around us. Through his ecological artworks and the theories that accompanied them, Beuys argued more than 50 years ago that creativity was not an exceptional attribute reserved for a fortunate few, but an inherent potential shared by every person and living being [1]. Today, it is worth revisiting these ideas in a global context increasingly marked by ecological crisis, where it is urgent to rethink the role of education in shaping individuals committed to more sustainable futures.

In this reconceptualization of education, a profound shift can be observed: it has gradually moved from being understood as a mechanism of socio-cultural reproduction to becoming a strategic factor for social transformation. This metamorphosis has intensified public debates about the role education should play in the face of contemporary challenges: should it educate citizens who adapt to these accelerated changes, or should it instead assume the responsibility of shaping citizens capable of playing an active and anticipatory role? Should it simply teach how to survive, or educate for action? Whatever one's position regarding its "utility" in relation to these issues, there does appear to be a consensus on its capacity both to transform itself and to transform reality, linked to concepts such as "innovation" and "creativity." This is how new questions emerge, prompting reflection on which educational approaches can truly foster meaningful change towards more conscious and sustainable futures.

Education was established as a central pillar for well-being and sustainable development with the approval in 2000 of the Millennium Development Goals (MDGs) by the Member States of the United Nations (UN), which remained in force until 2015 [2]. In particular, Goal 2 aimed to ensure universal and equitable access to education. However, this agreement on the central role of education does not resolve a critical question: what dimensions should this universal education encompass? The 2030 Agenda adopted a broader approach, advocating for inclusive, equitable, and quality education, with learning opportunities throughout life. These approaches, detailed in SDG4, recognize that progress on the remaining goals depends largely on their achievement: an educated and committed citizenry will be capable of attaining them. It is in this context that concepts such as Global Citizenship Education (GCED) emerge, along with the recognition of Cultural Rights as essential components of sustainable development [3]. It is also within this framework that the concept of "educational innovation" arises, gaining prominence in academic, institutional, and scientific discourse, although its widespread use has led to a certain degree of conceptual ambiguity. It is therefore not surprising that innovation frequently appears almost as an inevitable label in projects that incorporate new digital technologies, active methodologies, or organizational reforms, without necessarily addressing whether a genuine improvement in teaching–learning processes is achieved. In simple terms, innovation only acquires its full meaning when it actively contributes to reorienting education towards more sustainable and participatory futures.

Linked to this debate is the redefinition of the concept of "creativity" as a strategy that enables the connection of diverse forms of knowledge and the imagining of possible alternatives to complex problems. In this way, creativity and innovation share common horizons, with interrelated, complementary, and almost equivalent definitions. It is at this conceptual intersection that arts education acquires particular relevance, in a context in which creativity, traditionally associated with the artistic domain, is being progressively incorporated into educational and research practices. This interest in how the arts activate creative skills contrasts with the historically marginal position that arts education has occupied within formal curricula, often subordinated to so-called "core" subjects. As arts education is now

understood as a privileged space for the development of creativity, practices grounded in arts education are increasingly studied as potential processes of innovation.

Although research on Education for Sustainable Development (ESD), educational innovation, and arts education for creativity has increased significantly in recent decades, the connections between these interrelated fields remain fragmentary. This highlights the need to critically examine how scientific literature conceptualizes and implements innovation through arts education in relation to the SDGs. In response to this gap, the present article aims to conduct a review of scientific literature to identify and analyze Open Access (OA) publications from the past 25 years that incorporate arts education as a strategy for educational innovation within the framework of sustainable development.

2. Background

2.1. Conceptual Foundations in Educational Terms: Towards a Sustainability Grounded in Creativity

The concept of sustainability, in its early formulations in the eighteenth century, appeared as little more than a concern not to fell more trees than nature itself could regenerate [4]. The development of modern society, rooted in the Industrial Revolution, gradually sparked debate about the effects that industrial society was having on the planet—effects that extended beyond the environmental sphere. It was not until the creation of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1948 that international agencies began to warn that this ecological emergency had a direct impact on human life and well-being [5]. In parallel, the theoretical evolution of the concept of “sustainability” was a highly fragmented and slow process [6]. Only in the early 2000s did its scope expand towards the Triple Bottom Line (social, economic, and environmental), suggesting that these pillars cannot be considered in isolation in our efforts to maintain planetary stability [7,8]. Today, the normative and political role of sustainability was formalized in 2015 with the adoption of the 2030 Agenda for Sustainable Development by the General Assembly of the United Nations. This document outlines 17 SDGs and affirms that sustainability constitutes an integrated and indivisible process encompassing the three pillars identified fifteen years earlier [9].

From this triad emerges the need to generate new concepts that help conceptualize and plan specific actions for a more sustainable world. This need is reflected in the Brundtland Report produced by the World Commission on Environment and Development (WCED), also known as *Our Common Future* (1987), which defines what the pursuit of a more sustainable future at a global level would entail: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” [10] (p. 41).

This turns education into a key factor in addressing the need to engage new generations in the promotion of sustainable action. In this regard, UNESCO introduces and defines a new key concept in *A Roadmap for ESD*:

“Education for Sustainable Development (ESD) empowers learners of all ages with the knowledge, skills, values and attitudes to address the interconnected global challenges we are facing, including climate change, environmental degradation, loss of biodiversity, poverty and inequality (...) is a lifelong learning process and an integral part of quality education that enhances the cognitive, social and emotional and behavioural dimensions of learning. It is holistic and transformational and encompasses learning content and outcomes, pedagogy and the learning environment itself.” [11] (p. 8).

ESD is not a static concept but a framework for transformative learning. This potential of ESD is articulated throughout the 2030 Agenda and is specified in its SDG 4, relating to Quality Education. This goal includes 10 targets to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.” [11] (p. 17). Target 4.7, specifically oriented towards ESD, states:

“...ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development” [11] (p. 14).

ESD entails much more than the transmission of content about environmental conditions and care [12,13]. It is understood as a comprehensive educational process for addressing sustainability challenges from a critical and global perspective [14]. In this same vein, ESD in educational contexts requires transformative learning approaches in which teachers and students participate in the co-creation of sustainable actions. The aim is for them to develop competencies, shifts in perspective, and social commitment towards more responsible and sustainable practices in real-world contexts [15–18].

This education for action takes shape in another concept promoted by UNESCO, GCED, which “aims to empower learners of all ages to assume active roles, both locally and globally, in building more peaceful, tolerant, inclusive and secure societies. GCED is based on the three domains of learning—cognitive, socio-emotional and behavioural” [9]. By contrast, education for sustainable action is often presented in educational curricula in a fragmented manner and with a lack of innovative methodological approaches to support it [19–21]. It is here that the design of new pedagogical strategies becomes particularly relevant.

From a pedagogical perspective, educational innovation is a dynamic process that involves the introduction of methods, strategies, or educational resources that generate more meaningful learning. Often confused with the mere introduction of new digital tools, innovation requires both theoretical and practical changes in the teaching–learning process in order to respond to contemporary challenges [22–25]. In this sense, we draw on Serdyukov’s [26] definition, which describes innovation as any method, strategy, or resource that develops an idea, is implemented in practice, and results in change. This implies that innovation is a dynamic process of transformation that goes beyond simply adopting new tools.

This pedagogical transformation is only possible through creativity, understood as a factor intrinsic to innovation because of its ability to find alternative and effective solutions to these challenges [27]. It has also been understood as an inherent and developable quality in human beings, almost synonymous with innovation. In the words of Torre [28], “if to define is to enclose a field of ideas within a fence of words, defining creativity is like attempting to contain a sea of ideas within a continent of words” (p. 271, translation mine, in the original in spanish: “Si definir es rodear un campo de ideas con una valla de palabras, definir la creatividad es como intentar retener un mar de ideas en un continente de palabras”). The concept of “creativity,” widely debated, has historically been linked to the arts, and within education, to artistic practices. From this perspective, arts education ceases to be an isolated school subject and becomes an ideal setting for integrating creative expression with ecosocial commitment. If introducing creativity as a learning outcome is essential, it is equally important to place creativity at the core of teaching strategies oriented towards sustainable learning [29]. In this way, the arts are positioned as a driver of educational innovation, capable of projecting imaginative solutions towards a sustainable

future [30,31]. This perspective is also of interest to UNESCO, which emphasizes that creativity is not only a cultural or artistic value but also a fundamental driver of sustainable development. It understands creativity as a resource available to everyone, enabling the generation of new ideas and innovative solutions to present challenges. This becomes even more relevant considering that in 2021 the UN declared it the “International Year of the Creative Economy for Sustainable Development,” recognizing the role of creativity as a key component of global progress [32].

2.2. Positioning the Arts as a Driver of Educational Innovation for a Sustainable Future

Having established the link between sustainability, innovation, and creativity from an educational perspective, as well as the intrinsic connection between creativity and the arts, it is essential to begin by defining what we mean by arts education. Arts education involves activating structured creative processes that integrate aesthetic experiences, as well as cultural interpretation, critical thinking, and meaning-making [33–35]. This definition departs from the outdated perception of arts education as concerned solely with technique, emphasizing instead how its teaching processes—through different artistic expressions—stimulate cognitive, creative, and social skills [36,37]. In the same vein, arts education reflects reality through artistic languages, which, in the words of Yáñez [38], “(…) are, in turn, a reflection of changes in society” (p. 168, translation mine. In the original in Spanish: “(…) son, a su vez, reflejo de los cambios de la sociedad”).

Within contemporary arts education, contemporary art movements and their artists have been actively engaged in addressing environmental and social issues, concerns, and challenges [39]. This involvement is not entirely new: movements emerging around these concerns began to develop in the 1980s and consolidated during the 1990s, in connection with approaches linked to eco-justice [40]. The year 1982 was particularly significant in this regard, with two works that marked a turning point in this artistic commitment to nature. The first key intervention was created by the artist Agnes Denes with her work *Wheatfield: A Confrontation*. In this piece, Denes leased a plot of approximately two hectares in central Manhattan, where she cultivated a wheat field. Located close to the financial district of Wall Street, the image of an agricultural field in one of the most emblematic spaces of global capitalism created a striking symbolic contrast. The second was the landscape installation *7000 Oaks* by the artist and educator Joseph Beuys, mentioned at the beginning of this study. The project began with the installation of a large mound of seven thousand basalt stones in front of one of Europe’s oldest public museums, the Fridericianum. Each stone represented an oak tree to be planted in the city, and as citizens participated in the planting, one stone was removed from the pile and placed next to the newly planted tree. Beuys conceived this action as a “social sculpture” that would promote an ecological transformation of urban space: the initial mound gradually disappeared as the city itself was transformed. The project lasted five years and was completed in 1987, one year after Beuys’s death. Both actions, although different in form, share a common intention: to use art as a strategy to activate public reflection on the relationship between society, nature, and territory.

In recent developments, a shift can be observed in artistic practices towards social and community-oriented approaches, with artists increasingly assuming, through their commitment and action, a leading role in making conflicts visible and promoting social justice. Among movements closely linked to the SDGs are “activism”—a combination of art and activism—which encompasses creative processes and works addressing social or political issues [41–43], as well as others such as Land Art or ecosocial art, whose works specifically seek to stimulate dialogue and foster responsible practices towards the social and natural environments in which we live [44,45]. These movements are supported by international networks of artists committed to this cause, such as the EcoArt Network,

with the aim of encouraging increasing involvement from artists, educators, and citizens. Another example is Global Artivism, a collective led by activists from the Global Majority that brings together artists, activists, and communities worldwide, aimed at organising, aligning, and amplifying collective calls for climate solutions.

Across various sectors of the arts industry, there has been growing concern about adopting more sustainable practices, leading to initiatives such as the Gallery Climate Coalition (GCC), an international community that brings together hundreds of artists, as well as galleries, professionals, businesses, and nonprofit organizations. The GCC aims to reduce greenhouse gas emissions in the visual arts sector by at least 50% by 2030 and promote zero-waste practices. To this end, it promotes specific tools and measures such as the creation of a Carbon Calculator tailored specifically to the art world, the establishment of a Strategic Climate Fund to finance environmental initiatives, and the formation of Green Teams within art organizations and spaces.

This tendency among artistic movements and organizations to advocate for environmental and social rights has been reflected in classroom practices through educational processes that seek to foster students' participatory and critical engagement [46,47]. From this perspective, educational processes addressing the SDGs enable the establishment of collaborative and co-creative ties between art, schools, and society in the development of sustainable practices [48,49]. This triangular collaboration allows for progress towards more just and inclusive societies through socially engaged community art, which requires participatory processes that go beyond the mere creation of objects [46,50,51].

All of this is reflected in initiatives and projects such as Transformation from Waste to Art, in which arts education students worked over a three-month period researching ecological issues, experimenting with waste materials, and producing artworks that convey environmental messages [52,53]. In the same vein, Chapman [54] challenges certain traditional views of education and proposes a pedagogical model termed "Arts Immersion," arguing that from an early age learning can be developed across different subject areas by using artistic languages as an alternative means of expression and engagement with the world [55–57]. This approach is illustrated in educational initiatives such as the one implemented at Colégio Santa Chiara in Aracaju (Brazil), which uses artistic activities and creative learning experiences to help students understand the importance of water and local environmental relationships. With a similar aim, Busleyden Atheneum Pitzemburg (Belgium) implemented an Arts-Based Project Learning (ABPL) initiative on the social and environmental impacts of mining in the Democratic Republic of the Congo [58].

In the same vein, training programmes focused on innovation strategies in arts education have also emerged, such as Artful Minds, Creative Spirits—eTwinning (Europe), in which students from different countries engage in artistic activities integrating the SDGs through visual art, sound, poetry, and storytelling [59]. Another notable example is the programme Sustainability Starts with Teachers (Africa), which prepares educators to integrate ESD transversely through school-based change projects that incorporate creative and integrative initiatives [60].

The UN itself, in pursuing the SDGs, promotes innovative arts education as a key strategy for advancing ESD and for building communities committed to sustainability [58,61,62]. In other words, the UN has identified innovative arts education as a transformative educational practice. The UNESCO World Report Re|Shaping Cultural Policies: Advancing Creativity for Development states that creativity and culture are genuine drivers of sustainable development: "the diversity of cultural expressions can have a direct impact in the implementation of the SDGs" [63] (p. 181). This was reaffirmed in 2023 when this organization presented the Art Charter for Climate Action (ACCA), an initiative that recognizes the social role of art and arts education in fostering education for sustainability [64].

This initiative seeks to create an international network in which the arts sector, cultural institutions, non-profit organizations, educational institutions, and educators commit to creating, designing, and implementing sustainable initiatives that promote meaningful learning and awareness of climate-related challenges [32,65].

In recent years, international initiatives such as Social Sciences, Humanities and the Arts for People and the Economy (SHAPE) have helped to strengthen the recognition of the arts, humanities and social sciences as key fields for understanding and addressing contemporary social challenges. In this vein, UNESCO seeks to foster teachers' creativity and capacity for innovation. To this end, it provides resources and materials for educators that support the integration of the SDGs into school curricula, offering ideas for designing classroom experiences and teaching strategies focused on sustainability. One example is the implementation guide following the Framework for Cultural and Arts Education, presented in February 2024 in Abu Dhabi. This resource guide places culture and the arts at the centre of education systems, aiming to foster creativity and critical thinking, strengthen teacher training, and support educational practices that promote high-quality cultural and arts education [21]. These guidelines are consolidated in the Framework for Cultural and Arts Education, presented in Barcelona (Spain) on 1st October 2025 during the World Conference on Cultural Policies and Sustainable Development, known as Mondiacult 2025 [66].

These initiatives and experiences, closely linked to the promotion of ESD, demonstrate an ongoing concern and sustained effort to strengthen teacher training and education committed to the 2030 Agenda. Creativity, from the perspective of arts education, appears to position itself as an essential vehicle for understanding the world, developing environmental and social awareness, fostering reflection, and raising awareness among today's citizens—agents capable of building a more just and balanced future [67].

3. Materials and Methods

The methodology employed in this study follows the principles of a systematic literature review, specifically a scoping review. This model of analysis is grounded in a synthesis of scientific knowledge that comprehensively examines the documentation within a specific field, mapping the available evidence and evaluating the scope, diversity, and characteristics of existing research. Unlike other bibliographic analysis methods, which simply address specific research questions, a scoping review engages with broader issues, enabling the identification of knowledge gaps and areas requiring further investigation. It should be noted that this methodological approach is particularly suited to indexed publications, which ensure rigorous scientific quality.

Building on these precedents, this study follows the guidelines developed by Lluís Codina [68], with the aim of understanding the field of study at the intersection of sustainability, innovation, and creativity, as well as its main applications in the scientific literature since the beginning of the twenty-first century. To this end, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (Figure 1) will be used in order to ensure the reproducibility and rigor of the review process (Appendix A) [69].

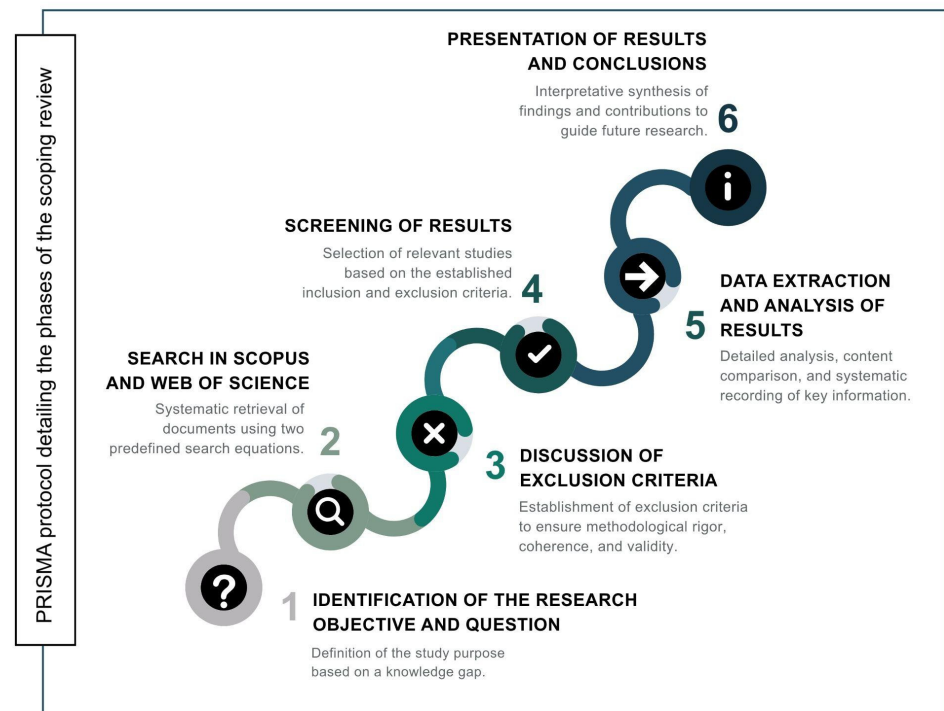


Figure 1. PRISMA protocol detailing the phases of the scoping review. Source: Figure prepared by the authors.

3.1. Objectives and Research Questions

Every scoping review must begin from a gap that it seeks to address, as already indicated in the objective outlined in the theoretical framework of this study. Accordingly, this review of the scientific literature takes as its starting point the following research question: How does the OA scientific literature conceptualize and implement educational innovation at the intersection of arts education and sustainability, and what is its relationship with the SDGs in the twenty-first century?

From this main question, the literature review seeks to address a series of secondary research questions related to the topic under study: From which educational or institutional contexts are the innovative processes identified in these publications developed and applied? Do the analysed publications establish an explicit link with the improvement of education within the framework of the SDGs? What types of documents predominate in the scientific output analysed? What geographical and linguistic distribution characterizes this body of research? From which perspectives do these publications conceptualize educational innovation, and how do they frame its contribution? What limitations or gaps does this literature analysis identify? What future lines of research could advance studies exploring the intersection of arts education, sustainability, and educational innovation?

3.2. Sources of Information and Search Strategies

Taking the research questions and the proposed methodology as a starting point, two search equations were developed following the Faceting, Deriving, and Combining (FDC) framework [69], thereby identifying key terms in relation to the object of study, as well as the theoretical and methodological frameworks to be considered. Based on these three elements and using Boolean operators, the following search equations were defined, adapted to the databases in which they were applied:

- For the Scopus repository: ("Art educat*") AND ("Sustainab*") AND ("Innovat*");
- For the Web of Science (WoS) repository: ("Art educat*") AND ("Sustainab*") AND ("Innovat*").

Additionally, four types of academic works were considered for inclusion in the review: scientific articles published in indexed journals, book chapters, conference papers, dissertations, and reviews. The search in the selected databases was conducted between 6 and 27 January 2026, yielding 120 publications potentially relevant for this analysis.

3.3. Selection Criteria

The starting point is the beginning of the twenty-first century, a moment marked by a notable increase in scientific production in these fields of study. This period also coincides with the establishment of the MDGs in 2000, situating the analysis within a temporally relevant context for the development of international policies related to sustainability. The initial search yielded a broad corpus of results. To define the sample, priority was given to publications available in OA, as this was considered a relevant condition for ensuring accessibility, transparency, and the democratization of knowledge, in line with the guidelines of the Digital Operational Resilience Act (DORA) and Coalition for Advanced Research Assessment (CoARA). This decision reduced the number of available documents but made it possible to focus the analysis on accessible research with potential transferability across different educational contexts, without imposing prior restrictions based on document type.

4. Results

4.1. Application and Preliminary Results of the Scoping Review

The selection process was carried out collaboratively, with each author conducting a detailed reading of the full-text publications selected in the initial phase ($n = 24$), considering titles, abstracts, objectives, methodologies, and main results. Duplicate records identified across both repositories were then removed ($n = 5$). Subsequently, in a second phase of manual review, publications were excluded if, although they addressed issues related to creativity, innovation, or sustainability, they did not present a clearly educational focus or an explicit link to arts education. Among the documents excluded at this stage were four scientific articles ($n = 4$) and one book ($n = 1$). This meticulous process, detailed in Figure 2, resulted in a final selection of publications ($n = 19$) included in this review. No software was used for the selection or data extraction processes.

To present the results in a clear and visual manner, a table was developed detailing the characteristics of each publication. It includes nine distinct variables to capture the main differentiating factors (Table 1).

Regarding the explicit link that researchers establish between their projects and the SDGs, this scoping review reveals a clear consensus: all the publications analysed explicitly mention SDG4—Quality Education ($n = 19$; 100%). Although SDG4 forms the backbone of all the research analysed, the projects are frequently linked to other SDGs, highlighting the multidimensional nature of sustainability and the capacity of educational initiatives to contribute simultaneously to a range of social, cultural and environmental challenges. This finding underscores the relevance of approaching this topic from an educational perspective, placing emphasis on the processes, methodologies, and approaches that contribute, from different angles, to sustainability within the framework of SDG4, with the aim of improving education (Figure 3).

One of the key aspects identified in this study is the distinction of three types of publications according to their context of production and application. First, there are studies developed within educational institutions, which present proposals either implemented or intended to be implemented in formal teaching–learning contexts. Second, studies developed within museum institutions are identified, in which initiatives are situated in non-formal educational spaces, also with a predominantly practical orientation. Third,

theoretical studies are included which, although mostly produced within academic settings, focus on the analysis and conceptual systematization of the object of study. This classification of publications according to their context of production and application reveals a clear trend in the literature analysed: the majority of approaches originate from educational institutions ($n = 13$; 69%), in contrast to the limited presence of proposals developed within museum institutions ($n = 1$; 5%). Additionally, several theoretical publications ($n = 5$; 26%) are identified, contributing to the conceptual consolidation of the field at the intersection of innovation, arts education, and sustainability (Figure 4).

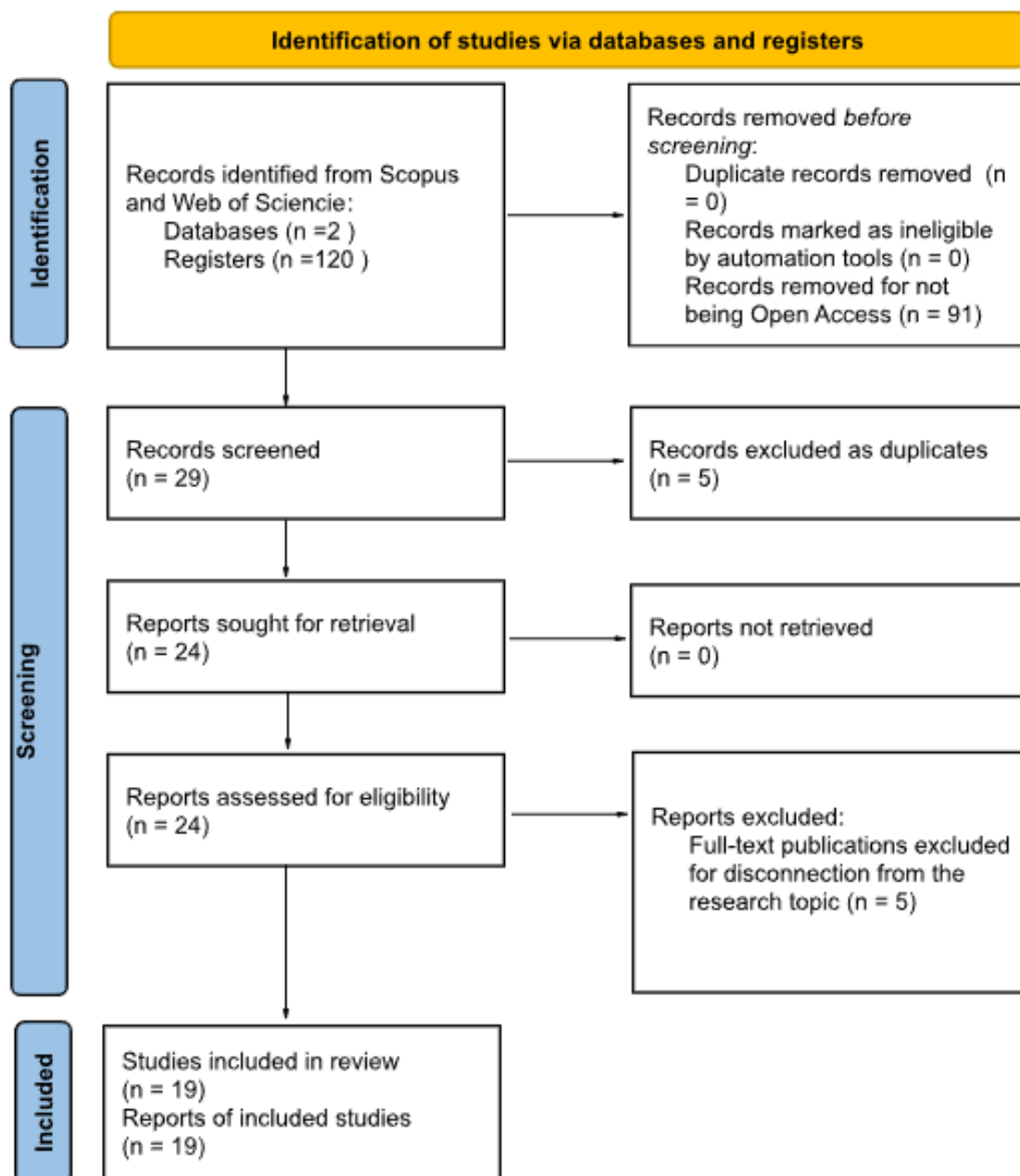


Figure 2. PRISMA flow diagram of the scoping review search and selection process. Source: Figure prepared by the authors.

Table 1. Scoping review simplified analysis table. Source: Table prepared by the authors.

YEAR	AUTHORS	TITLE	TYPE	LANGUAGE	COUNTRY	CONTEXT	METHODOLOGY	OBJECTIVES	SGD	REFERENCES
2025	Sharma, Sorabh; Dhanalakshmi B.; Shankar Prasad S.; Malik, Mohit; Thakuriya, Kajal; Gupta, Mohit; & Wawage, Pawan	SMART MATERIALS IN SCULPTURAL EDUCATION	Scientific article	English	India	Educational Institutions	- Theoretical review of smart materials and their artistic applications. - Qualitative case studies in educational settings. - Workshop experimentation and observation of student projects. - Comparative analysis of educational metrics before and after integration. - An interdisciplinary approach combining art, materials science, and engineering.	- Explore how smart materials expand the expressive and functional possibilities of sculpture. - Assess the educational impact of incorporating them into sculpture education. - Identify challenges (cost, technical complexity, sustainability). - Propose an interdisciplinary curriculum framework for teaching them.	SGDs 4, 9, 11, 12.	[70]
2024	Jian, Yi; & Abu Bakar, Juliana Aida	Comparing cognitive load in learning spatial ability: immersive learning environment vs. digital learning media	Scientific article	English	Malaysia	Educational Institutions	- Experimental design featuring both a control and experimental group. - Participants: 28 first-year art students, categorized by gender and initial performance. - Independent variables: type of learning environment (DLM versus ILE). - Dependent variables: academic performance (multi-view test) and cognitive load (Likert scale). - Statistical analysis: normality tests, - Student's t-test, and one-way ANOVA.	- Compare the learning performance of spatial abilities in an immersive learning environment (ILE) versus a traditional digital learning environment (DLM). - Assess cognitive load in both environments. - Examine the impact of gender on performance and cognitive load.	SGDs 4, 5, 9.	[71]
2024	Kim, Ji-Yoon; Kim, Han-Sol	Innovative Integration of Poetry and Visual Arts in Metaverse for Sustainable Education	Scientific article	English	South Korea	Educational Institutions	- Mixed methods (qualitative and quantitative). - Survey of 85 exhibition visitors in the metaverse (7-point Likert scale). - Focus group interviews (FGI) with four visual design students who produced the works. - Statistical analysis using R: descriptive statistics, correlation analysis, logistic regression, structural equation modeling (SEM). - Practical project: creation and exhibition of "visual poetry" posters in a virtual environment (Meum platform).	- Formulate a convergent pedagogical approach that leverages the metaverse to merge poetry and visual arts. - Assess student satisfaction regarding the content and instructional method. - Examine the correlation between satisfaction with the content and the instructional approach. - Investigate the advantages and drawbacks of the metaverse in arts education. - Provide actionable recommendations for educators and metaverse developers.	SGDs 4, 9, 11, 13.	[72]

Table 1. Cont.

YEAR	AUTHORS	TITLE	TYPE	LANGUAGE	COUNTRY	CONTEXT	METHODOLOGY	OBJECTIVES	SGD	REFERENCES
2025	Yang, Mei; Zhang, Jingru; Yahaya, Wan Ahmad Jaafar Wan; Yang, Yong	Developing and implementing the fourdimensional aesthetic education framework in elementary education	Scientific article	English	China and Malaysia	Educational Institutions	- Quasi-experimental design incorporating pre- and post-intervention assessments. - Participants: 49 first-year Primary Education students from an institution in Jiangsu, China. - Intervention: A 12-week (32-h) art course grounded in the 4DAE framework. - Instruments: Validated pre- and post-intervention questionnaires utilizing a 5-point Likert scale (Cronbach's alpha: 0.867 pre-intervention, 0.933 post-intervention). - Statistical analysis: Normality assessments (Shapiro-Wilk), paired t-tests, and Wilcoxon signedrank test for non-parametric data, conducted using SPSS 26.0. - Satisfaction survey administered at the conclusion of the course.	- Propose and validate the Four-Dimensional Aesthetic Education (4DAE) framework for the training of primary school teachers. - Assess the framework's effectiveness in cultivating students' aesthetic, critical, creative, and pedagogical competencies. - Investigate student satisfaction with the revamped course. - Enhance the incorporation of aesthetic education into teacher training within the context of sustainable development.	SGDs 4, 11, 12, 16.	[73]
2023	Huerta, Ricard	Educar en disseny a secundària mitjançant les píndoles Second Round	Scientific article	Catalan	Spain	Educational Institutions	- Participatory action inquiry. - Case studies in secondary education. - Development and application of audiovisual materials (educational modules). - Collaboration between universities and schools. - Qualitative methodology with theoretical examination and analysis of pedagogical practices.	- Establish a meeting space for professionals in art and design education. - Cultivate a spirit of collaboration among drawing instructors. - Create online communication channels between educators and master's students. - Formulate action plans that promote design education in secondary schools. - Inspire teachers and students through dialogue networks. - Incorporate ICT in the creation and dissemination of images. - Coordinate efforts between universities and secondary schools. - Connect design education with sustainability and the Sustainable Development Goals (SDGs).	SGDs 4, 5, 9, 11, 12, 17.	[74]

Table 1. Cont.

YEAR	AUTHORS	TITLE	TYPE	LANGUAGE	COUNTRY	CONTEXT	METHODOLOGY	OBJECTIVES	SGD	REFERENCES
2024	Gebeshuber, Ille C.; Graves, Pia M.; Wardzinska, Inez; Mateus-Berr, Ruth; Shanahan, Breda Walsh	Interdisciplinary Approaches in Engineering Education: Preparing Young Minds for Complex Challenges	Conference paper	English	Austria and Ireland	Educational Institutions	- A qualitative-descriptive approach grounded in exemplary best practices. - An overview of specific educational initiatives (Rainbow Cocoa Creations, EduFungi Constructs, Viral Canvas). - A theoretical framework underpinned by educational theories (Kolb, Bloom, Vygotsky) and methodologies (Design Thinking). - Excludes quantitative experimental methodologies or statistical analyses; it serves as a reflective article and a dissemination of experiences.	- Emphasize the benefits of incorporating arts and sciences (STEAM) into engineering education. - To showcase exemplary practices in interdisciplinary education. - Demonstrate how these methodologies equip students to tackle complex challenges. - Advocate for interdisciplinary collaboration as a sustainable framework for educational innovation.	SGDs 4, 9, 12, 17.	[75]
2024	Ben-Horin, Oded	Creativity in an Emergent and Improvisational Global Educational Environment	Book chapter	English	Norway	Educational Institutions	- A qualitative case study grounded in the author's experience as the coordinator of the Global Science Opera (GSO) and as a middle manager at a higher education institution. - A reflective and theoretical approach, underpinned by conceptual frameworks including intra-action (Barad), creative pedagogies, educational improvisation, and posthumanism. - This is not an empirical study featuring quantitative data; rather, it constitutes a conceptual and experiential analysis.	- Elucidate the innovative and emergent pedagogy of the Global Science Opera. - Examine the managerial challenges associated with creative R&D initiatives in higher education. - Advocate for an intermediate leadership strategy grounded in improvisation, risk-taking, and intra-action. - Make a case for the necessity of a transdisciplinary shift in higher education to effectively address the Sustainable Development Goals.	SGDs 4, 13, 16, 17.	[76]
2010	de Eça, Teresa Torres Pereira	Educação através da arte para um futuro sustentável	Scientific article	Portuguese	Portugal	Educational Institutions	- Theoretical-reflective approach rather than empirical. - Grounded in a literature review and documentary analysis of educational policies, international declarations (UNESCO, EU), and prominent authors (Eisner, Hetland, Mészáros, among others). - Incorporates examples of educational practices from Spain, Portugal, and Brazil to support its arguments.	- Define the role of arts education in fostering a sustainable future. - Advocate for the necessity of a new transdisciplinary educational paradigm centered on creativity. - Emphasize the significance of teacher training in realizing this transformation.	SDGs 4, 10, 11, 12, 16, 17.	[77]

Table 1. Cont.

YEAR	AUTHORS	TITLE	TYPE	LANGUAGE	COUNTRY	CONTEXT	METHODOLOGY	OBJECTIVES	SGD	REFERENCES
2023	Mascarell-Palau, David; & Rodriguez-Lopez, Ramona	Reflexiones de estudiantes de magisterio entorno al paisaje sonoro y la visualidad con dispositivos móviles en el grado de infantil	Scientific article	Spanish	Spain	Educational Institutions	- Qualitative methodology, descriptive and explanatory case study. - Sample: 33 third-year students enrolled in the Early Childhood Education Degree program at the University of Valencia. - Data collection methods: Focus groups, qualitative questionnaires featuring open-ended and semistructured questions. - Data analysis: Qualitative content analysis, identification of metacodes and emerging categories.	- Cultivate reflection and awareness among prospective educators and young children concerning the SDGs through active listening and the utilization of mobile devices. - Evaluate students' responses to the proposed pedagogical approach. - Enhance digital competence through mobile devices in Early Childhood Education. - Encourage innovative activities that transform traditional educational practices.	SDGs 4, 5, 6, 7, 13, 16, 17.	[78]
2023	Font-Company, Enric	Espacios compartidos: prácticas artísticas urbanas en entornos formativos	Scientific article	Spanish	Spain	Educational Institutions	- A qualitative approach grounded in pedagogical experience and action research. - Design: A comprehensive description and analysis of projects executed in two contexts (Eina—Design; UB—Education). - Data collection: Evaluation questionnaires, self-assessment forms, surveys of campus users, and analysis of artistic outputs. - A systematic sample is not delineated; instead, the involvement of students in particular projects is taken into account.	- Contemplate the responsible utilization of shared spaces. - Engage in artistic creation and explore the communicative potential of images. - Contribute to the design of one's own learning process. - Develop the technical and organizational skills necessary to employ murals as a pedagogical tool in socio-educational contexts.	SDGs 4, 10, 11, 16, 17.	[79]
2022	Romero Pineda, Rafael; & Porquer Rigo, Joan Miquel	Enseñar tintas antiguas en la educación superior de artes plásticas. Miradas pretéritas ante futuros inciertos	Scientific article	Spanish	Spain	Educational Institutions	- A qualitative and pragmatic approach grounded in didactic experimentation. - Three interrelated phases: (1) Theorization: Historical and technical contextualization of inks. (2) Production: Practical synthesis of inks (carbon and metallic) in the laboratory. (3) Creative experimentation: Artistic application of inks in individual projects. - Service-Learning (SL): Dissemination of knowledge to secondary school students via workshops.	- Restore and enhance traditional ink-making techniques within higher arts education. - Cultivate a sustainable and heritage-oriented approach to artistic practice. - Facilitate knowledge transfer to society through service-learning initiatives. - Encourage creative experimentation with traditional materials in modern contexts.	SDGs 4, 11, 12, 17.	[80]

Table 1. Cont.

YEAR	AUTHORS	TITLE	TYPE	LANGUAGE	COUNTRY	CONTEXT	METHODOLOGY	OBJECTIVES	SDG	REFERENCES
2022	Malytska, Olena; Patron, Iryna; Chabanenko, Natalia; Shvets, Olena; Polishchuk, Anna; & Martyniv, Liubomyr	Development of Art Education as a Basis for Sustainable Development of Society	Scientific article	English	Ukraine	Educational Institutions	- A qualitative and pragmatic approach grounded in didactic experimentation. - Three interrelated phases: (1) Theorization: Historical and technical contextualization of inks. (2) Production: Practical synthesis of inks (carbon and metallic) in the laboratory. (3) Creative experimentation: Artistic application of inks in individual projects. - Service-Learning (SL): Dissemination of knowledge to secondary school students via workshops.	- Restore and enhance traditional ink-making techniques within higher arts education. - Cultivate a sustainable and heritage-oriented approach to artistic practice. - Facilitate knowledge transfer to society through service-learning initiatives. - Encourage creative experimentation with traditional materials in modern contexts.	SDGs 4, 11, 12, 17.	[81]
2014	Bengtson, Jaylene K.	Changing Perspectives for Students At-Risk Through Expressive Art Experiences: A Case Study	Dissertation	English	United States	Educational Institutions	- Qualitative methodology incorporating mixed methods. - Case study framework (Grover Middle School). - Action research and visual ethnography (observation, journals, videos, photographs). - Data acquisition: - Participant observation (the researcher concurrently serves as the art instructor). - Interviews with educators, administrators, students, and a resource officer. - Surveys targeting teachers and students. - Analysis of artifacts (journals, masks, murals). - Data triangulation and grounded theory employed to discern emerging themes.	- Examine the essential components of an integrated arts program that foster academic and behavioral success. - Develop and execute an arts intervention program (Studio Express) tailored for at-risk students. - Assess the influence of expressive art on self-leadership, self-esteem, and behavior. - Explore the potential of art as a catalyst for philosophical and collaborative transformation in educational settings. - Recommend a sustainable framework for incorporating art into alternative education programs.	SDGs 4, 3, 10, 16	[82]

Table 1. Cont.

YEAR	AUTHORS	TITLE	TYPE	LANGUAGE	COUNTRY	CONTEXT	METHODOLOGY	OBJECTIVES	SGD	REFERENCES
2025	Basanta, Carmen; Urpi, Carmen	Art-Based Museum Programs for Teacher Wellbeing: A Delphi Study for a Socially Just and Sustainable Framework	Scientific article	English	Spain	Museum Institutions	- Delphi study in two rounds with a panel of international experts. Participants: 26 experts in the first round, 17 in the second, from universities, schools, museums and art and welfare organizations. Instrument: Quantitative questionnaire with Likert scales and spaces for qualitative comments. - Data analysis: Statistical (averages, fashions, standard deviation) and qualitative analysis of comments. - Approach: Expert consensus for the construction of a pedagogical framework.	- Establish a consensus-driven pedagogical framework for art-based museum programs that enhance teacher well-being. - Determine essential guidelines across nine domains: audience, objectives, content, methodology, timeline, facilitators, activities, evaluation, and compliance. - Advance socially equitable arts education and SGD4.	SGDs 3, 4, 10, 11, 17.	[83]
2025	Xay, Pham Van; Khanh, Mai Quoc; Kien, Phan Trung; Tinh, Tran Trung; Nguyen, Do Le	Bridging art, culture and ecology: innovative environmental education practices in university settings	Scientific article	English	Vietnam	Theoretical Focus	- Qualitative approach utilizing a case study design at MUCA. - Mixed methods: - 52 comprehensive interviews with faculty members. - Surveys conducted with 120 students. - Content analysis of artistic projects and exhibitions. - Thematic and comparative analysis of qualitative and quantitative data.	- Investigate how the incorporation of art and culture into university environmental education enhances ecological awareness. - Assess the influence of creative practices (public art, workshops, exhibitions) on students' sustainable behaviors. - Discern challenges and opportunities associated with the implementation and scalability of these initiatives.	SGDs 4, 11, 12, 13, 15, 17.	[84]
2024	Li, Shan; Gou, Zenghui; Lu, Chan	The Evaluation of Art Beauty in the Integration of Art Elements Into Urban Street Landscape Ecological Environment Construction	Scientific article	English	China	Theoretical Focus	- Theoretical examination of concepts in art, ecology, and aesthetic appraisal. - Comparative analysis of artistic integration and conventional landscape transformation. - Mathematical modeling (formulas for beauty evaluation, optimization algorithms). - Case studies employing comparative figures and tables (e.g., plant growth with and without water). - Psychophysical methodology for assessing landscape beauty.	- Assess the incorporation of artistic elements within the ecological urban landscape. - Formulate a model for aesthetic evaluation in urban environments. - Suggest strategies to enhance sustainability and aesthetic appeal in cities. - Advocate for art education as a means to foster ecological awareness.	SGDs 4, 9, 11, 13, 15.	[85]

Table 1. Cont.

YEAR	AUTHORS	TITLE	TYPE	LANGUAGE	COUNTRY	CONTEXT	METHODOLOGY	OBJECTIVES	SGD	REFERENCES
2024	Tao, Yiyi; Tao, Yuheng	Integrating Aesthetic Education in Quality Education: A Bibliometric Analysis of Sustainable Development Perspectives	Review	English	China and Taiwan	Theoretical Focus	- Bibliometrics employing the CiteSpace tool. - Analysis of keyword cooccurrence. - Thematic clustering of research studies. - Examination of temporal evolution (timeline, timezone view, burst detection). - Database: Web of Science (824 articles, 2015–2023). - Quantitative-qualitative methodology to identify trends, thematic cores, and research frontiers.	- Examine research trends in aesthetic education and quality education within the context of sustainable development. - Delineate thematic areas and their progression over time. - Identify research frontiers and prospective directions. - Provide a theoretical and practical foundation for scholars, administrators, and educators.	SGDs 4, 10, 16, 17.	[86]
2021	Si-Hang, Cheng; Yun-Long, Wang	The Application of Entertainment Design and Digital Technology in Children's Educational Exhibition Space: Take the art Education in Fun exhibition as an example	Conference paper	English	China	Theoretical Focus	- Practical case study: an analysis of the design and development of the "Art Education in Fun" exhibition. - A qualitative-descriptive approach centered on spatial, visual, and interactive design. - Implementation of principles related to spatial narrative, child psychology, and digital technology. Excludes quantitative experimental methodology (e.g., impact assessment on learning).	- Incorporate entertainment design and digital technology into the exhibition environment. - Augment the spatial narrative and interactive engagement. - Inspire children's curiosity, creativity, and innovative thought. - Develop a more scientific and captivating educational space that departs from conventional linear models. - Provide a multidimensional and more nuanced exhibition experience.	SDGs 4, 9, 11, 12, 17.	[87]
2019	Sumozas, Rafael; & Galindo Miguel, Beatriz	Educación artística y gestión cultural. Imagen visible del desarrollo sostenible	Conference paper	Spanish	Spain	Theoretical Focus	- Theoretical-descriptive approach: A documentary review and conceptual analysis of international frameworks (2030 Agenda, UNESCO, international declarations). - Thematic structure: Organized into three primary sections: (1) Culture as an educational paradigm. (2) Sustainable art as a catalyst for development. (3) The 2030 Agenda and the SDGs as components for cultural and artistic discourse. - An empirical methodology involving data collection is not included; this is a work of theoretical reflection and proposal.	- Underscore the potential of cultural and arts education as a tangible manifestation of sustainable development. - Connect arts education and cultural management with the Sustainable Development Goals (SDGs). - Advocate for teacher training in arts education as a means of promoting heritage and culture. - Highlight the significance of sustainable art as a catalyst for cultural and environmental advancement.	SDGs 4, 8, 11, 12, 16, 17, 5, 10, 13, 16	[88]

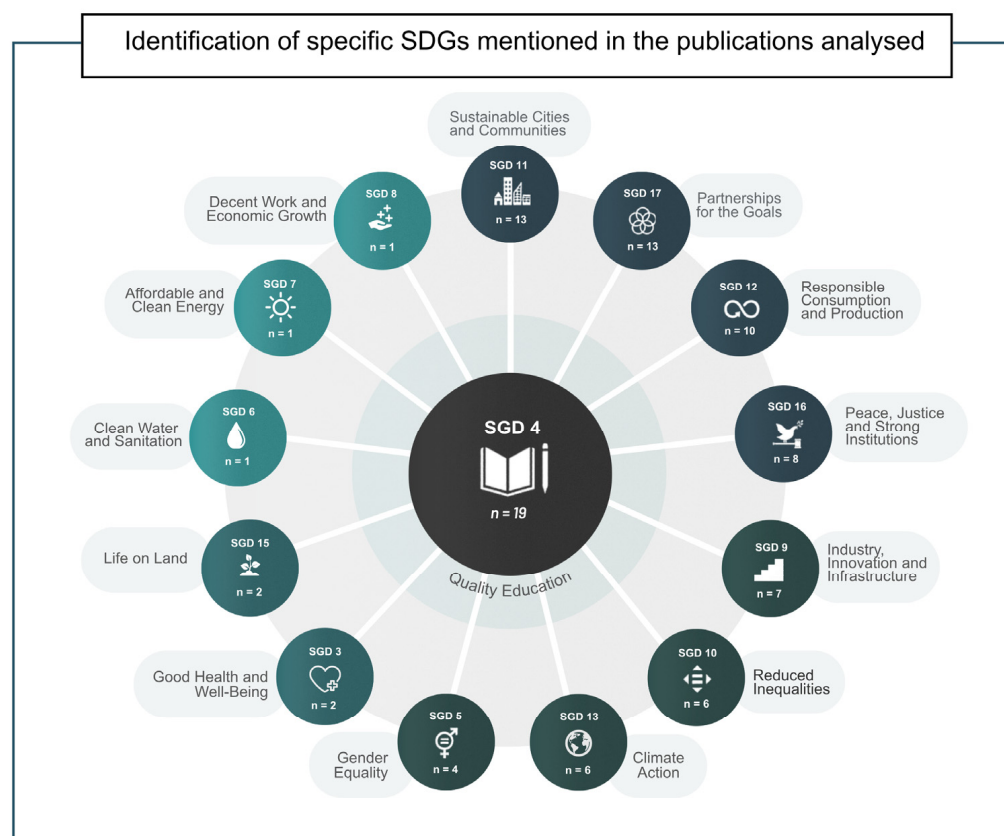


Figure 3. Identification of specific SDGs mentioned in the publications analysed. Source: Figure prepared by the authors.

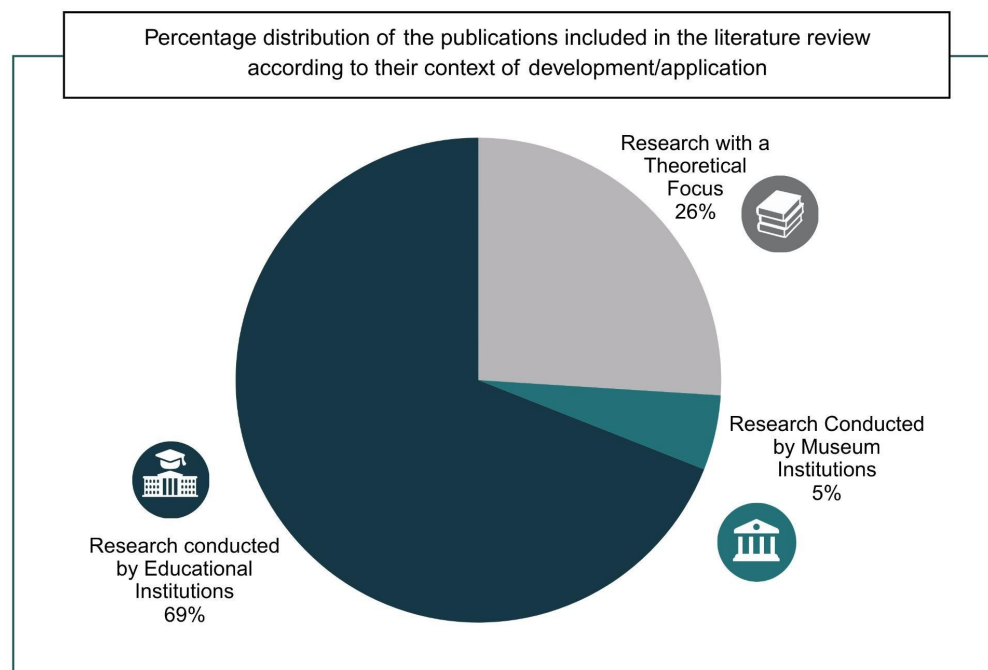


Figure 4. Percentage distribution of the publications included in the literature review according to their context of development/application. Source: Figure prepared by the authors.

Regarding the 19 publications included in the final sample, the majority correspond to peer-reviewed scientific articles ($n = 13$; 68.42%). To a lesser extent, other formats are identified, such as conference papers ($n = 3$; 15.78%), book chapters ($n = 1$; 5.26%), reviews ($n = 1$; 5.26%), and academic dissertations ($n = 1$; 5.26%). These data highlight the predominance of scientific journals as the main channel for disseminating knowledge in this field, reinforcing their relevance within academic production. This trend aligns with the guidelines of DORA and CoARA, which emphasize the role of academic journal publications—especially in OA—in the dissemination of research results. It also reveals a preference for indexed formats over other traditional channels, such as book chapters or monographs, in line with the principles of the San Francisco Declaration, which underscores the importance of disseminating research data in OA to ensure that results are accessible to a broad audience and support the democratization of knowledge.

In line with the above, it is important to analyse the geographical distribution of the publications included in this review. The main geographical clusters of the institutions that have conducted this research are shown in Figure 5. A total of 23 university institutions have examined this phenomenon within the selected articles ($n = 23$). Two principal geographical hubs can be identified: Europe with Spain standing out ($n = 7$), and Asia, led by China ($n = 4$). By contrast, scientific studies on education, creativity, innovation, and the SDGs show only a single contribution from the United States (US), corresponding to the sole dissertation/thesis ($n = 1$) included in this scoping review. This finding suggests that concern for sustainability is particularly rooted in Europe and Asia (12 European academic institutions and 10 Asian academic institutions), both in their political, social, and scientific engagement with the SDGs. It is also noteworthy that most Asian contributions are indexed in Scopus, whereas European publications appear primarily in WoS (Figure 6).

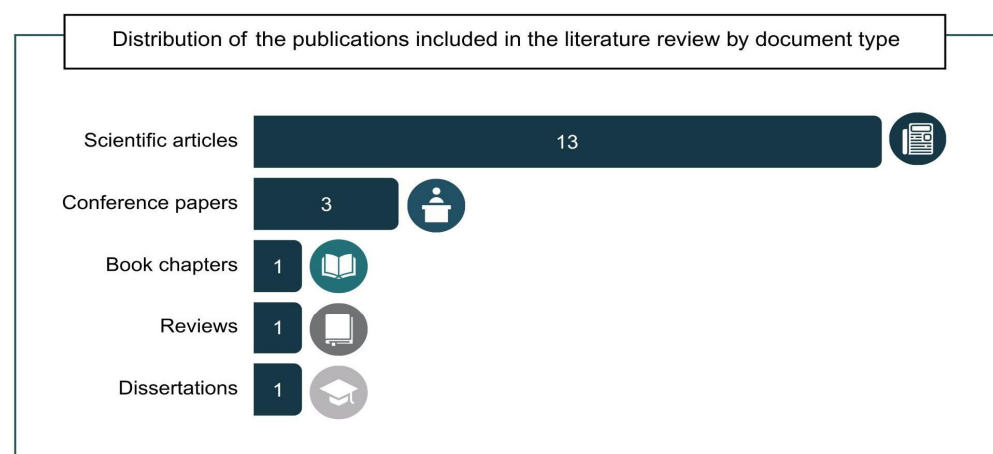


Figure 5. Distribution of the publications included in the literature review by document type. Source: Figure prepared by the authors.

At the linguistic level, a clear predominance of the English language over others can be observed. Among the 19 publications selected, the majority are written in English ($n = 13$; 69%), highlighting its role as the lingua franca of international scientific communication. Spanish ranks second with four contributions ($n = 4$; 21%), while Catalan and Portuguese show a more limited presence, with one publication each ($n = 1$; 5%). It is worth noting the inclusion of a publication in Catalan, a co-official language in Spain, which is particularly relevant within the framework of guidelines promoted by initiatives such as DORA and CoARA, which advocate for linguistic diversity in scientific communication and encourage the dissemination of knowledge across different linguistic contexts (Figure 7).

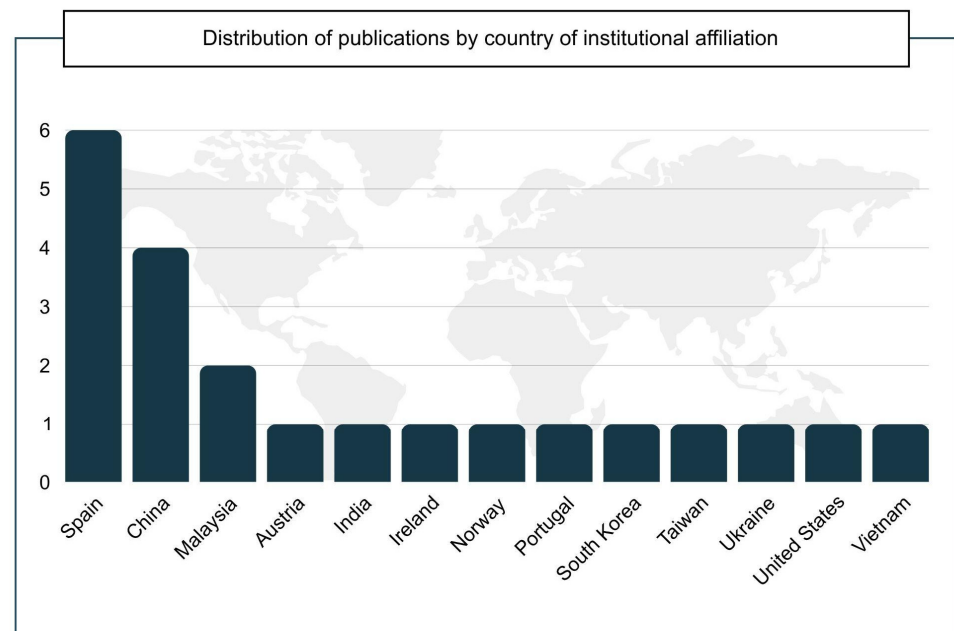


Figure 6. Distribution of publications by country of institutional affiliation. Source: Figure prepared by the authors.

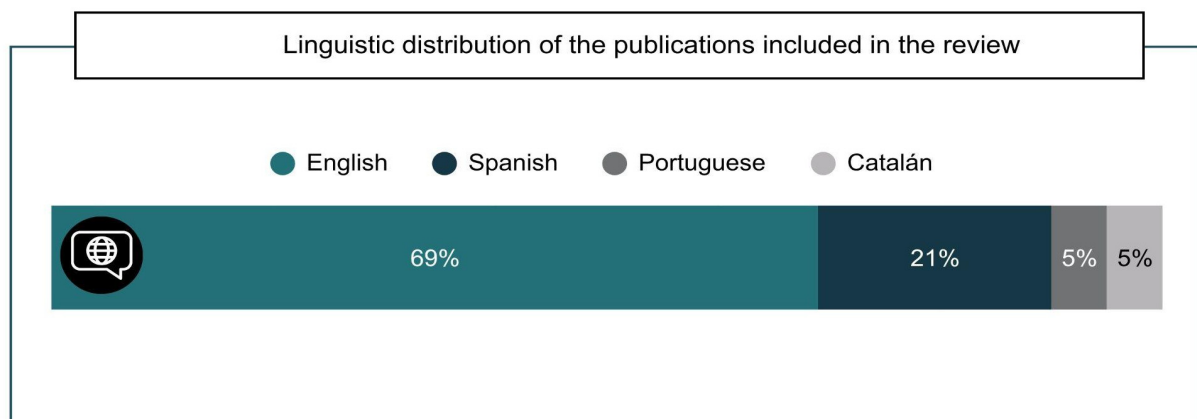


Figure 7. Linguistic distribution of the publications included in the review. Source: Figure prepared by the authors.

With the aim of further developing this perspective, a critical analysis of the main contributions identified in the scientific literature is presented below, focusing on how educational innovation is conceptualized and applied in these publications, and on the approaches through which their contribution to this field of study is articulated.

4.2. Detailed Analysis of the Scientific Literature

To structure this section, we have developed a classification system based on the three types of publications identified according to their contexts of production and application in the preliminary results of this scoping review: (1) studies developed within educational institutions; (2) studies developed within museum institutions; and (3) theoretical studies (Figure 8).

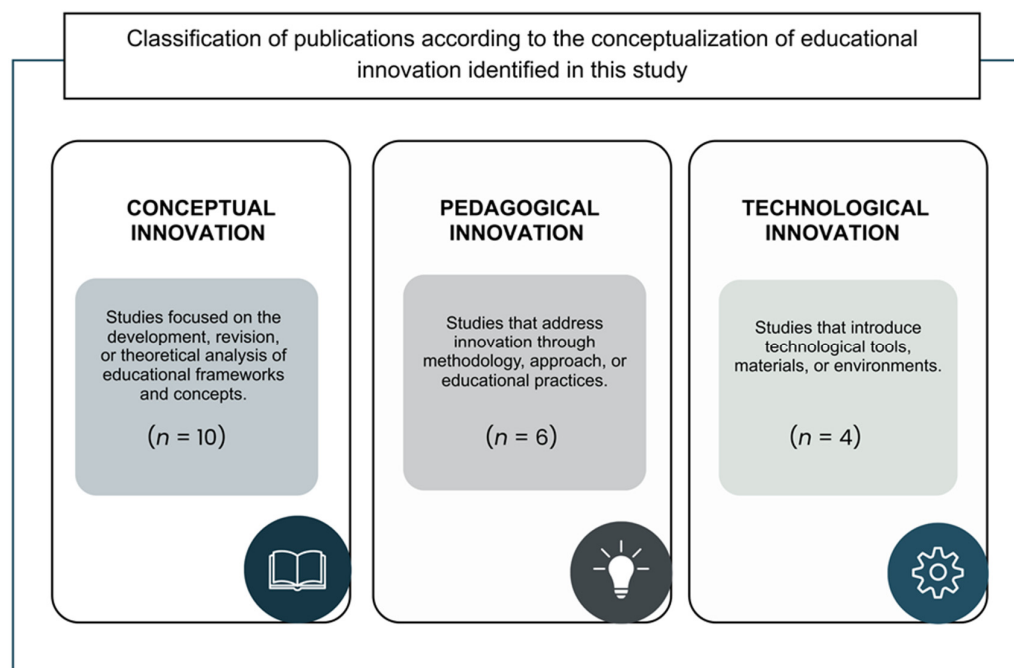


Figure 8. Classification of publications according to the conceptualization of educational innovation identified in this study. Source: Figure prepared by the authors.

In addition to the classification by institutional context, the detailed analysis of these publications seeks to identify different conceptualizations of educational innovation present in the scientific literature—that is, to understand the perspectives from which authors approach innovation. In this regard, the publications are grouped into three main types: technological innovation ($n = 4$), focused on the incorporation of digital tools, materials, or emerging resources; pedagogical innovation ($n = 6$), based on the development of new teaching–learning strategies; and conceptual innovation ($n = 9$), oriented towards the theoretical redefinition of educational frameworks and the foundations guiding educational practices. This classification makes it possible to understand not only where innovative proposals are developed, but also which educational dimensions are being advanced in terms of arts education and sustainability.

4.2.1. Studies Developed Within Educational Institutions

As indicated above, the predominant axis in arts education and sustainability proposals originates from educational institutions, specifically within the realm of formal education. This section presents 13 distinct publications ($n = 13$), all of which are supported by university departments.

First, a synthesis is provided of the contributions identified in the Scopus database, with results predominantly presented in English. This further confirms the dominance noted earlier, which can be interpreted in relation to the processes of internationalization in academic research.

A first group of studies links educational innovation to technological innovation through the use of new Information and Communication Technologies (ICT) tools in educational processes. The work of Sharma *et al.* [70] is the most recent contribution in this regard. It presents a theoretical approach to innovation based on the integration of “smart materials” in the classroom, with the aim of fostering arts education, specifically in the field of sculpture. From a perspective clearly centred on interdisciplinarity and experiential learning, this study may be particularly valuable for educators and artists interested in techniques, materials, and methods applied to sculpture. However, certain theoretical

aspects receive limited attention, especially those related to sustainability, which is only implicitly identified as a relevant challenge. As a result, the text is primarily descriptive in nature. Although it stands out for its innovative technical approach, its findings may be less directly transferable to other educational contexts, particularly in relation to the SDGs and sustainability. The following section presents two publications that link educational innovation with the use of digital technological tools in educational settings.

The first, also situated within the university context, corresponds to the study by Jian *et al.* [71]. It presents an experimental study from the perspective of technological innovation, focusing on the use of Virtual Reality (VR). The research centres on the development of participants' creative skills ($n = 28$). It employs a rigorous methodology, including a control group, and provides clear evidence of the benefits of VR in arts education. However, its small sample size may limit the scope of the results. The study also examines practical aspects such as cost, accessibility, and the teacher training required to implement these tools—labelled as innovative—within arts education classrooms.

The second study, also linked to technological innovation in the university context, presents the work of Kim and Kim [72]. Through surveys conducted with visitors to an exhibition in the metaverse ($n = 85$), the study develops a practical project involving the creation and display of “visual poetry” posters in a virtual space (within the Meum platform). From an arts education perspective, the study explores the integration of immersive technologies into artistic disciplines; however, the absence of a control group makes it difficult to compare its outcomes with more traditional methods. Furthermore, although the study mentions sustainability as a potential benefit of the proposal, it does not provide data that would allow for a concrete evaluation of its impact on reducing environmental impact.

In a different vein, the proposal by Yang *et al.* [73] is situated within pedagogical innovation, presenting an innovative methodology in the field of higher education. The project was developed with first-year undergraduate students in a Primary Education degree programme in China ($n = 49$). The intervention lasted 12 weeks and was based on the Four-Dimensional Aesthetic Education (4DAE) framework, a methodological approach that integrates arts and aesthetic education, teacher training, and the SDGs. To assess its impact, the study adopted a quasi-experimental design with pre- and post-intervention measurements. Data were collected through Likert-scale questionnaires, and the results were analysed statistically. The findings indicate significant improvements in participants' artistic perception, critical thinking, creativity, and teaching-related communication skills, as well as a high level of satisfaction with the course. Overall, the methodological design is robust for a small-scale educational intervention, as it employs validated instruments and appropriate statistical analysis. In this sense, the study offers an interesting approach for exploring the relationship between arts education, teacher training, and education for sustainability.

In a similar vein, the pedagogical innovation study by Huerta [74], although applied to a different educational context, is developed with secondary education students. It proposes incorporating creative methodologies from arts education into design through audiovisual resources (referred to as “learning capsules”). Among its objectives is fostering collaboration between universities and secondary schools, integrating theoretical review with the analysis of educational practices. It offers a transferable model for integrating design, technology, and sustainability in secondary education, with a strong emphasis on educational innovation and institutional collaboration. The text represents an example of applied action research with a practical and collaborative approach, developed over six editions, using OA resources and integrating theory with educational practice. The project opens up new research possibilities, such as conducting systematic

evaluations of learning impact, expanding the quantitative description of its results, and exploring strategies to support teacher engagement and motivation in implementing these educational practices.

Publications are also identified that approach educational innovation from a conceptual perspective, grounded in a theoretical–discursive framework. An example is the work of Gebeshuber *et al.* [75]. In the form of a conference paper, it analyzes various educational projects (Rainbow Cocoa Creations, EduFungi Constructs, and Viral Canvas) using a qualitative–descriptive approach. The text proposes a theoretical framework for the use of these engineering technologies in educational contexts and their potential suitability for developing new pedagogical models based on arts education. As such, it adopts a more reflective than empirical stance, with a primarily conceptual and expository focus. Consequently, some relevant practical aspects—such as teacher training, resource availability, or potential curricular resistance to the incorporation of these approaches—are addressed only to a limited extent.

Similarly, Ben-Horin [76] presents a book chapter with a reflective and theoretical approach to an arts education project developed within higher education (Global Science Opera). The text, framed within conceptual innovation, explores how creative pedagogies, educational improvisation, and posthumanism generate both conceptual and experiential learning for participants. It offers an innovative reflection and contributes to ongoing debates on arts education in the university context. At the same time, empirical evidence regarding the development of the project is relatively limited, and its connection to the SDGs is addressed primarily at a discursive level.

The work [77] on arts education by Eça is particularly noteworthy, presenting a conceptual innovation project developed five years prior to the emergence of the SDGs, and thus demonstrating an early awareness of the potential of arts education for education for sustainability. This article, the oldest within Scopus on formal education, with a gap of 13 years compared to its immediate successor, adopts a theoretical and reflective rather than empirical approach. Through a literature review and documentary analysis of educational policies, international declarations, and key authors, the Portuguese scholar substantiates the role of arts education in promoting a sustainable future. To this end, the author argues for the need to develop a new transdisciplinary educational paradigm centred on creativity, emphasizing the importance of teacher training in this field. The text in [77] successfully establishes a compelling link between arts education, sustainability, and social justice. However, it is limited by a lack of practical orientation, as it does not offer concrete methodologies for implementing the proposed changes, nor does it address potential structural barriers (such as funding or institutional resistance) beyond teacher training. Furthermore, its scope is predominantly European, although it includes examples from Brazil.

Next, the contributions identified in the other database used, Web of Science, are analysed. In the university context, Mascarell-Palau and Rodríguez-López [78], in pursuit of pedagogical innovation, conduct a qualitative study with a descriptive and explanatory case study approach, applied to arts education students ($n = 33$) enrolled in a Degree in Early Childhood Education at the Universitat de València. Through focus groups and qualitative questionnaires, the authors examine how the integration of the SDGs can foster reflection and awareness among future educators, using active listening and mobile devices. The results show that students perceive the integration of the SDGs as a relevant educational topic that enhances creativity in early childhood education. The study sample is limited and focuses on a single university, which suggests the need to consider its extension to other contexts. Although some difficulties in its implementation are mentioned, the text opens the possibility of exploring concrete strategies to support teacher training. Furthermore,

the project is primarily developed within a university context, offering a solid foundation that could be adapted and applied in early childhood classrooms in the future.

In line with this, the publication by Font-Company [79] presents a proposal for pedagogical innovation in university contexts. Using a qualitative approach based on teaching experience and action research, the study introduces interventions involving urban art as a pedagogical resource for arts education, with 100% reported student satisfaction. The article offers a well-founded and innovative pedagogical proposal, with a clear intention to link arts education to urban space and social responsibility. It is also one of the few documents identified in this review that includes visual materials to support the understanding of the pedagogical proposal. The initiative demonstrates a creative and applicable approach, although it leaves room for further development in terms of systematic data collection and the inclusion of diverse student perspectives.

Also within the Spanish-speaking context, Romero Pineda and Porquer Rigo [80] present a Service-Learning project, in this case developed with secondary education students. From a pedagogical innovation perspective, its aim is to foster a sustainable approach to artistic practice based on knowledge of historical heritage. The study demonstrates a growing critical awareness of sustainability, cultural heritage, and contemporary artistic creation. At the same time, it suggests the need to develop a specific conclusions section and to establish mechanisms for systematically evaluating results, their long-term impact, and student satisfaction.

The relationship between arts education and cultural heritage is also addressed by Malytska *et al.* [81] from the perspective of conceptual innovation. Through a qualitative and practice-oriented approach based on pedagogical experimentation, they propose a model that seeks to connect both fields in relation to sustainability. Presented as the editorial of a monographic journal issue, the document highlights the conceptual premises of the model, offering an inspiring framework for future educational practices rather than a fully developed project.

The document that concludes this section is Bengtson's [82] pedagogical innovation, an academic dissertation that connects arts education with educational psychology. Through a qualitative approach incorporating elements of mixed methods, it presents a case study design conducted at Grover Middle School, and it is the only document in this review originating from the US. It is noteworthy that the study was carried out under time constraints and with some variability in attendance, suggesting opportunities to strengthen planning and consistency in future implementations. The absence of a control group also points to the need for strategies that could enhance the generalisability of the results. At the same time, its narrative and qualitative–humanistic approach stand out for capturing in depth the complexity of students' artistic experiences, which constitutes one of the project's main strengths.

4.2.2. Studies Developed Within Museum Institutions

In this scoping review, only one publication was identified that explores innovation in arts education and sustainability from a museum institution rather than from a university department, in which educational innovation is approached from a conceptual perspective. This is the study by Basanta and Urpí [83], who present a project designed within a museum setting. In their work, the Spanish researchers conduct a Delphi study with experts from universities, museums, schools, and art and well-being organizations ($n = 27$). The aim is to develop expert consensus for the construction of a pedagogical framework focused on designing museum-based art programmes that promote teacher well-being. In addition, the project seeks to contribute to the development of socially just arts education through the promotion of quality education. The article demonstrates rigorous research, with a solid

methodological design and clear social relevance. The integration of perspectives on social justice and teacher well-being is both innovative and necessary. At the same time, the selection of experts—predominantly from Western contexts—suggests opportunities to broaden the intercultural validity of the project, and the inclusion of in-service teachers as direct participants could further enrich the conclusions.

4.2.3. Theoretical Studies

This section includes studies primarily focused on theoretical analysis and reflection. Their main strength lies in providing analytical frameworks, linking arts education with sustainability and the SDGs, and opening up avenues for interdisciplinary discussion. This is the case of Pham Van Xay *et al.* [84], who conduct a theoretical-reflective study accompanied by qualitative analysis aimed at conceptual innovation. The study includes in-depth interviews with teachers ($n = 52$) and surveys of students ($n = 120$). The results establish connections between art, culture, and environmental education within a specific university context, showing how both faculty and students perceive the integration of the SDGs into arts education and educational innovation. However, it would be useful to assess the generalisability of these findings, as no empirical evidence from statistical studies conducted in other public or private institutions is included. In conclusion, the publication does not present a concrete innovative project, but rather offers an interesting state of the art based on personal perspectives.

An interdisciplinary theoretical review is presented in the conceptual innovation study by Li *et al.* [85], which analyses the concepts of “art,” “ecology,” and “aesthetic evaluation.” Through a comparative analysis between artistic integration and traditional landscape transformation, the article offers an innovative proposal by linking art, ecology, and urban design. Its methodological design combines mathematical modeling with qualitative analysis. It would be useful to clarify the practical application of the formulas presented, given the study’s theoretical orientation. Likewise, although the interdisciplinary approach is valuable, the integration of art and ecology opens the possibility for further exploration of their relationship in greater depth.

A bibliometric study by Tao and Tao [86] is also included, conducted using the CiteSpace tool on the Web of Science database, within the framework of conceptual innovation. Through a rigorous methodology, the study presents relevant, well-structured, and robust bibliometric results, clearly linked to the 2030 Agenda and identifying gaps and future research directions. This approach provides a solid foundation for guiding future research in arts education; however, it focuses exclusively on a single database, on English-language scientific literature, and on quantitative analysis, leaving room to complement these findings with qualitative approaches or sources in other languages.

A conference paper by Cheng and Wang [87] also appears, presenting a proposal from the perspective of technological innovation through the design of an art exhibition. Focused on integrating entertainment design and digital technology within the museum space, the authors aim to create a more engaging and scientifically oriented educational environment that breaks with traditional models. The proposal is highly suggestive from a conceptual and creative standpoint, although it could be further developed through empirical evaluation to assess its actual educational impact.

Finally, the conference paper by Sumozas and Galindo Miguel [88] offers a conceptual innovation analysis through a documentary review and an examination of international frameworks related to the SDGs from the perspective of arts education. Organized into three main sections, the study develops a conceptual analysis of the relationship between the 2030 Agenda, the SDGs, and key elements of arts education and cultural heritage. As a result, the text provides a well-documented and integrative view of the role of arts

education and cultural management in sustainable development. At the same time, the study is primarily theoretical in nature and focuses on a single illustrative case (Inhotim), which opens opportunities for future empirical research to expand its applicability.

5. Conclusions

Following this in-depth review focused on the analysis of publications presenting innovative and sustainable educational processes based on arts education within the OA literature, it is noteworthy that all the publications analysed make explicit reference to SDG4, consistently linking it to the concept of sustainability, despite it not being specified in the search strategy. In other words, SDG4 functions as a common and transversal nexus in the pedagogical and theoretical projects found in the scientific literature that brings together creativity, sustainability, and innovation [10,58,62]. This demonstrates a growing concern with educating for sustainability as a starting point for a more sustainable world [11,12]. This finding also aligns with the authors' decision to select OA publications for the study of science oriented towards the democratization of knowledge.

The detailed analysis of the 19 selected publications ($n = 19$) reveals certain trends and issues that still need to be defined and consolidated. Accordingly, this scoping review suggests that publications related to arts education, framed within the context of the SDGs, are currently in a particularly favourable position to develop and generate processes of educational innovation aimed at promoting sustainable best practices [22,24,27,61]. With only three publications prior to 2020—and none before 2010—the majority of the studies analysed fall within the time frame between 2019 and 2025, with a notable concentration between 2022 and 2025. This finding indicates a significant increase in scientific output in recent years, at a moment close to the temporal horizon set by the 2030 Agenda. It is also worth highlighting the absence of publications prior to 2010. In this regard, it should be recalled that the SDGs were established in 2015, which allows for the interpretation that their incorporation into research agendas occurred progressively between 2015 and 2020, a period after which a greater dissemination of results from projects and initiatives linked to their implementation begins to be observed.

When specifically analysing the use of the concept of “innovation,” and more precisely “educational innovation” in relation to SDG4, it becomes necessary to understand it not as an ambiguous notion but to clarify the different ways in which it is manifested [25,26]. Thus, educational innovation does not constitute a homogeneous process; rather, it requires analysis of the approach from which it is developed in order to identify how progress in the field can be promoted. In this scoping review, three types of innovation have been identified: conceptual, pedagogical, and technological. Although technological innovation is often the most recognized in everyday discourse, the results show that it occupies a secondary position compared to pedagogical innovation and, especially, conceptual innovation, which emerges as the predominant form. This finding suggests that the advancement of the field is not based solely on the incorporation of technologies but, more significantly, on the reformulation of conceptual frameworks and the transformation of pedagogical approaches [75–77]. In this sense, it is noteworthy that conceptual advancement outweighs pedagogical development, particularly that which involves empirical implementation in real-world contexts.

It is also observed in the literature analysed that the majority of publications are developed within the field of higher education, particularly in university contexts. In many cases, these are situated within university departments related to early childhood, primary, and secondary education. From this, it can be inferred that there is a clear concern with incorporating the SDGs as content in the training of future teachers [60,73,78]. By contrast, the limited number of publications presenting pedagogical proposals developed at earlier,

compulsory levels of the education system is striking, despite an apparent consensus on the importance of introducing sustainability-related content and knowledge from the earliest stages of education [54,57].

Another aspect worth noting is the near absence of publications focused on the museum field. This gap is particularly significant considering that museum institutions have historically played an important role in cultural mediation and in promoting “cultural rights” for sustainability, a concept currently gaining prominence in scientific research [3,54,83]. In this regard, one possible explanation is that, although innovative practices may indeed be taking place in these contexts, the lack of an obligation to disseminate results in academic formats may cause them to remain underrepresented in systematic search strategies such as this one. Another possible reason lies in the selection of “innovation” as a keyword for this study, as it is a term frequently used in educational research but perhaps less prevalent in museum-related fields. Furthermore, it is noteworthy that few of these publications make use of images to document creative processes and artistic outcomes—either as visual complements to quantitative data or, even less frequently, as research data in their own right. It is also striking that there is a lack of studies employing Arts-Based Educational Research (ABER) methodologies, despite their growing prominence in fields related to arts education [33,34].

In this regard, the literature reviewed confirms that arts education holds significant transformative potential to promote improved practices and to advance towards high-quality ESD. Innovation appears closely linked to creativity as a necessary process for identifying new educational alternatives aimed at achieving SDG4 and its targets before 2030.

6. Future Directions

From an objective analysis of the design and development of this study, one of the inherent limitations of this type of literature review is its reliance on keyword-based searches applied to titles and abstracts within the scientific literature. This criterion may have introduced a bias in identifying relevant publications with innovative processes, simply because they were not labelled under the term “innovation” by their authors.

This bias may have particularly affected the identification of innovative educational processes in arts education for sustainability developed within cultural institutions. The limited presence of publications originating from museums is striking, especially considering that, just as arts education has traditionally been linked to the concept of creativity, museums constitute one of the institutional spaces most closely associated with this concept and with cultural dissemination. It is likely that such publications do exist but were not identified due to the use of different terminologies within the museum field. For this reason, it would be advisable to formulate new search strategies that incorporate specific concepts used in this domain, functioning as synonyms or more commonly employed categories in the museum context than in the educational one. This would allow for a more precise identification of innovative pedagogical practices developed in these spaces and their potential connection to arts education and sustainability.

Another potential line of future research would be to develop arts education projects with a stronger long-term perspective, either through designs with extended duration or through follow-up studies that analyze in detail their effects and outcomes on citizens’ education, particularly in relation to the concept of GCED. This approach would address the issue highlighted by studies that warn that the implementation of ESD often remains limited to partial, superficial, and insufficiently systematic initiatives [88].

In this regard, it is particularly important to address the gap between conceptual innovation and pedagogical innovation, especially that which involves practical or empirical application in real-world contexts. This suggests that, although educational transformations are frequently proposed at a conceptual level, they do not always translate into concrete practices. Therefore, a future line of research could focus on exploring how to materialise these conceptual transformations into real, sustained, and context-sensitive educational proposals.

Likewise, in the case of publications reporting empirical or practice-based research, it would be advisable to conduct studies with a larger number of participants and to provide a more detailed description of their processes. This could contribute to the development of replicable (though adaptable) models for other contexts. Such more detailed studies could also open up new avenues of research within arts education or ABER, enabling further exploration of the impact of applied artistic practices. Identifying these well-documented projects would make it possible to examine whether specific creative methodologies recur within arts education as particularly effective strategies for fostering creativity from a sustainability-oriented perspective.

Overall, the intersection between innovation, creativity, and education emerges as a promising field, whose development we hope will be strengthened by the analysis and conclusions presented in this study. This would require an active commitment from researchers and education professionals across educational, artistic, and scientific institutions, so that future generations may enjoy a more sustainable world than the one we inhabit today.

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Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. PRISMA Checklist

Section and Topic	Item #	Checklist Item	Location Where Item Is Reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Pages 2–7
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Pages 7–9
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 9
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 9
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Page 9
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Pages 9–14
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Pages 9–14
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g., for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Pages 9–14
	10b	List and define all other variables for which data were sought (e.g., participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Pages 9–14
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Pages 9–14

Section and Topic	Item #	Checklist Item	Location Where Item Is Reported
METHODS			
Effect measures	12	Specify for each outcome the effect measure(s) (e.g., risk ratio, mean difference) used in the synthesis or presentation of results.	Pages 9–14
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g., tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Pages 9–14
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Pages 9–14
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Pages 9–14
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Pages 9–14
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g., subgroup analysis, meta-regression).	Pages 9–14
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Pages 9–14
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Pages 9–14
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Pages 9–14
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Pages 9–14
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Pages 9–14
Study characteristics	17	Cite each included study and present its characteristics.	Pages 14–20
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Pages 14–20
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g., confidence/credible interval), ideally using structured tables or plots.	Pages 14–20

Section and Topic	Item #	Checklist Item	Location Where Item Is Reported
RESULTS			
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Pages 14–20
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Pages 14–20
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Pages 14–20
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Pages 14–20
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Pages 14–20
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Pages 14–20
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Pages 20–22
	23b	Discuss any limitations of the evidence included in the review.	Pages 20–22
	23c	Discuss any limitations of the review processes used.	Pages 20–22
	23d	Discuss implications of the results for practice, policy, and future research.	Pages 20–22
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 23
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 23
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Page 23
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Page 23
Competing interests	26	Declare any competing interests of review authors.	Page 23
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Page 23

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