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Contribution of the ‘Equality, Diversity, and Inclusion’ Concept to Design Education: A Systematic Literature Review

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Abstract: The rise of awareness and attention around the concept of EDI (Equality, Diversity, and Inclusion) within the scientific and professional communities working in design studies is apparent. However, ensuring high-quality education for all—Sustainable Development Goal 4—while educating future generations of designers in acting responsibly by preventing biased actions requires the higher education (HE) sector to appropriately interpret this multi-concept. A systematization of available knowledge is required to clearly depict main trends and developments made in the field in the last years. A systematic literature review of a sample of 56 works, selected from an original sample of 191 studies, both empirical and theoretical, performed in the field of design education allowed to identify trends, research themes, and disciplinary evolutions of the EDI concept into teaching and learning (T&L) environments. The extracted data show clear interweaves between EDI and design education through three research themes: (i) educational contexts, (ii) design disciplines, and (iii) emerging topics. Future research trajectories for advancing the field of design education are proposed from qualitative interpretation of findings. Synergies among interdisciplinary aspects provide rooms for critical reflection about the opportunities to progress the knowledge in the field within unexplored cultural domains.

Keywords: design education; EDI; equality; diversity; inclusion; systematic literature review; research trends; future research trajectories



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1. Introduction

Within the cultural framework driving the concept of sustainable development [1], which depicts the long-term vision for present and future generations to benefit from prosperity, democracy, and fair living conditions for all, the Sustainable Development Goals (SDGs) embody the commitment of scientific and industrial communities to address social, economic, and environmental challenges [2]. Although all SDGs promote a cultural progression on fair access, use, and consumption of all resources, SDG 4, i.e., ‘Quality Education’ [3,4], encompasses a deeper meaning: the commitment to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all [5,6]. The role of education in shaping individuals’ aspirations and communities’ capacities was also a critical aspect pointed out by the Brundtland Commission [7], which highlighted the interconnection between education and socioeconomic fairness in fostering holistic approaches to educate different communities in shaping more resilient societies and a shared future for humanity.

In terms of design education, the concepts proposed by SDG 4 are crystallised into recent disciplinary developments regarding design and inclusivity, particularly those made over the last thirty years [8]. Thus, SDG 4 promotes inclusivity through some strategic elements, such as a barrier-free education, the value of cultural diversity, the accessibility to information and educational facilities, and innovative teaching practices [9].

Moreover, SDG 4 involves inclusivity when it is said that ‘Equality, Diversity, and Inclusion’ (EDI) is a foundational concept for any educational framework [2,9] and is a key successful driver to generate long-lasting, sustainable behaviours for learners. Therefore, EDI is a pivotal driver to put into place a culture of inclusivity by emphasizing the transformative power of education in fostering an equitable world. An emerging design culture is subtended to EDI, and then, improvements on design education are a direct consequence of it [10].

1.1. Overview on Design Education and EDI

There is a wide consensus that design education contributes to making important progressions for present and future society [11,12]; this is done both at the cultural and design levels through theories, methodologies, operative tools, and projects. Both design theorists and practitioners [13–17] agree that design education encompasses an organic knowledge ecosystem made by a culture (design theory) and a technical practice (design applications), where learners obtain the knowledge and practical skills needed to conceive and develop artefacts such as products, services, product-service systems, interior spaces, etc. [18]. Therefore, the use of design principles, critical thinking, and problem-solving skills are essential to comply with end-users’ needs [15]. In this perspective, the EDI concept assumes relevance, as it becomes a key driving force to guide future generations of designers in adopting an aware culture for the development of enabling solutions [19,20]. Therefore, higher education (HE) institutions such as universities have a crucial role in building and strengthening students’ cultural, technical, and human capabilities to address present challenges to respond promptly through inclusive artefacts that ultimately are sustainable and inclusive. Overall, the inclusion of EDI concept in design education is essential to equip future designers in using the best available knowledge to develop solutions that enable all potential consumers rather than disabling them [21,22]. It nurtures designers who are equipped to address the pressing challenges facing society through innovative and inclusive design solutions.

A strong background in design education can help learners but also teachers to properly address the fundamental notions behind EDI [21,22]. At the community level, EDI in design education allows underrepresented groups to contribute their unique perspectives and experiences to the area of design; at the product level, EDI promotes a culture focused on the creation of solutions that can be used by anyone, regardless of their background; at the cultural and methodological level, EDI encourages the exploration toward new teaching and learning (T&L) practices that enable future designers in growing confidence with societal challenges. Therefore, encouraging EDI in design education improves reflective creative practices for learners by exposing them to a wide range of cultural influences [23], traditions, and different perspectives that may stimulate and encourage cultural awareness in design practice, which is a parameter that many international companies are currently investing.

1.2. The Elements of EDI

EDI’s value lies in the ability to foster cultural ideals that enhance both curriculum design and student attainment. It enables students to gain an appreciation of the ethical dimensions of the design practice as well as the importance of considering diverse perspectives when it comes to the creation of enabling artefacts for all [22]. An analysis of the three elements composing it can provide useful considerations to better understand improvements on creativity, critical thinking, and problem-solving skills.

By promoting ‘Equality’, HE institutions can help break down systemic barriers to entry and ensure that diverse voices and perspectives are represented in the design process [24]. Within design education, equality involves the conditions of fairness and the potential for groups of people to access enabling solutions that do not cause harmful conditions to them or ensures that such artefacts do not produce any disadvantages during and after their everyday usage [25]. A solution developed around the equality concept,

such as an accessible website for blind users, a ramp at the entrance of a building, etc., is therefore a learning opportunity to reflect on the imperative of conceiving inclusive solutions that, regardless their shape, are ultimately affordable and designed around final consumers; in this way, users who may be disadvantaged according to some physical or environmental conditions (e.g., disabled users, elderly, etc.) have the resources they require to have the same, equitable possibilities as their peers [26].

‘Diversity’ is an essential value for any academic or cultural institution. Within design education, diversity strongly implies confronting the cultural, social, psychophysical, and economic differences of final users that will access and use the solutions designed [27]. Accordingly, the term ‘users’ is here intended as anyone involved in the codesign process. Pedagogically, diversity emphasizes the idea that a single solution cannot be designed for all potential end-users since there are collateral factors that may affect the interaction with them—this also accounts for the environment where the actions performed due to an ‘inclusive’ effect are experienced in a living context. Instead, the use of holistic design processes in design education can motivate learners to examine customers’ origins, cultural habits, and attitudes as well as human, psychological, economic, and social abilities, both positive and negative [28,29]. A pedagogic empowerment in the culture of creativity and invention that recognizes diversity as a virtue can eventually improve collaborations with business companies keen to open to social markets.

Finally, ‘Inclusion’ involves both cultural and design aspects. It is often assumed as a target for some kind of design intervention [27,30]. Encouraging people to feel fully appreciated and to come up with solutions that create an engaging inclusive atmosphere with products tailored for final users, regardless of their race, age, gender, psychophysical skills, or disabilities, is part of the inclusion process [31]. Within design education, inclusion and inclusive design practices play a pivotal role in ensuring that design solutions are accessible to individuals of all backgrounds and abilities, contributing to the development of more socially conscious and empathetic designers. Compared to equality and diversity, which look at the final outcome, inclusion is more about the cultural and methodological processes employed by designers in achieving the results [32]. Precisely because of this, it is paramount that teaching staff are confident with unbiased notions that overcome mere designing for disabled users. Therefore, inclusion not only enhances the user experience but also underscores the designers’ ethical responsibility to consider the needs and perspectives of all individuals [33].

1.3. Study Motivations, Aims, and Research Objectives

Several studies (e.g., [34–36]) have discussed the value on EDI in promoting higher pedagogical improvements at the T&L dimension of design education. However, a comprehensive analysis of studies conducted by the community regarding the dynamics governing the links between design education and the EDI concept does not exist, though a map of all the body of knowledge in the area would be beneficial.

What are the present or past practices that can be considered as reference models? What are the studies that provide a comprehensive phenomenological discussion about the application of EDI concept to design education? What are the design fields that have adopted an EDI-led culture that are proven to have produced improvements in T&L practices? What are the future trajectories that need to be explored in terms of teaching, research, and design? These are the initial speculative questions that this work tries to answer so that an advancement to the scientific discussions around the contribution of the EDI concept to design education can be proposed, also against the main trajectories included in the SDG 4 [3,4]—‘ensure inclusive and equitable quality education and promote lifelong learning opportunities for all’. Later, these initial questions are used as a baseline to define the main research objectives of this work—see RO1, RO2, and RO3 at the end of this section.

In terms of aims, this work examines disciplinary and interdisciplinary advances made integrating the EDI concept into design education at both scientific (theoretical and

methodological discussions) and studio levels (case studies). The main goal is to present a comprehensive overview of main studies linking EDI and design education by considering a wide spectrum of peer-reviewed evidence.

Consistent with the research background, specific methods are used to answer three primary research objectives: RO1, to identify the main literature published in the last twenty-five years on the EDI concept, considered in its broader meaning and possible interpretation, in design education; RO2, to critically describe the main research themes portrayed by studies linking design education and EDI; and RO3, to outline future research trajectories linking design education and EDI.

2. Materials and Methods

To examine the connections between design education and the EDI concept, a thorough systematic review of the literature [37] was carried out using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) [38] as a main methodology. Therefore, three methods were used to conduct this research stage: (i) searching for relevant sources within bibliographic databases (Section 2.1), (ii) refinement of the sample of works to consider for the study (Section 2.2), and (iii) data analysis and development of a bibliometric networks (Section 2.3). Overall, this study fully complies with the recommended PRISMA guidelines (see [39] and Supplementary Material S1).

Data resulting from the use of this methodology are presented in Section 3 and critically discussed in Section 4. The implications and considerations against the vision proposed by the SDG 4 are also discussed in Section 4.

2.1. Searching Strategy and Setting

The search of relevant documents to include in the systematic literature review was performed in January 2024 using two databases: Scopus and Web of Science (WoS). The decision to use both databases was motivated by the fact that these often provide sets of data with reduced similarities, benefitting the completeness of potential findings to gather at an initial stage. However, Scopus database produced a more comprehensive and aligned set of results in relation to both the aims of this study and the adherence of topics related to design education and EDI. Hence, records produced by Scopus were objectively favoured over those from WoS for numerical reasons, influence, and completeness [40].

Operatively, relevant terms such as ‘Design Education’ and ‘EDI’ (in its different meanings and textual forms) were used to identify a suitable searching strategy and matchings within titles, keywords, and abstracts (i.e., ‘TITLE-ABS-KEY’ in Scopus). Different iterations were made to identify the most suitable query to be used in both databases. In terms of timespan, the analysis was restricted to only studies written in English and conducted in the last twenty-five years (1999–2024). Only articles, reviews, and chapters were selected due to the rigorous peer-review process prior to publication (e.g., double-blind review and similar processes). No knowledge area restrictions were used.

The Scopus search was conducted using a specific search query: (TITLE-ABS-KEY (“design education”) AND TITLE-ABS-KEY (equality) OR TITLE-ABS-KEY (diversity) OR TITLE-ABS-KEY (inclusi*)) AND PUBYEAR > 1999 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE, “cp”) OR LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “ch”) OR LIMIT-TO (DOCTYPE, “re”)) AND (LIMIT-TO (LANGUAGE, “English”)). Through the query, a heterogenous set of 146 valid documents were found that connected design education and EDI with distinct semantic interpretations.

The WoS search was performed using another query due to a different setting in the interface of the database: Design (Topic) and Education (Topic) and Equality (Topic) and Diversity (Topic) and Inclusi* (Topic). Other selection criteria, such as timespan, type of source, language, etc., were added manually through WoS’s web interface. As said before, WoS produced fewer results than Scopus: 45 documents (70% lower than Scopus).

Overall, this research approach enabled a comprehensive collection of 191 records, which later served as the foundation for conducting the bibliographic analyses.

Regarding the exclusion criteria for specific terms used in the search queries, this study does not consider certain disciplines related to EDI, such as universal design and inclusive design, for two main reasons: Firstly, the work's scope was not to explore the interpretation of EDI within specific disciplines commonly taught in an academic environment—e.g., the concept of diversity in design education through the cultural lens of universal design—which could have resulted in impaired outcomes, such as excessive regionalization of results, biased records, excessive redundancy of publications to consider, etc. (RO1); secondly, the work explores the contribution of EDI in design education, which is intended as a cultural driving force capable of producing positive discontinuities, innovative practices, and impacts across various learning fields, reflecting the value of documenting the cultural contribution of EDI for both designers and teaching staff (RO2).

2.2. Refinement of the Final Sample of Works

To create the final sample of works to be used in the next stages of the study, a scrupulous examination of each document resulting from Scopus and WoS was conducted. This aimed at ensuring that only those demonstrating a strong connection with the aim of this work were selected. Specifically, the inclusion criteria were carefully set, demanding that essays not only establish a clear link between design education and EDI concept but also provide valuable contributions to both fields. The PRISMA screening technique [41] (Figure 1) was used to identify the final sample of works. Accordingly, the eligibility of each document was determined through independent evaluations by two researchers who reviewed each article. Any disagreements in the evaluations were resolved iteratively through consensus discussions. Special attention was given to studies published in 2023 and 2024, as this timespan often included pre-print works, unpublished papers, and articles awaiting editorial assignment. To comply with PRISMA guidelines [38,41], these works were carefully assessed before inclusion. As a result, the rigorous screening process culminated in a total sample size of 56 studies that formed the basis of this analysis.

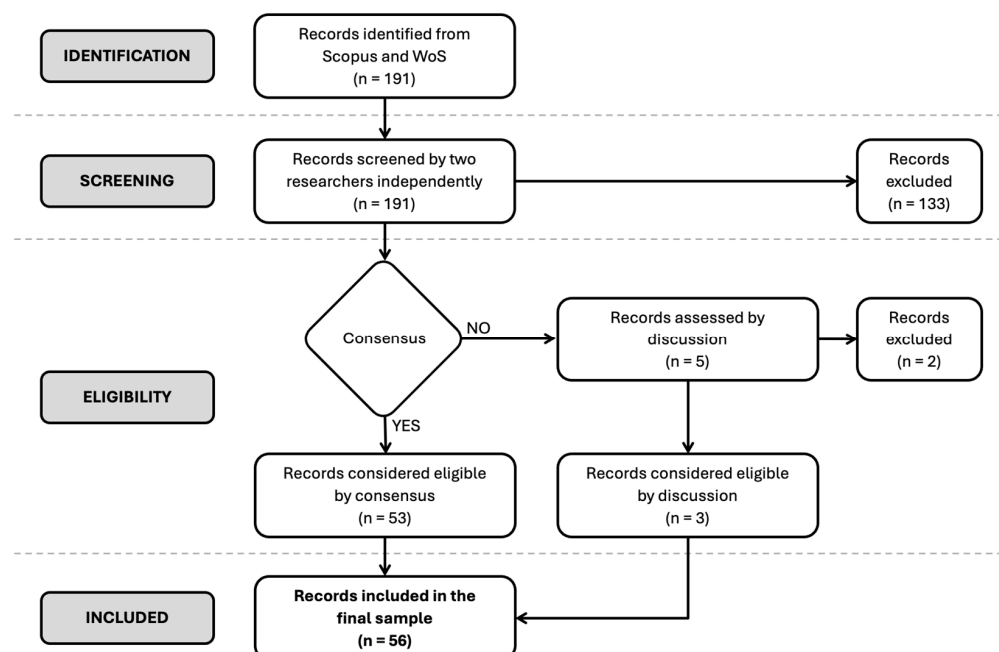


Figure 1. PRISMA Protocol: Screening procedure to reach the final sample.

2.3. Data Analysis

Desk-based qualitative research methods in the form of literature review and systematic review were used to accomplish the primary research goal of this work: to critically

assess and describe the contribution of the EDI concept in design education. Electronic datasheets refined through PRISMA served as the basis for this task.

The network analysis program VOSviewer (Version 1.6.20) [42] provided qualitative support by allowing data extraction from the sample of 56 works considered. VOSviewer is a software commonly used for bibliometric analysis and networking representation and was chosen due to its capability to manage bibliometric data as well as to provide clear representations of visual maps of thematic research clusters hidden within raw datasets (i.e., co-occurrence network). Furthermore, VOSviewer enables researchers to visually detect both explicit and hidden linkages between topics.

To address RO1, the study used VOSviewer and the authors' keywords to generate a co-occurrence network. A co-occurrence network is a semantic network (of keywords in this case) that provides elements to graphical visualization of potential relationships between certain parameters represented within written materials [43–45]. For this work, a co-occurrence network helps in the identification of relations between relevant authors' keywords and evinced within selected studies from PRISMA (see Section 2.2). Although data produced from co-occurrence network analysis may result in biased interpretations owing to semantic redundancies and terminological mismatches [45], this approach proved beneficial for identifying theme clusters that group certain sub-subjects that were later converted into main research themes on design education and the EDI concept (see Section 3.2).

To address RO2, articles from categorized groups identified to provide answers to RO1 were later evaluated to identify the important themes for each category. Researchers categorized these topics into various clusters based on how similar their material was. Eight sub-clusters were created to give completeness and characterisation, and they were classified as clusters and sub-clusters related to the design education and the EDI concept (see Section 3.2). Both authors controlled the interpolation to ensure the maximum level of impartiality and data consistency. The conclusions of the systematic literature study relating design education and the EDI concept were therefore based on this stage.

To address RO3, new clusters and sub-clusters linking design education and the EDI concept identified from the data produced to attain RO2 were used to determine the overall prospects for study and practices (see Section 4). Accordingly, future research trajectories linking design education and the EDI concept were evinced by the identification of missing areas of research from the current picture of works analysed (see Section 4.2). This analysis also aimed at providing qualitative guidance and suggestions to all researchers working in design education who are interested in exploring novel research avenues or proposing future studies to cover potential disciplinary gaps.

3. Results

This section discusses the results obtained through a thorough systematic evaluation of the literature, which offers evidence for both the methodological and operational settings described in Section 2. Results are offered to provide answers to the preliminary research questions established in the introductory part of the study and are later utilized to critically analyse the attainment of ROs. The map of studies on design education and EDI (RO1) is shown in Section 3.1; the main research themes (RO2) evinced from this analysis are presented in Section 3.2; future research trajectories (RO3) are discussed in Section 4.

3.1. Map of Studies Linking Design Education and the EDI Concept

The co-occurrence network produced by VOSviewer (Figure 2) resulted in five categories denoted by various colours. To give enough items to be coupled to only keywords that were relevant for the sample of studies considered, the analysis considered authors' keywords that were used in two or more articles (co-occurrence = 2). This eventually allowed to narrow down the analysis to the main themes expressed by the author's keywords. However, because design education and EDI concepts, considered in their different semantics, were used as major search terms to identify the sample of publications, they were excluded from the interpolation to avoid interpretive biases in the network's development.

Additionally, a thesaurus was created to bond recurring terms with the same meaning but different spellings (e.g., ‘co-design’ and ‘codesign’). Table 1 provides the co-occurrence intensity of each grouping’s keywords.

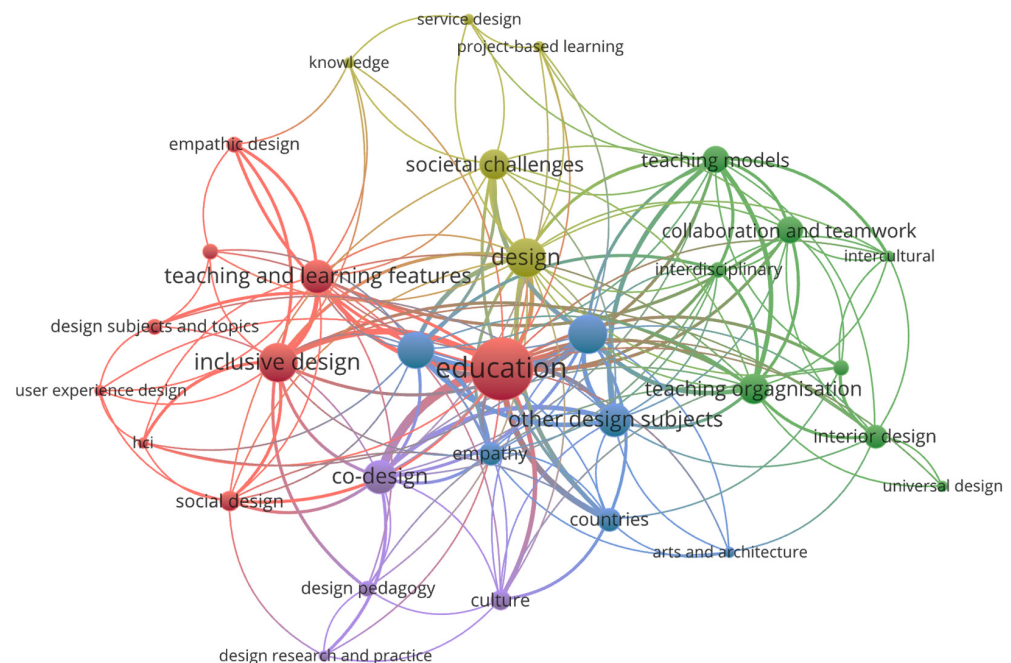


Figure 2. Co-occurrence network of authors’ keywords generated through VOSviewer software (normalised through a thesaurus).

Table 1. Groups of keywords extracted from VOSviewer: Co-occurrence network and values.

Groups	Keywords ¹
Red	Education (18), inclusive design (10), teaching and learning features (8), design subjects and topics (5), social design (4), empathic design (3), ergonomics (3), HCI (2), user experience design (2)
Green	Teaching organisation (7), collaboration and teamwork (6), teaching models (6), interior design (5), curriculum (3), interdisciplinary (3), intercultural (2), universal design (2)
Blue	Teaching practices (10), design processes and methods (9), other design subjects (8), empathy (6), countries (5), arts and architecture (2)
Yellow	Design (10), societal challenges (7), knowledge (2), project-based learning (2), service design (2)
Purple	Co-design (8), culture (4), design pedagogy (3), design research and practice (2)

¹ Numbers indicate the intensity of co-occurrence found for each keyword included in the network and normalised through a thesaurus.

3.2. Main Research Themes about Design Education and the EDI Concept

Section 3.1 portrays the semantic distribution of authors’ keywords found within the final sample of 56 studies used in this analysis. However, it is known that semantic interpretations based on the analysis of keywords are not exempt from biases and sometimes may lead toward inherent biases, specifically the following:

- The first bias relates to authors’ preferences when indicating keywords, and this often represents primary and secondary scopes in arranging the investigations in relation to the goals of the studies and the paper’s aims [45];

- The second bias relates to journals' keyword arrays, which frequently provide condensed lists of pre-identified keywords from which to select, which eventually forces authors to fit their work's scope to comply with editorial strategies.

A second data refinement made through comprehensive content analysis using the findings of Table 1 was performed to preserve the scientific quality of the process and to overcome such biases. Specifically, data that were separately retrieved from each article were reorganized into three major clusters and eight sub-clusters linking the EDI concept and design education. Table 2 shows the new clusters and the sub-clusters. Detailed descriptions are provided in Sections 3.2.1–3.2.3 and critically discussed in Section 4.

Table 2. New clusters and sub-clusters identified about design education and the EDI concept.

Clusters		Sub-Clusters	
1.	Educational contexts linking design studies and EDI concept	1.1.	Organizational aspects to teach EDI
		1.2.	Teaching and learning models for Design Education
		1.3.	Design methods to implement EDI
2.	Design disciplines to experiment EDI concepts	2.1.	Disciplines involving the human dimension of EDI concept
		2.2.	Disciplines involving the spatio-relational dimension of EDI concept
		2.3.	Disciplines involving the digital dimension of EDI concept
3.	Emerging topics about design and EDI concept	3.1.	Emerging topics on EDI
		3.2.	Design subjects

3.2.1. Educational Contexts Linking Design Studies and EDI

Articles in the first group show the links between design education and the concept of EDI; they are closely intertwined, with a wide range of disciplinary implications. Several studies link design programmes to EDI in the educational context (HE). EDI-related issues in this context explore several dimensions:

- The development of individual, collaborative, and strategic competencies (i.e., professional, social, and relational in the medium to long term);
- The role of teaching staff and their contribution to teaching processes;
- Issues related to the organization of teaching, associated pedagogical practices, and T&L models for design education.

Studies in this group showed interest in developing original insights that link strategies, methods, and procedural tools to address the complexity of design for EDI, translating them into the dimensions of T&L from an interdisciplinary and strategic perspective for the training of future designers and citizens. Overall, studies included in the first group relate to SDG 4 by considering EDI within design education contexts [4–6] through two main trajectories. From one side is the transformative power of educational pathways centred on inclusivity in developing critical competencies that foster collaboration and strategic thinking, which are paramount in conceiving prosperous futures for all; on the other side is the strategic role of educators as well as that of the teaching and learning contexts in generating consistent and accessible learning. The selected group of articles that make up this cluster were further organised into three sub-clusters.

The first sub-cluster, 'Organisational aspects to teach EDI', brings together pedagogical, organisational, and strategic aspects to support the links between EDI and the design education sector. Papers in this sub-cluster identified the following main research lines:

- A small group of studies delved into the organisation of educational programmes by focusing on the crucial issue of interdisciplinary and intercultural learning [46–48];
- This issue is recognised as paramount in shaping the future of design education;

- A consistent group of studies approached design education from a pedagogical perspective by emphasising the effectiveness of student-centred [49] and collaborative pedagogical strategies [45,50,51]. These strategies have shown great potential in enhancing the learning experience;
- An interesting group of studies converged on the theme of empathy for teaching inclusive design skills and developing student self-reflection and how these practices, particularly from a learning organisation perspective, can help designers to identify and respond to bias through the critical lens of user assumptions [52,53];
- Another group of studies highlighted the urgency of including people with disabilities in design education [52,54,55] and then paying higher attention to issues such as dropout, exclusion from access to education, and aspects such as students' individual and collective well-being in 'building a supportive university culture' [55];
- A group of articles dealt with quality issues and teaching strategies of physical and virtual as well as individual and collaborative learning environments. These studies focused on aspects related to technological (i.e., accessibility, usability, and user experience) and pedagogical dimensions of teaching using virtual tools and environments [56];
- Finally, from a strategic point of view, collaborations between universities and different stakeholders were found to extend student learning and lead to capacity building for all collaborators, communities, and enterprises [57].

The second sub-cluster, 'Teaching and learning models for Design Education', mainly collects articles that address issues related to T&L models. Here, the focus is on learning styles-related cognitive models and design practice as strategic steps to enhance EDI. Articles in this sub-cluster identified the following research themes:

- Supporting and reviewing learning practices based on evaluating final projects, shifting from reflective learning to holistic T&L processes [58];
- Strengthening teaching models to implement design practices focused on social responsibility and ethics. Some studies [49,55] emphasized the importance of adopting student-centred methods to develop empathic design skills. This approach places students at the core of learning processes, making them feel valued and part to their own development;
- Adopting methodologies to collect multimodal datasets and to explore diversity and designs for real users (e.g., student diaries beyond personas) as well as holistic approaches to design [29];
- Implementing teaching methodologies and models that support (i) collaborative interaction [59] and creative teamwork [60], (ii) diversity as a transformational engine for creative teamwork, (iii) empathic modelling to support and develop cognitive learning domains [61], and (iv) valuing the diversity of learning styles [62]. These diverse perspectives can be powerful catalysts for innovation in design education;
- Collaborative teaching, particularly with practices enveloped in methodologies related to the design discipline (e.g., workshops, co-design, etc.). Many studies (e.g., [63]) have declared their relevance as strategic practices for understanding inclusion and diversity;
- Finally, another group of studies highlighted the importance of supporting teaching practice with resilient, sustainable, and inclusive learning environments (e.g., [62]).

The third sub-cluster, entitled 'Design methods to implement EDI', collects studies that address design methodologies useful for implementing EDI principles during the design process. This group of papers identifies the topic of empathy as strategic and how collaborative processes and co-design practices with users and experts can facilitate the acquisition of EDI principles during experimentations. Articles in this sub-group dealt with the following topics:

- The timing and incorporation of information throughout the design process (especially the prototyping phase). As described by Lee et al. [64], this aspect can significantly

impact social and symbolic expressions as well as functional aspects compared to other design elements;

- The strategic importance of empathic methods employed during the design process. Some studies dealt with ‘build-to-learn’, which promotes experiential learning that is effective in students’ multisensory and bodily involvement with processes and products. Mateus-Berr et al. [65] stated that the education for the future requires collaboration between professionals and people with disabilities;
- Several studies highlighted the importance of strategically planning the user-involvement phase. For example, McDonald et al. [48] focused on aspects such as end-user privacy towards AI-enhanced tools: The study joins intersectional thinking with the elicitation of privacy to understand its impact into inclusive design education;
- About design processes and methods, some studies referred to design thinking as a way of revealing situations that stimulate holistic approaches [66,67]. An interesting work discussed the CIDER technique (Critique, Imagine, Design, Expand, Repeat): an educational analytical design evaluation method for teaching inclusive design skills [53];
- Another area of research dealt with the strategic dimension of co-design within educational practices—involving users and experts. Several studies highlighted the need to strengthen these practices within educational environments from a strategic perspective, both for the dimension of design education and as an opportunity to form social responsibility in an expanded way. Co-design was adopted in numerous studies as a practice to empathise with diversity [54];
- Design studio activities were addressed in several works. Hasanin put emphasis on the importance of integrating cultural diversity and social context within the design studio environment by implementing co-design methodologies [67];
- An exciting group of studies concurred on the importance of methods for empathy and self-reflection. Among them, the ‘participatory elicitation toolkit’ and the topic of ‘intersectional identities’ [53] were identified as strategic methods for co-design [65,68] and participatory design practices [48];
- Finally, individual awareness recurred in some studies. Students who are aware of their learning style are more able to use appropriate personal learning skills in each design stage. Some studies highlighted the need for a supportive school culture [47].

3.2.2. Design Disciplines to Experiment EDI Concepts

Articles in the second group deal with design subjects and their synergy with EDI principles. One cluster addresses the disciplinary application issues and areas of intervention within different design contexts. As a result, studies in this cluster operate at multiple intervention levels and are linked with other disciplines and approaches that are already established—e.g., human factors and ergonomics (HFE), inclusive design, universal design, etc.—and their fields of intervention. In relation to SDG 4 [4], the studies discussed in the second group encourage reflection on the positive effects of inclusivity at various design levels; thus, these studies help to create educational environments that are accessible and supportive for diverse learners, promoting educational equity and improving learning outcomes for all. In detail, the considered articles are organised into the three sub-clusters described below.

The first sub-cluster, entitled ‘Disciplines involving the human dimension of the EDI concept’, mainly collects studies that address issues that are related to design disciplines and useful to test EDI principles through actions capable of focusing on human diversity. These studies report effective strategies to promote EDI, starting from the common assumption that these actions must consider complex and dynamic socio-cultural factors. Studies in this sub-cluster discuss the following:

- The importance of incorporating inclusive design within design education [49];
- The inclusive design approach at the level of discipline. Some studies referred to this approach with reference to empathic comprehension and the need to raise awareness

about inclusive design [45,64]. The focus is the shift from accessibility-led designs to enhancing inclusion-oriented designs and developments;

- The theme of user involvement—user-centred approaches—recurred in many studies mapped. Specifically, how individual user requirements are defined was emphasised as a strategic step, and it was expanded in some studies to include the theme of community and resilience. Dong [69] discussed the topic of user-driven innovation. Overall, inclusive design was recognized as the approach that has the potential to help students appreciate the capabilities, needs, and expectations of users—a first step towards user-driven innovation;
- Several studies highlighted the importance of the HFE within design curricula, underlining their importance in promoting experiential learning during teaching practices, particularly in terms of student multisensory and bodily engagement with design processes and products [67];
- A small group of studies embraced the philosophy of universal design [56,70].

The second sub-cluster, entitled ‘Disciplines involving the spatio-relational dimension of the EDI concept’, brings together studies in social design, interior design and spatial design, art, and architecture that deal with the spatial-relational dimension of the EDI concept. One of the main aspects covered by these studies is the use of techniques for multisensory and physical learning (and design) to be adopted by students in all design stages. Thus, studies included in this sub-cluster make it possible to identify the following main research lines:

- Several studies addressed the topic of cultural diversity in the human population—interior design concentration, e.g., [71]. In a study, the problem of the dominance of Eurocentric ideas was exposed and how these have reinforced generalisations that devalue the role of non-Western social, cultural, aesthetic, and other traditions that shape built environments [72];
- About social inclusion, the relationships between different groups of people give new meanings to spaces by introducing new interpretations, redefining their shapes, or imposing places that may exclude large groups of people [48,72];
- Reviewing the design framework for EDI was discussed in a study [57] that presented an interesting normative survey and a model for effectively incorporating inclusive design and co-design into social design education;
- Three studies focused on marginalisation and social exclusion. As an example, Farrell [73] highlighted the influential role of art and design in enabling marginalised individuals and groups to create meaning through engagement with artistic and design practices. This process also influences the built environments;
- Many contributions collected in this sub-cluster focused on the designer’s social responsibility and the implications for education [74,75];
- Finally, a group of studies focused on experiential learning, particularly the multisensory and bodily engagement of students during all phases of design. This emphasis underscores the importance in the field of design [65,71,76].

The third sub-cluster, ‘Disciplines involved in the digital dimension of the EDI concept’, mainly gathers studies related to the disciplines of HCI, user experience, and service design by addressing issues at the ethical and technical level of the design practice as well as the digital dimension of human–product interaction. The themes of designers’ awareness and the consequences of design choices that do not consider human variability, social, and cultural relational needs are at the core of these studies. Consequently, studies included in this sub-cluster enable the following research lines:

- Numerous studies have addressed the digital divide in education and the role of educators in preventing it. For instance, Sin et al. [35] highlighted the ethical and social implications of design and the crucial role of educators in educating digitally aware designers to avoid digital exclusion. Accordingly, the issue of digital design marginalisation (DDM) was addressed at the level of educational design;

- Salinas [72] introduced a research view on design for social policy. The study emphasised the significance of an approach to design for local policy that aims to create ‘preferable futures for world-building through critical service design’—this approach proposes an impactful way of engaging in participatory, spatially based local policy-making. The theme of experiential learning during all design stages was apparent.

3.2.3. Emerging Topics about Design and EDI Concept

Articles in the third group, ‘Emerging topics about Design and EDI concept’, explore emerging topics at the intersection of design fields and EDI topics. These highlight the transformative potential of inclusive design methodologies. Integrating the EDI principles into design is increasingly recognised as essential to create equitable and innovative solutions that reflect society’s diverse needs. When compared to SDG 4 [4], studies included in this group underline clear connections with design domains; specifically, by encouraging inclusive design principles, designers may build educational resources and environments that cater to the different needs of all learners, improving educational accessibility and equity. Overall, this relationship emphasizes the transformational potential of design in promoting SDG 4’s aims of inclusiveness and diversity, resulting in more effective and creative educational solutions. Thus, articles included in this cluster are further organised into the two sub-clusters described below.

The sub-cluster entitled ‘Emerging topics on EDI’ highlights EDI’s dynamic and evolving nature when related to design. It puts emphasis on the need for interdisciplinary collaboration, cross-cultural understanding, and commitment in addressing societal challenges. Studies included in this sub-cluster discuss the following:

- The topic of interdisciplinarity by addressing the issue of educational programmes involving interdisciplinary and intercultural mobility and learning [55,65,66];
- The issue of geographic, disciplinary, and intercultural boundaries by offering practical solutions through online and hybrid learning environments (e.g., COIL and studio models) [42]. This ability is recognised as an essential skill for future designers to tackle complex challenges and significantly impact the future society. Furthermore, these educational experiences can generate innovative pedagogical dynamics while reducing the economic and social gaps between countries;
- The understanding of emotional and cultural intelligence issues offers opportunities for educational programmes to provide direct impact by increasing the emotional and cultural intelligence of future designers [72];
- Concerning online and hybrid learning programmes, some studies reported the need to develop higher awareness of web accessibility and teaching strategies that exploit virtual learning systems (VLSs) [46,56,77];
- Finally, integrating cultural diversity and social contexts within design studio environments and collaborative teaching practices is essential (e.g., T&L) [67,78].

The sub-cluster entitled ‘Design subjects’ portrays studies discussing both experimentations (product design, services, systems, and living environments) and operational implications at the methodological and practical level. Studies in this sub-cluster deal with the following domains and subjects:

- The first domain concerns the digital sector (HCI and PSS), such as interface design, ITCs, and issues related to identity in a broader sense, with a focus on digital identity and privacy (of interest are the topics of LGBTQ, ethnic groups, and disability) [35,52,54];
- In the context of digital and service design, the recurring theme of universal access and the prevention of exclusion, or marginalisation, is paramount. This includes linguistic, cultural, economic, and political implications, underscoring the need for inclusivity and diversity in our design practices [63];
- About service design, the need to strengthen the strategic skills needed for enhancing local and territorial politics emerged. This involves the understanding of the political

landscape of a specific region or localities and the use of knowledge to design services that are responsive to the needs and challenges of that area [63,74];

- The fashion design sector [64] addresses the issue of gender diversity and the need to develop products capable of supporting social and symbolic expressions in addition to the aesthetics of final products;
- Communication design plays a crucial role in creating messages that are accessible and representative of different social realities. The significance of cultural sensitivity in designing these messages cannot be overstated. It is a principle that demands respect and consideration for diverse cultural backgrounds, ensuring that communication resonates with various groups while avoiding stereotypes and cultural biases [78];
- The game design sector is actively addressing the theme of inclusive design through narrative actions and characters that are aligned to EDI principles. This pedagogical approach is not just a theoretical concept; it is a practical tool to foster inclusivity by inspiring designers to make a difference through their work [54];
- Gender equality on an educational and design level was the subject of several studies and is linked to design T&L and professional practices [78];
- The theme of creative teamwork recurred in many studies, with greater emphasis on the contributions that deal with the theme of co-design, participatory design, and LivingLab, with an emphasis on leadership management [50,60,79];
- Finally, transition design [80] is an emerging field that addresses the need for social changes towards a more sustainable and equitable future. By integrating the EDI principles, it seeks to promote systemic change that benefits all members of society.

4. Discussion

Consistent with the analysis of data presented in Section 3, the three clusters discuss the following aspects. Cluster 1, ‘Educational contexts linking Design Studies and EDI concept’, showcases how design programs are intertwined with EDI by opening up a wide range of disciplinary implications. EDI-related issues delve into several dimensions, including the development of individual, collaborative, and strategic competencies; the role of teachers; and organizational aspects for T&L models. Cluster 2, ‘Design disciplines to experiment EDI concepts’, explores the intersection of design disciplines and EDI principles, emphasizing the synergy between these fields. EDI-related issues are linked within the context of design by highlighting contributions at multiple levels, with established approaches such as HFE, inclusive design, and universal design. Cluster 3, ‘Emerging topics about Design and EDI concept’, delves into novel areas for EDI to underscore the transformative potential of inclusive design methodologies. EDI principles are increasingly recognized as crucial for creating innovative and equitable solutions that cater to society’s diverse needs.

When compared to SDG 4, the topic ‘Contribution of EDI in Design Education’ reveals interesting developments that reflect cultural progressions in design studies (see Section 3.2.1), innovations in T&L modalities and pedagogical environments (see Section 3.2.2), and the creation of proactive educational resources and design experimentations (see Section 3.2.3). Altogether, these developments can lead to sustainable advances in fostering holistic approaches to educate diverse groups of pupils.

Going further with the analysis of clusters, it is believed important to propose a discussion on the specific themes of EDI that have emerged with respect to design education; this can provide completeness to the aims of RO2 (see Section 4.1). Moreover, evidence-based speculative reflections are proposed to define an initial work agenda for future research trajectories, which will help to meet RO3 (see Section 4.2).

Although this work mainly provides qualitative evidence on the impact of EDI on design education, from the quantitative point of view it is interesting to note that most of the included works were produced in the last ten years (60.7), with an acceleration in the period 2020–2024 (39.3%) (Figure 3). This is a clear sign of the growing attention paid by scholars to the emerging topics composing EDI and their value for the qualitative enhancement of design practices in the HE system.

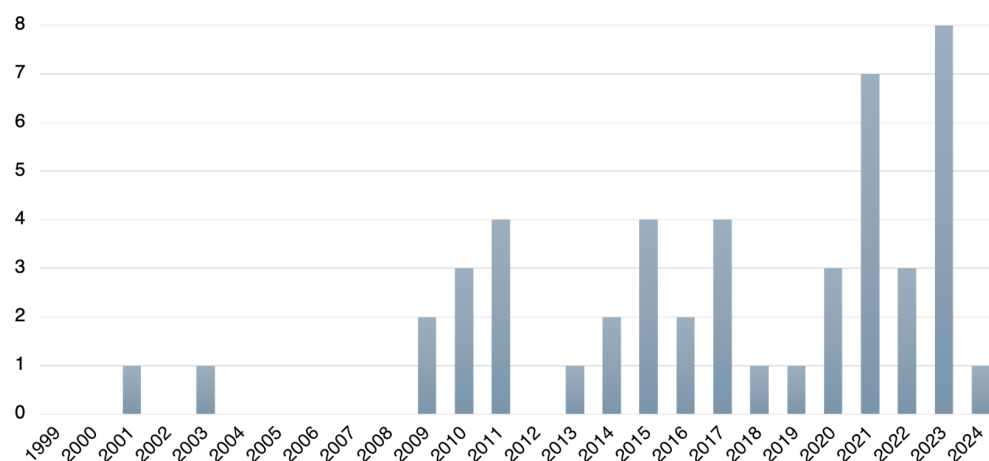


Figure 3. Design Education and EDI: Distribution of studies over time.

4.1. Research Themes on the Concepts of ‘Equality, Diversity, and Inclusion’

4.1.1. Research Themes on the Concept of ‘Equality’

The concept of ‘Equality’ is essential to create the needed cultural background from which EDI can take root. Equality is also an important pedagogical aspect to enrich the cultural value of projects. It contributes to the breakdown of structural barriers, ensuring that varied voices and opinions of both students and teaching staff are heard and considered using the same priority level. Thus, fairness, accessibility, and equal chances serve as the foundation for developing inclusive design education.

Cluster 1 documents that equality is an asset to improve the structural elements defining teaching programmes in design, and this is evincible by considering the following five themes: (i) upgrading the pedagogical, organizational, and strategic aspects to align EDI to design education; (ii) emphasizing the importance of intercultural learning; (iii) the pedagogical dimension of physical and virtual learning environments; (iv) models to foster social responsibility and ethics; and (v) integrating cultural diversity and social contexts into design studio environments.

Cluster 2 shows the use of equality in enriching disciplinary features while covering gaps to improve the market readiness of students; this is demonstrated by the following three themes: (i) fostering the individuation of user requirements (both users and communities), (ii) contrasting marginalization and social exclusion through design, and (iii) covering the pedagogical gaps to equip designers with skills to broader social impacts.

Cluster 3 emphasises the need to use equality to overcome the structural limitations affecting many programmes in design. Six themes involving both cultures and technological features can be evinced: (i) overcoming geographic, disciplinary, and intercultural boundaries; (ii) integrating cultural diversity and social contexts within collaborative teaching practices; (iii) addressing linguistic, cultural, economic, and political barriers; (iv) preventing exclusion and marginalization; (v) promoting gender equality; and (vi) fostering empathy through creative teamwork and participatory design methods.

4.1.2. Research Themes on the Concept of ‘Diversity’

Compared to equality, the concept of ‘Diversity’ is generally assumed as a value for HE institutions, and as such, it requires students and teachers to deal with the cultural, social, psychophysical, and economic conditions of end-users who will benefit from the proposed solutions. This indirectly establishes a link between pedagogical curves and professional creative practices. Thus, the application of holistic design approaches in design education encourages students to investigate multiple elements ranging from technology to social domains.

Cluster 1 uses the concept of diversity to strongly reflects on T&L practices, learning environments, and the impact of good practices in contrasting low-quality education

and design cultures. Accordingly, five themes can be identified: (i) using empathy and self-reflection help designers addressing biases; (ii) including people with disabilities in design education as well as novel user-centred topics (e.g., privacy, AI, etc.); (iii) exploring innovative learning styles, cognitive models, and design practices as strategic steps for EDI; (iv) using holistic T&L practices focused on learning processes; and (v) improving teaching curriculums (i.e., content redefinition, adaptation to EDI, expansion of instructors' roles, and increased awareness of students' mental health and well-being) to reduce dropout and social exclusion.

Cluster 2 displays that diversity is a strategic component of T&L practices, improving the modalities through which contents and methodologies are used and delivered to students to improve the perception of inclusion-oriented topics. Specifically, its five themes discuss the need for the following: (i) emphasizing the spatio-relational dimension of human diversity across different disciplines; (ii) strengthening educational strategies to promote EDI while considering complex socio-cultural factors; (iii) promoting experiential learning through multisensory and bodily engagement; (iv) adopting novel techniques for multisensory and physical learning and design, exploring the role of cultural diversity in interior design; and (v) contrasting digital divide in design education by highlighting ethical and social implications.

Cluster 3 records the strategic role of diversity in promoting the cultural transitions of design programmes by emphasizing the multifaced implications of the concept itself across disciplines as well as inspiring deep reflections for learners; this is indeed documented in the following four themes: (i) understanding the dynamic and evolving nature of EDI, (ii) enhancing the emotional and cultural intelligence (e.g., increasing designers' sensitivity to diverse cultural and emotional contexts), (iii) incorporating EDI into design across various fields (e.g., digital identity, gender diversity, inclusion of ethnic groups, etc.), and (iv) developing inclusive solutions that support social and symbolic expressions.

4.1.3. Research Themes on the Concept of 'Inclusion'

The concept of 'Inclusion' plays a fundamental role in transforming the quality of HE systems and design programmes by stimulating awareness and critical reflection on the impacts produced by T&L practices in the middle to long term at the different levels of society. Inclusion is also crucial in updating the design culture about the transformative power of designers in acting as agents of change by liaising with stakeholders and societal actors. Accordingly, inclusive design education becomes the catalyst for educating all societal actors by using shared methodologies and common learning pathways. Inclusion methods and T&L practices involve encouraging individuals to feel completely valued when engaging in inclusive environments regardless of their psychophysical and social conditions.

Cluster 1 interprets the idea of inclusion by reconsidering the power of experiential learning in promoting novel pedagogical experiences; specifically, four themes are identified: (i) stressing the effectiveness of student-centred collaborative T&L experience; (ii) promoting the collaborative interaction between universities and stakeholders; (iii) reinforcing empathy, self-reflection, individual awareness, and co-design as a key-driving force that promote experiential learning; and (iv) strategic dimension of co-design within educational practices.

Cluster 2 considers inclusion in terms of cultural maturity and empathic commitment toward good design for all so that different groups of users can feel represented by the proposed solutions; this is evincible by considering the following four themes: (i) raising awareness and empathy about inclusive design and its value to produce inclusive developments, (ii) connecting different groups of people to introduce holistic interpretations (e.g., valuing non-Western traditions, create new meanings, etc.), (iii) reviewing design frameworks to develop engaging social design education, and (iv) developing experiential learning, participatory design, multisensory, and bodily engagement to raise awareness and the consequences of design choices.

Cluster 3 generates interesting reflections on the concept of inclusion by pointing out the value of the transformative power of educational practices. From this, three themes are discussed: (i) promoting interdisciplinary collaboration, intercultural mobility, and cross-cultural understanding and a dedication to addressing societal challenges into educational programs; (ii) thinking beyond traditional boundaries and equipping students to tackle complex global challenges that bridge economic and social gaps toward equitable futures; and (iii) strengthening strategic skills to valorise territorial politics gathering diverse ethnic and cultural groups.

4.2. Future Design Research Trajectories

The analysis presented in Section 4.1 using the data discussed in Section 3 allows to infer certain EDI-based research trajectories that will be relevant for future advances in the field of design education. Fourteen original trajectories (Table 3) attempt to open up novel options linking EDI and design education for furthering the corpus of theoretical, methodological, and design achievements. Matches indicated by ‘X’ show the areas where innovations can take place in relation to EDI concepts.

Table 3. Future design research trajectories: integrating EDI into design education.

Research Trajectories	Equality	Diversity	Inclusion
1. Intersectionality within design education (investigating how intersectional identities such as race, gender, sexuality, disability, etc., influence and shape design education experiences)	X	X	X
2. Culturally responsive teaching practices for design education (developing and assessing the teaching practices that respond to cultural backgrounds and needs of diverse student populations)	X		
3. Inclusive pedagogy in design education (developing tools and studio practices to ensure inclusivity in online and hybrid T&L contexts)			X
4. Accessibility of resources for design education (implementing full-accessibility resources such as tools, software, etc., for people involved in design education, including those at the fringe of society)	X		X
5. Build-to-learn (implementing empathy-based methodologies and tools during the design processes)		X	X
6. Intercultural learning (emphasizing the importance of intercultural learning among peers)	X		
7. Inclusivity of learning environments (implementing the pedagogical dimension of physical and virtual learning environments through EDI-oriented lenses and development strategies)	X		
8. Collaborative teaching and cultural diversity (integrating cultural diversity and social contexts into collaborative T&L practices)	X	X	X
9. Empathy tools (using empathy and self-reflection to help learners addressing cultural biases)	X		
10. Inclusive education practices and policies (including people with disabilities in design education to address user-centred topics)	X	X	X
11. Co-design practices (implementing or developing new tools for participatory elicitation to trigger behavioural changes)		X	
12. Emotional and relational well-being (increasing awareness of issues related to students’ mental health and well-being)	X	X	X
13. Experiential learning (promoting experiential learning through multisensory and bodily involvement)		X	
14. Bridging the digital divide in design education (reducing the gap between online and in-studio T&L practices to promote fluid learning curves and participatory learning among peers)	X	X	X

4.3. Research Limitations

In terms of limitations, the methodological constraints resulting from the use of a bibliometric analysis based on co-occurrence and keyword searches only minimally resulted in inherent biases for the interpretation of the works evaluated. From the qualitative perspective of the ROs under consideration, this constraint has not resulted in a gap between predicted and achieved outcomes.

Another element of potential limitation of this study may be found in the multifaceted and multidimensional aspects related to the concept of EDI when applied to specific design domains. EDI is intrinsically connected to specific design disciplines and approaches such as universal design and inclusive design, which have been extensively discussed in various studies presented in this work, though not always directly mentioned as such. However, it is important to note that the purpose of this study was not to investigate the distribution of these disciplines within design education but rather to analyse the contributions of EDI in its strategic development by considering it in a broader sense as well as the possible interpretations related to design education, as outlined in RO1 and RO2. This aspect seems very important not only for what concerns the searching strategy adopted but also because this work indirectly documents that, amidst the growing fragmentation of knowledge—which results in the proliferation of terms connoting several disciplines—EDI is holistically embraced by a large part of the design community. Ultimately, EDI promotes a culture-oriented approach over disciplinary-centred practices.

5. Conclusions

From an initial discussion about the value of high-quality education in relation to SDG 4, this paper presents the first and most comprehensive analysis of studies published in the last twenty-five years linking design education and the concept of EDI (Equality, Diversity, and Inclusion), including a detailed analysis of all cultural, methodological, design, and research dynamics connecting the work of the research community. Compared to SDG 4, the theme of ‘EDI’s contribution to Design Education’ highlights notable developments that mirror cultural shifts in design studies, innovations in teaching and learning methods, and the transformation of pedagogical environments. It also emphasizes the creation of forward-thinking educational tools and design experiments. Significantly, these advancements not only promote inclusive, holistic educational approaches for diverse student groups but also hold the potential to drive sustainable progress. From the analysis of the works selected through PRISMA, the concept of EDI has emerged as strategic in many ways; it influences the structural dynamics of content development, the quality of studio environments, the modality through which students learn and obtain knowledge, as well as the cultural dynamics related to stakeholders’ involvement, the nature of projects, and the emotional/experiential side of T&L. Accordingly, this work portrays how EDI has strategically improved design education. Thus, three main clusters and eight sub-clusters were identified and described in detail. This result also gave rise to critical reflection on the opportunities that the body of research in the field currently fails to express. Consequently, from a detailed analysis of inherent limitations, in-depth analyses for future research directions (fourteen) relating to design education were developed to stimulate further steps and improvements.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su16198478/s1>, S1: PRISMA checklist.

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