



Systematic Review

Can Holistic Education Solve the World's Problems: A Systematic Literature Review

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Abstract: UNESCO argues that having a holistic approach to education is essential to address global development challenges. However, what empirical evidence do we have about holistic education practices? This study aims to review empirical research on holistic education. The methodological design is a systematic review study following the PRISMA guidelines based on a search of the Scopus and Semantic Scholar databases carried out in December 2021. The selected studies were analysed through a qualitative three-stage screening process based on 218 subjects, 9 of which were included in the final sample. The following inclusion criteria were used: empirical studies or research in English; free access via the internet; and categories limited to "holistic/education/curriculum/pedagogy". The qualitative analysis of the articles based on the interpretative paradigm and the open coding method was implemented in MAXQDA. The study shows a lack of large-scale quantitative and comparative research showing the benefits of holistic education, its impact on personal and social transformation, and the preparation of teachers to become holistic educators. There is a lack of research analysing the effect of holistic education on environmental awareness compared with traditional education.

Keywords: holistic education; future education; human wholeness; humanistic education; posthumanist environmental education

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1. Introduction

With accelerated climate change, our planet's fragility is becoming more apparent. Persistent inequalities, social fragmentation, and political extremism are bringing many societies to the point of crisis [1]. The question is, how can humanity overcome this crisis? Guattari [2] distinguished the relationships among "The Three Ecologies"—mental, social, and environmental—arguing that changing one type of ecology requires the others to also change. For this reason, the climate crisis will not be solved without addressing social problems and changing people's mentalities. Is there a better way to change the mindset of humanity than education? Knowledge and learning are humanity's most significant renewable resources for responding to challenges and inventing alternatives. Education does more than react to a changing world; education transforms the world [1].

To transform the world, we need a new approach to education. A new way of looking at education could bring our fragmented world together and help us to develop a coherent vision toward a better world. UNESCO's "Education 2030" states that a renewed vision for education should be:

Comprehensive, holistic, ambitious, aspirational and universal, and inspired by an idea of education that transforms the lives of individuals, communities and societies, leaving no one behind [3] (p. 24).

The solution to the evolution of education could be holistic education—a vision of education that connects a fragmented world, communities, societies, and individuals. However, what do we know about this educational paradigm?

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Holistic education is a new movement that emerged as a recognised field of study and practice in North America in the mid-1980s [4]. In 1989, eighty education representatives signed the Chicago Statement. A year later, this agreement led to the publication of "Education 2000: A Holistic Perspective", which sets out ten principles for holistic education that fundamentally contradict the prevailing reductionist paradigm [5]. A vision of holistic education based on ecological awareness, spirituality, relationships, and values was developed based on the work of Douglas Sloan, David Purcell, Ed Clark, Ron Miller, Phil Gang, Jack Miller, and Parker Palmer. In this document, holistic education is defined as a transformative, postmodern, ecological, cosmic, and spiritual type of education that addresses global issues. Holistic education does not seek to provide a model of education but aims to challenge the fragmented and reductionist assumptions of mainstream culture and education [6]. To achieve this vision, holistic education is based on three fundamental principles: balance, inclusion, and connectedness [7]. Holistic education seeks to balance the individual with the group, educational content with processes, knowledge with imagination, rationality with intuition, quantitative with qualitative assessment, and competition with collaboration [7]. Inclusiveness is achieved through a combination of different knowledge construction approaches: transmission, transaction, and transformation. The teacher must find a balance between the different methods of transmitting knowledge using their experience and intuition [7]. Connectedness is achieved through the development of relationships:

The relationship between linear thinking and intuition, the relationship between the mind and the body, the relationship between the various fields of knowledge, the relationship between the individual and the community, the relationship with the earth and the relationship with our soul [7] (p. 16).

Holistic education aims to change people's relationships with each other and with nature to address global problems such as climate change, racism, sexism, and hatred [4,8–10].

Holistic education is based on the idea of the wholeness of the human being [11]. Education for the whole person is defined as education that harmoniously integrates the intellectual, emotional, physical, social, aesthetic, and spiritual aspects of individual learning [11–14]. Holistic development encompasses all aspects of human development, going beyond a person's intellectual potential. Pong [15] argues that emphasis should be placed on developing students' spirituality and inner lives to help them connect with their inner selves. Hare claims that:

Holistic education prepares a student for lifelong learning. The educational focus moves towards the life skills, attitudes and personal awareness that the student will need in an increasingly complex world [16] (p. 6).

Holistic education aims to educate the whole person by nurturing human potential, talents, and individual uniqueness.

According to Miller, in the 1950s and 1960s, humanistic education was developed as a direct precursor to holistic education [17]. Based on the ideas of Rogers, Maslow, Weinstein, Fantini, Dewey, Steiner, and Montessori, holistic education has embraced the respect for individuality, theories of citizenship and democracy, experiential and affect-based learning, and nurturing, caring relationships. Humanism was originally defined as "considering the human being as the centre of all creation" [18] (p. 109). According to Duobliene [19], human knowledge, self-expression, and satisfaction are the most emphasized concepts in humanistic education. It is understood that self-construction is inseparable from the environment, forming a holistic personality. This educational philosophy solves problems by seeing the child at the centre of the educational process. Javadi et al. [20] added that humanistic education shifts the focus from academic goals to possibilities for personal self-realisation, and the primary purpose of humanistic education is "to create society responsible for civil society that has adopted a variety of cultures" [20] (p. 46).

However, Šarkan et al. [21] emphasised that humanism faded after the Second World War and lost its ideological value, because it showed that humans are not as human as they claim to be. This led to the development of a new movement, post-humanism, which

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no longer elevates humans above other forms of life. However, Pedersen [22] argued that the concept of posthumanism emerged not only as a result of the chronological progression of the humanist movement but also in response to the fundamental need for an ontological and epistemological discussion of human nature in a changing world. Datta [23] defined posthumanism as "understanding relationships between people and the material world" (p. 54). Bateman [24] added that, in the posthumanist movement, the human being is no longer the main point of reference but, rather, the relationships between human and nonhuman systems are emphasized. Therefore, the posthumanist movement discusses what it means to be human in terms of having harmonious relationships with natural resources, plants, animals, technology, artificial intelligence, etc. [25]. Relationships and interconnectedness are central concepts of posthumanism [23], but how does the post-humanist movement affect education?

Howlett [25] argued that education of humanity is currently facing a daunting and uncertain future, which is why posthumanism reminds us that education should be responsible for the world's future. By framing the current ecological crisis as a crisis of humanism and other aspects of modernity, posthumanist environmental education promotes a new way of looking at the relationship between humans and nature [22]. Blyth and Meiring [26] argued that posthumanist environmental education requires new ways of reconciling ethical values with the well-being of the extended community, emphasising that ethical practices are interactive, because actions and thoughts are interwoven. In contrast to anthropocentric philosophy, holistic education does not elevate human beings above the ecosystem. Rather, it links them directly to nature and the surrounding environment, reflecting the ideas of posthumanist environmental education. Blyth and Meiring [26] identified the following themes of posthumanist environmental education: (1) all actions have consequences; (2) there is respect for different points of view and constant dialogue with different members of the community; (3) environmental education requires "being in the world"; (4) ecoeducation requires the simultaneous development of aesthetic and moral skills; and (5) environmental education should be universal, interdisciplinary, integrated into all subjects and the basis for all education (pp. 112–113). Nakagawa [8] argued that an ecological worldview is directly linked to holistic education, as "ecological literacy" addresses climate change, sustainability, and the human relationship with nature. Fernandes-Osterhold [27] stressed that an essential element of holistic education is the understanding that change in the world begins with changing oneself, having a deep understanding of society and culture, fostering authentic relationships, and consciously preserving the Earth and nature. A posthumanist perspective on holistic education could contribute to solving the world's ecological problems by bringing a connection to nature, an awareness of interconnectedness, and a respect for life and the Earth into education.

In this study, holistic education is defined as education that focuses on the development of the whole person with an emphasis on humanistic and posthumanistic ideas regarding environmental education and the interconnectedness of all living and non-living ecosystems on Earth. Holistic education has been extensively described at the theoretical level [4,7,28–41]. Furthermore, UNESCO states that:

Education alone cannot solve all development problems, but a humanistic and holistic approach to education can and should contribute to the realisation of a new model of development [42] (p. 10).

The following questions remain: how does holistic education contribute to the solving of the world's global development problems? What do we know about the empirical outcomes of holistic education practices? In which contexts is research on holistic education prevalent? What are the challenges facing holistic education practices? What are the universal features of holistic education? To answer these questions, this study aims to review empirical research on holistic education using the Scopus database.

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2. Method

We decided to conduct a systematic literature review along the lines of PRISMA (2020) to identify the prevailing themes in empirical research on holistic education. Page et al. [43] defined the systematic literature review as a systematic method that is used to examine the literature by employing predetermined selection criteria to select the most relevant scientific articles. The study was conducted in the Scopus and Semantic Scholar databases, as these databases provide reliable, high-quality information, allow convenient and fast data extraction, and contain a wealth of relevant articles. After automated data screening of the Scopus database, the selected papers were saved in three formats: PDF, Excel, and the RefWorks bibliographic system. This was performed to gather scientific evidence and ensure the reliability of the study. All articles were imported into Excel and assigned a sequence number from 1 to 221. The papers were coded according to these sequence numbers with MAXQDA analysis software. Then, a three-stage article selection process was carried out based on the PRISMA (2020) guidelines using predefined exclusion criteria (see Table 1). This involved (1) title screening; (2) abstract screening; and (3) full-text screening. This work was done by assigning codes to the articles (1 = YES; 0 = NO) and assigning exclusion criteria in Excel. Finally, the selected papers were uploaded into the MAXQDA program, and the data were coded based on an inductive approach. Leavy [44] claimed that inductive reasoning is often used in qualitative research, whereby the researcher seeks to find completely new, undiscovered data to create new knowledge rather than using it to support existing theories. Finally, the qualitative segment codes were analysed according to the interpretive paradigm [44].

Table 1. Exclusion Criteria.

	Exclusion Criteria	Meaning
A	Unrelated Topic	All empirical studies that do not have holistic education as the main object of study or political articles.
В	Holistic Analysis or Approach	Research that takes a holistic approach or uses a holistic model but does not focus on exploring holistic education.
C	Theoretical Review	A theoretical paper or a book chapter that does not empirically investigate holistic education.
D	Unavailable	Not an open-access document.
Е	Description of the New Education Programme	The article describes a new holistic curriculum and its implementation but does not provide specific research or analysis methods.

2.1. Search Procedures

The systematic literature selection and review were guided by the PRISMA (2020) guidelines [43]. Using the Scopus database, the bibliographic data search was implemented in December 2021 using a combination of the following descriptors: holis* (title) AND education (title, abstract, keywords) OR curriculum (title, abstract, keywords) OR pedagogy (title, abstract, keywords). All articles on the following topics were automatically excluded from the search: health, nursing, engineering, sustainability, and medicine. Articles were rejected using Scopus' automated tools. A total of 1552 papers were automatically rejected based on the selected language and related topics. The selection was based on the following criteria: (1) written in English language; (2) peer-reviewed scientific journal; and (3) open access. No time limit was used as an exclusion criterion to find empirical studies. At this initial stage, the search resulted in 220 articles. After eliminating duplicates, the initial investigation was reduced to 217 articles. However, after the complete literature review process, one paper [14] from the Semantic Scholars database was added to the study. This study was included after assessing the relevance of the empirical data and the richness of the survey results. In total, 218 articles were screened. All items were entered into Excel

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and given a sequential number from 1 to 221 according to the order in which they appeared in the system. This was followed by a three-stage screening process. Three researchers conducted the entire screening process as a group, using a discussion method to decide whether to include or exclude studies.

In the first stage of the screening process, the titles of all articles were reviewed. At this stage, the aim was to exclude only articles that did not seem relevant to the topic of holistic education. Papers were retained for the next step if there were any doubts about its relevance. If an article was rejected, the reason for rejection was assigned. Figure 1 shows us that 105 papers were dismissed after the first round. Table 1 reveals that 42 articles were rejected for being irrelevant, 15 were theoretical analyses of holistic education that did not investigate holistic education itself, and 48 were theoretical analyses of holistic education that did not include empirical research.

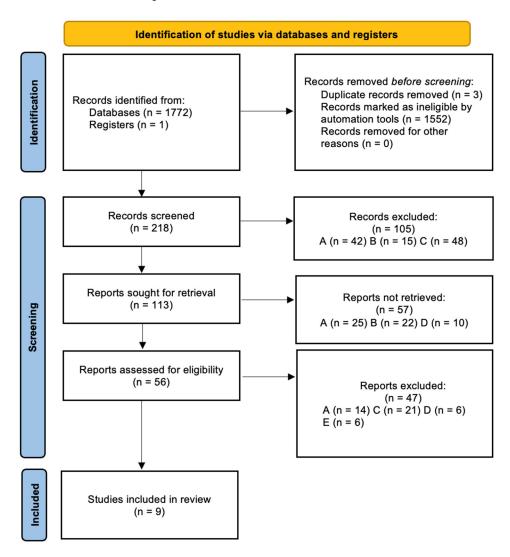


Figure 1. The PRISMA (2020) flowchart used for selecting empirical articles on holistic education from the Scopus and Semantic Scholar databases from Page et al. [43].

In the second stage of the screening process, the researchers read the abstracts of all remaining articles to determine whether these works empirically explored holistic education. An article was only rejected if it was clear that it was not suitable for investigation. Figure 1 shows that after the second round of selection, 57 articles were rejected. Table 1 explains that 25 papers were dismissed for being irrelevant, 22 were holistic analyses or approaches, and 10 abstracts could not be read or screened. Consequently, there were only 56 articles left for the last stage.

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Finally, in the third stage of the screening process, the researchers read all articles and decided which articles contained enough empirical information to be included in the study. Figure 1 reveals that 47 articles were rejected at this stage. In total, 14 papers were rejected due to containing unrelated topics, 21 were found to be theoretical analyses without a precise research method, 6 were not open-access, and 6 were descriptions of new education programs without accurate research methods. This left only 9 empirical studies on holistic education, and these were analysed in this study (see Table 2).

Table 2. Descriptions of studies included.

Title	Authors	Year	Country	Aim
Equinox: portrait of a holistic school	Miller, J. P.	2016	Canada	"In 2015, I conducted a qualitative study where I interviewed teachers, parents, and students to see whether the school was realising its vision of teaching the whole child" [45] (p. 283).
Holistic Pedagogy in Public Schools: A Case Study of Three Alternative Schools	Rudge, L. T.	2016	USA	"Through a multiple-case study design, this study examines and describes how three alternative public schools in the United States implement holistic pedagogical practices while still attending to the demands of the public school system" [14] (p. 169).
Engaging with holistic curriculum outcomes: deconstructing 'working theories'	Hedges, H. and Cooper, M.	2014	New Zealand	"Our aim is as stated, to provide evidence in language familiar to parents and policymakers that these elements are present in young children's complex learning. A second aim then might be for teachers to consider documenting some children's working theories in their assessment practices in ways similar to our analysis, in order to assure interested parties worthwhile learning is occurring" [46] (p. 400).
A Contextualized Account of Holistic Education in Finland and Singapore: Implications on Singapore Educational Context	Lee, D. H. L., Hong, H. and Niemi, H.	2014	Finland and Singapore	"This paper, thus, aims to illustrate how two high-performing education systems had infused holistic education into their schools" [47] (p. 873).
Developing holistic practice through reflection, action and theorising	Glenn, M.	2011	Ireland	"The paper examines how, through reflection on and thinking critically about my work, I gained new insight and understanding of my practice and developed a new epistemology of practice" [48] (p. 489).
Holistic understanding in geography education (HUGE)—An alternative approach to curriculum development and learning at key stage	Renshaw, S. and Wood, P.	2011	United Kingdom	"The current article reports on a small-scale, collaborative curriculum development project which attempts to develop an approach to learning based on a notion of holistic understanding" [49] (p. 366).
The design and implementation of a holistic training model for language teacher education in a cyber face-to-face learning environment	Wang, Y., Chen, N. and Levy, M.	2010	Taiwan and Australia	"This study aims to explore the design and implementation of a specifically designed teacher training model in a cyber face-to-face language learning context" [50] (p. 777).
University students' perceptions of a holistic care course through cooperative learning: Implications for instructors and researchers	Pan, P. J. D., Pan, G. H., Lee, C. and Chang, S. S.	2010	Taiwan	"Under this context, the main purpose of this study is to explore students' perceptions of a holistic care course through cooperative learning" [51] (p. 199).
A holistic perspective on student growth and development: A look at academic programs in graduate schools of human service	Seelig, M., Eldridge, W. and Schirtzinger, M.	1982	USA	"The purpose of this survey was to (1) ascertain the various personnel services provided to students enrolled in undergraduate, graduate, and doctoral programs of social work throughout the United States, (2) to determine the level of importance placed upon these services by each institution, (3) to determine the extent of varying philosophies concerning the institutional role for providing for the holistic needs of students, and (4) to identify the various mechanisms used to provide student services." [52] (p. 32).

2.2. Data Analysis

The articles were analysed using inductive reasoning and an interpretative paradigm [44]. Inductive reasoning is a method that first looks at individual cases and then makes a

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hypothesis and generalisation [53]. In contrast to deduction, this avoids preconceptions that might narrow the study's conclusions.

To ensure bias, MAXQDA qualitative and mixed methods analysis software was used. This software was chosen based on the following features: (1) the ability to encode all files in one place; (2) the variety of visualisation tools available for the encoded data; and (3) the ability to easily extract the coded segments. The study used an open coding strategy until a sufficient level of data richness was achieved. Open coding involves the assignment of a new label by the researcher to a piece of data [54]. Relevant data were coded in sentences. New codes were created, or existing codes were merged when reading the articles. New codes appeared even in the final papers. Consequently, the entire reading and coding process was carried out twice to code all relevant information and overlaps. Researchers conducted the data analysis process as a group with regular discussions and collaborative decision-making. The analysis of the selected articles focused on theoretical, methodological, and empirical information equally in order to reveal the contexts and challenges of holistic education as well as the features of human wholeness, humanism, and posthumanistic ecological education. All papers were read and coded for the following aspects: title; author; year; keywords; country; study objective; study type; research question; research strategy; study participants; data collection methods; level of education; study results; challenges; and recommendations. The analysis of the theoretical part of the research and findings looked for features of holistic education.

The selected data analysis was based on a qualitative comparative research method [54]. The segments were coded on the following topics: Research Contexts (see Section 3.1), Challenges of Holistic Education (see Section 3.2), and Features of Holistic Education (see Section 3.3). These were compared and are summarised with a descriptive interpretation in Section 3.

2.3. Limitations

The study's main limitation is that the entire search for articles on holistic education was conducted in the Scopus database. Only eight studies on holistic education were found in this database. For this reason, due to the relevance of the results, another empirical study using the Semantic Scholar database was included. It can be assumed that a review of other databases would have led to the discovery of more relevant studies, which is why we recommend that this investigation should be continued. Another limitation is that "The Holistic Education Review" journal was not included in the study. This journal is not part of the Scopus database, which was the primary source for data selection.

3. Results

3.1. Contexts of Holistic Research

First, we investigated the question of the contexts in which holistic education practices are prevalent (see Table 2). Why is holistic education relevant in some contexts and not in others? The following comparative content analysis of the selected articles attempts to answer these questions.

It was found that the selected studies were predominantly conducted in Europe [47–49], the East [46,47,50,51], and North America [14,45,52], and this fact supports Lee et al.'s statement:

The literature suggests that while holistic education is predominantly propagated by Euro-American educational systems, its philosophical underpinnings are strongly compatible with Eastern value systems [47] (p. 872).

The study found that holistic education has been incorporated into the general curriculum as a national education policy in Eastern countries. For instance, Hedges and Cooper [46] claimed that New Zealand's "Te Whāriki" curriculum is holistic and takes an integrated approach to education. New Zealand's curriculum focuses on knowledge and experiences that motivate children; relationships with people, places, and things; and how knowledge is connected and used holistically [46]. Furthermore, Taiwan's ed-

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ucation program is also holistic. Pan et al. stated that "holistic education is one of the most important and influential objectives of higher education" [51] (pp. 199–200). As a result, the body of literature on holistic education in Taiwan has increased, but there is still a lack of empirical information. Moreover, according to Lee et al. [47], Singapore is a post-colonial country that inherited existing infrastructure from the British, including intensive examination-based learning in academic subjects. However, since the beginning of the twenty-first century, Singapore has declared that it provides holistic education with a predominantly examination-based academic curriculum. It can be concluded that holistic education is integrated into public education policy in Eastern cultural countries such as New Zealand, Taiwan, and Singapore.

It was also noted that holistic education is prevalent in countries on the North American continent as an alternative educational practice that must meet national academic standards. Rudge [10] defined alternative education as being different from mainstream schools. It includes Steiner, Montessori, and democratic schools. For instance, Rudge [14] used a multiple-case study strategy to investigate three alternative holistic education schools in the United States: "Wickliffe Progressive School (K-5)"; "The Project School (K-8)"; and "Clark Montessori School (7–12)". The study notes that there are at least 638 alternative holistic schools in the United States and questions how these schools maintain the principles of holistic education and meet state educational requirements. Another example of an alternative holistic school is described in Miller's [45] research, "Equinox holistic alternative school", the most prominent alternative school in Toronto, Canada. The study examined how the school manages to implement the principles of holistic education. Moreover, Seelig, Eldridge, and Schirtzinger [52] studied the services provided by universities to undergraduate and postgraduate social work students as holistic individuals with diverse needs. In summary, research on holistic education on the North American continent, in Canada and in the USA, defines this type of education as involving alternative educational practices that aim to realise a holistic vision and meet established national academic requirements.

The context of research on holistic education varies across Europe: studies from Ireland and the UK describe teacher-initiated holistic education projects, while Finland, on the other hand, has a historically rooted tradition of holistic education as a public education policy. Glenn [48] presented a paper including a self-assessment of a teacher who wanted to explore the possibility of incorporating digital technologies into primary school teaching and eventually discovered the principles of holistic education and began to use them to shape her practice. Renshaw and Wood [49] described another example of a holistic teacher initiative project, the updated Key Stage 3 curriculum for 11–14-year-olds in England, introduced in 2007, which led to significant content changes in many subjects. The new curriculum has enabled geography teachers to develop local programs themselves. This study is an example of a small-scale collaborative program development project that attempted to develop an approach to geography learning based on the notion of holistic understanding. A completely different example of holistic education was described by Lee et al. [47], who showed that holistic education was introduced in Finland in the 1960s and that this educational paradigm has been further developed. The study compared two Finnish holistic primary education institutions and showed that different holistic education practices prevail in other contexts. It can be concluded that research on holistic education differs among varying European contexts. While in Finland, holistic education is a national educational tradition, it is a teacher-driven initiative in the UK and Ireland.

From the methodological perspective, a lack of in-depth quantitative studies and comparative analyses was identified when examining the prevailing studies. Predominantly, qualitative case studies [14,45,47,49–51] investigating individual school cases [14,45,47], curriculum projects [49], and university study modules [50,51] were identified. However, based on these studies, no generalised conclusions can be drawn about the benefits of holistic education, as the results were not compared to those of traditional education systems. Moreover, we found that empirical research on holistic education has mainly been con-

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ducted at the primary education level [14,45,47,48]. Few studies were found at other levels of education: pre-school [46]; basic education [49]; higher education [51,52]; and short-term tertiary teacher training [50]. This finding supports Lee et al.'s assumption "that holistic education is most impactful for the younger age groups" [47] (p. 875). Future detailed quantitative, mixed-method, or experimental studies are recommended to substantiate the benefits of holistic education. According to Rudge [14], these studies are necessary, because holistic education practices are spreading in both universities and schools. However, there is insufficient evidence to justify their advantage over traditional educational institutions.

In response to the question about the contexts in which research on holistic education is prevalent, it was found that, in Eastern countries, holistic education is included in the general curricula, and analyses on how these curriculum goals are achieved have been conducted. Meanwhile, in the North American context, holistic education is defined as an alternative educational paradigm, so it has been explored as case studies of individual schools. In Europe, previous research on holistic education has ranged from individual teacher initiatives to an investigation of Finland's deep-rooted public holistic education policy. In summary, research on holistic education is prevalent in advanced education systems such as Finland, Singapore, Canada, and Taiwan. It can be assumed that, in countries with high academic performance, education is expected to do even more—to create a harmonious, fulfilled, holistically educated person and society that will shape the world of tomorrow. No research from South America or Africa was found, which supports the argument that holistic education is more relevant in developed education systems than in countries where access to education remains a significant problem. In terms of the methodological contexts of the research, it was noted that qualitative case study research has been predominant, and quantitative and comparative analysis studies on holistic education are lacking.

3.2. The Challenges of Holistic Education

This section addresses the question regarding the challenges in the practice of holistic education and how these challenges holistic education.

As can be seen in Figure 2, four main challenges to holistic education were prevalent in the selected studies on holistic education: (1) the changing role of educators; (2) developing a standardised curriculum; (3) measurability issues in holistic education outcomes; and (4) the ability of students to adapt to holistic learning practices. An analysis of these issues is presented below.

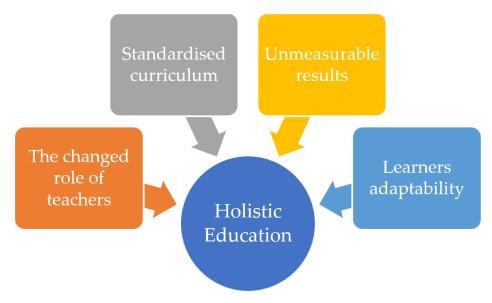


Figure 2. The challenges of holistic education.

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Holistic education requires a whole teacher. Miller defines whole teachers as "teachers who care for their own bodies, minds, and spirits" [11] (pp. 12–13). Such teachers consciously strive to be whole through conscious work on their bodies and souls, whether through meditation, yoga, or other sports. Miller [11] adds that whole teachers are patient, present, caring, loving, and lifelong learners. The analysis of the selected articles shows that holistic educational practices are confronted with challenges regarding the changing role of educators. For instance, Pan et al. [51] stated that, in holistic education, the educator takes a leadership role in guiding learners towards a goal. Thus, specific preservice training is recommended to allow the teacher to acquire the necessary leadership skills. Moreover, Renshaw and Wood [49] call teachers "guides"

The teacher begins, in part, to play the role of guide, helping students navigate their own liminal spaces as they grapple to understand the content and threshold concept at hand [49] (p. 377).

However, the essence of the teacher's role remains the same: the teacher no longer teaches directly but leads the students on a learning journey where they learn for themselves. Hedges and Cooper [46] added that holistic education requires a pedagogy that values relationships; emotional engagement, reflection and responsibility; and attention to content and process. Glenn [48] argued that teachers' standards of performance are rooted in their values and that if teachers are to address global issues, promote environmental awareness, and foster global citizenship, they must be guided by these values. Another challenge related to the point of holistic teachers is teacher turnover. Miller [45] explained that it is difficult to train new teachers in holistic approaches and that they need more time and support: "Some of these teachers lacked experience and understanding of holistic education" [45] (p. 299). Rudge [14] added that there is a shortage of teachers prepared to teach through projects: "TPS has great difficulty in finding teachers well prepared to teach through projects" [14] (p. 188).

In summary, the issue of the changed role of the teacher is linked to the challenges that affect the practice of holistic education. It is challenging to find teachers with experience with holistic education, so additional time and resources must be available for teachers to engage with holistic education. Further research on holistic teacher education and change is recommended.

Holistic education supports the uniqueness of the individual, which means that this educational paradigm recognises each person's differences, promotes tolerance and respect, and seeks to discover and nurture the strengths of each individual [4,10,39]. For this reason, holistic educators are moving away from a standardised approach to education and toward a personalised curriculum [10,55]. This study identified the following challenge for holistic education: the impact of having a standardised curriculum on holistic education programmes. For example, Miller [45] stated that it is challenging to work within the constraints of the system and implement a holistic vision of education: "The biggest challenges for the school include working within the constraints of the system" [45] (p. 300). Lee et al. [47] added that educational standards are essential for education policymakers, because they are easily measurable and comparable. It should be noted, however, that a standardised outcome measure does not provide a holistic view of a person. In the same study, it was recommended that Singapore move from a standardised examination-based education system to a constructivist approach to education: "On Singapore's part, it is imperative to temper absolutist assumptions of traditional examination-based learning with a more constructivist slant" [47] (p. 882). In addition, Rudge [14] found that preparation for standardised tests detracts from the holistic curriculum, because time spent on the integrated project has to involve test preparation:

The need to perform well in those tests has led the three schools to dedicate more time to teaching specific skills linked to curriculum standards, which has taken time away from projects and transdisciplinary learning [14] (p. 190).

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In addition, Rudge [14] found that mathematics education is area that is most affected by holistic education. In all of the schools studied, children were grouped to prepare for standardised tests:

Math has been the most affected subject, where students in all three schools are split by ability or grade level to facilitate instruction and skill building [14] (p. 190).

In conclusion, to promote each student's individuality, it is necessary to move away from standardised tests to a more flexible curriculum that gives teachers the freedom to differentiate and modify the curriculum according to the individual needs of their students. However, the question of how this can be done at the national level without compromising the quality of education remains.

Holistic education encompasses the development of the whole child—intellectually, emotionally, physically, socially, aesthetically, and spiritually—and promotes harmonious relationships with nature and people [9,10,55,56]. Various standardised tests easily measure a person's cognitive abilities, but we cannot measure a person's emotional intelligence, values, spirituality, and social skills. These issues are subjective and difficult to evaluate. This poses another challenge for holistic education—it is difficult to measure the outcomes of holistic education. For instance, Miller [45] stated that we live in a world based on outcomes, but these are limited to a few capacities and are, therefore, not a reflection of wholeness:

We live in the day of outcomes-based education, but often these outcomes are limited to a few skills that sometimes are put within the framework of being 'marketable' [45] (p. 300).

In other words, if we focus only on measurable results, we are missing the big picture or losing something. Hedges and Cooper [46] argued that the challenge of assessing holistic educational outcomes creates tension between teachers and parents, as parents often focus only on their child's academic performance:

Such tensions illustrate the complexities of reconciling holistic outcomes with domain-based outcomes that are more easily atomised, recognised and measured [46] (p. 404).

In a nutshell, the difficult-to-measure outcomes of holistic education can lead to tension between education policymakers, education policy assessment institutions, teachers, and parents. How can we ensure that holistic educators fulfil their holistic mission to educate the whole person? Further research is recommended to explore this question.

Holistic education is based on experiential learning methods, and students are defined as active participants in the educational process, building their knowledge through experience [4,9,13,55–57]. However, this study found that students have difficulty changing from traditional to holistic educational methods. For example, Renshaw and Wood [49] found that the teacher had to actively encourage students to adopt a holistic questioning approach, because students tended to ask closed questions:

The teacher did emphasise that they needed to persevere with this approach, as students tended to ask closed, knowledge-driven questions at the start of the process [49] (p. 377).

Holistic education requires patience and effort on the part of the teacher before students begin to think holistically. Pan et al. [51] found that some students who had participated in a holistic education course were later unable to apply or even remember what they had learned: "some of the participants seemed to be unable to either apply or sometimes even recall what they learned in holistic care" [51] (p. 207). In summary, it takes time and effort for teachers and students to adapt to the vision of holistic education. For this reason, when designing and implementing holistic education programs, it is advisable to assume that students will need time to adapt to an active learning style and that teachers will need to make extra effort to help students adjust to the principles of holistic education.

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When answering the question of what challenges holistic education faces and how this affects pedagogical practice, the changing role of teachers was the most frequently discussed topic. Holistic education requires the teacher to be responsible not only for intellectual development but also for the spiritual development of children. It has been noted that there is a shortage of teachers prepared to work in holistic education settings. Holistic education is also influenced by having a standardised curriculum, which hinders the holistic vision of institutions, as they have to prepare students for standardised tests. The results of holistic education are difficult to measure, which puts a strain on the various educational stakeholders. How can holistic education be achieved without compromising the quality of education? Finally, the last commonly mentioned challenge was students' adaptability to changing educational paradigms. In a traditional academic setting, students are used to being passive participants, whereas in holistic education, they need to step out of their comfort zone and become active participants. This change requires time and effort.

3.3. Features of Holistic Education

In Section 3.1, it was noted that the use of a standardised curriculum interferes with holistic education and thus poses a challenge to the development of holistic education. Miller [58] argued that holistic education cannot be defined as a particular method or technique but as an educational paradigm that can be applied in different ways. The question is, what features of education must be present for it to be called holistic?

In this study, holistic education was defined as a type of education that focuses on whole-person development with emphasis on humanistic and post-humanistic ideas of environmental education and the interconnectedness of all living and non-living ecosystems on Earth. Based on this definition, all identified features of holistic education were divided into three groups: (1) human wholeness, (2) humanistic education, and (3) posthumanistic education (see Figure 3).

Education for the whole person is a type of education that harmoniously integrates the intellectual, emotional, physical, social, aesthetic, and spiritual aspects of individual learning [11–14]. Education for the whole person is also known as "education for the head, the hands, the heart" [45] (p. 288) or education while "being, knowing, doing" [4], because it reflects the consistency and balance of the educational process between the different spheres of human development. The theme of developing the wholeness of the human being as a fundamental feature of holistic education is prevalent in the selected articles. For instance, Miller [45] suggested that educating the whole person requires a wide range of different educational approaches:

In general, there was a broad consensus that holistic education focuses on teaching the whole child—head, hands and heart and uses a broad range of learning approaches to achieve this [45] (p. 289).

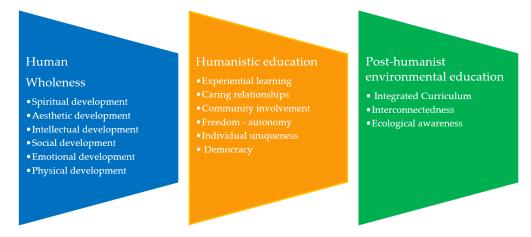


Figure 3. Holistic education features.

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Moreover, Lee et al. [47] claimed that the primary goal of education in Singapore is to prepare each person for life and living, rather than to pass a standardised exam. Rudge [14] added that educating the whole child requires an integrated curriculum, a focus on the arts, project and inquiry-based education, a passion for the classroom, and experiential learning. Furthermore, Wang, Chen, and Levy [50] argued that cooperative and reflective education contributes to personal development. Similarly, Pan et al. [51] showed that, after collaborative learning sessions, many of the participants clearly expressed their self-confidence as people. Seelig, Eldridge, and Schirtzinger [52] stated that holistic human development requires the consideration of the individual's biological, psychological, social, intellectual, and developmental needs and that all educational programmes must be based on this approach. In summary, the development of the whole person is a fundamental feature of holistic education, which is promoted through the individual's spiritual, aesthetic, intellectual, social, emotional, and physical development. The themes of education are discussed below.

3.3.1. Human Wholeness in Holistic Education

Ron Miller claimed that "the holistic worldview is essentially a spiritual worldview" [6] (p. 388). What is spiritual education, and why is it so crucial in holistic education? Bhatta [12] emphasized the idea that spirituality in holistic education is not linked to religion but leads to the discovery of meaning and purpose. Spirituality guides a person to harmony between their inner and outer lives [12]. The theme of spiritual education was frequently identified in the analysed articles [14,45,48,50-52]. For instance, Glenn [48] argued that the development of spirituality involves gaining a sense of awe and reverence for life that comes from connection to the world around us. Pan et al. [51] added that people find their identity, meaning, and purpose in life through connections to the natural world and community and by adopting spiritual values, such as peace and compassion. Moreover, Miller [45] found that nature and art nurture the soul, which is why outdoor education, meditation, yoga, mindfulness exercises, and reflection all help to foster a relationship with oneself. Rudge [14] confirmed that spiritual education can occur through moral education, the arts, meditation, and religious instruction. In summary, holistic education is a type of spiritual education that uses reflection, meditation, yoga, outdoor education, and the arts to create an inner connection with oneself and nature.

To ensure holistic personal development, aesthetic development must be integrated into the curriculum [14]. For example, Glenn [48] argued that, through aesthetic education, people can discover their everyday spirituality because poetry, music, art, and being in nature allow one to pause for a moment and empathise with the moment, feel better, and experience the beauty of the moment. Moreover, Miller argued that creating a holistic school environment requires "paying attention to the aesthetic environment of the school and classroom" [7] (p. 162). Miller's [7] idea was confirmed by Rudge [14], who showed that the physical environment of one of the holistic schools studied was aesthetically pleasing, leading to a desire to spend more time there:

The physical environment at WPS with its walls covered with students' artwork, its warm and inviting classrooms with quiet corners, plants, and play areas, and its natural wood playground, provides young children with a nurturing environment that respects children's needs for intimacy, play, and physical activity, values student work, and furthers their aesthetic development [14] (p. 189).

In conclusion, aesthetic education and an aesthetic school environment contribute to the idea of holistic education.

Even though holistic education involves different areas of human development, intellectual development remains essential. Renshaw and Wood [49] aimed to develop a deep holistic understanding of geography concepts related to the ability to relate new information to existing knowledge and experiences through questioning and concept mapping techniques. The study showed that the children had a deeper understanding of the concepts taught and better recall after completing these tasks. Moreover, Rudge [14] and Miller [45]

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showed that, although holistic education does not focus on standardised tests, children perform well on tests and meet all academic requirements; however, these achievements are not overstated. These holistic schools focus more on student and teacher well-being and an enjoyable educational process.

Holistic education emphasises interconnectedness with the whole environment and other human beings [7,33]. Holistic education aims to foster a sense of collective community in which each member is responsible for promoting the common good:

A sense of shared community leads to an appreciation and accommodation of the views, beliefs, and values of others and a realization that these may differ from their own [33] (p. 305).

Holistic education is, therefore, based on the theory of social constructivism, where education is implemented through cooperative methods. For example, Miller [45] emphasised the idea that, within the holistic education paradigm, educating the child as a whole includes a social dimension. This idea is related to research done by Wang, Chen, and Levy [50], who showed that group learning provides opportunities for mutual support, encouragement, and collaboration, while group discussions foster a culture of cooperation, shared understanding, and support. Miller stated that "cooperative learning employs small groups where students learn to trust each other and work together" [7] (p. 155). In addition, Pan et al. [51] confirmed that, through cooperative learning, students learn to give and receive information, communicate in socially acceptable ways, and develop new ways of thinking, acting, feeling, and doing. In summary, social education in the holistic education paradigm is implemented through cooperative education methods to develop a sense of collective community.

In summary, the holistic education paradigm is integral and encompasses many aspects of human development. However, the theory of holistic human development emphasises that these areas must be developed coherently, without placing one area above another.

3.3.2. Humanism in Holistic Education

The humanistic features of education were identified from the work of Miller [7,45] and Rudge [14]. According to Miller [45], in the 1950s and 1960s, humanistic education was developed as a direct precursor to holistic education. Based on the ideas of Rogers, Maslow, Weinstein, Fantini, Dewey, Steiner, and Montessori, holistic education has embraced the respect for individuality, theories of citizenship and democracy, experiential and affect-based learning, and nurturing and caring relationships. Rudge [14] identified eight principles of holistic education, the first four of which reflect a holistic philosophy: spirituality, reverence for life, connectedness, and human wholeness. The remaining four reflect features of humanistic education: respect for human individuality, caring relationships, freedom and autonomy, and democracy.

Experiential learning is often linked to holistic education [35]. Carver defined experiential learning as "education that makes conscious application of the students' experiences by integrating them into the curriculum" [59] (p. 9). Such experiences involve a combination of sensations, emotions, changes in the physical condition, and cognitive engagement. The analysis of the selected articles showed that experiential learning is the dominant feature of holistic education. For example, Pan et al. [51] argued that experiential learning can be a transformative educational experience. This means that experiential learning shifts from the use of traditional teaching methods to active methods where the learner becomes the active agent, and the teacher takes on a supervisory role.

Experiential learning can be implemented through cooperative learning, outdoor education, play-based education, reflection and visualisation, and meditation practices. Lee, Hong, and Niemi [47] stated that play-based education is designed to achieve educational goals through fun, active methods. Students learn to take the initiative and initiate change, apply existing knowledge, or create new knowledge. Children are motivated and have fun through play—they learn to have joyful lives [46]. Miller [45] claimed that outdoor education is important because it brings children closer to nature and nourishes their souls.

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At "Equinox Holistic School", the children go outside every day. Each morning begins with a circle in which the children meditate, move, play, or reflect. The children often go on field trips and keep diaries of their observations. The children develop their observational skills and describe, draw, sing, or write poetry about the details they observe. Nature brings the children closer to art and allows self-expression. The findings of Miller [45] were supported by Rudge [14] and Lee et al. [47], because the holistic education cases studied all emphasised the importance of outdoor education as well as children's outdoor play and being outside during breaks. Moreover, experiential learning can be achieved through cooperative learning. For instance, in the study conducted by Pan et al. [51], the thirty-four participants surveyed stated that they found the collaborative learning experience rich and exciting. A more unexpected finding of the study was that students developed close relationships with one another after participation in the cooperative project, which was not the aim of the course. The use of reflective learning in holistic education creates meaning, which leads to personal growth, transformation, and spiritual development. Reflection is a conscious act of self-consideration, asking oneself questions, and searching for answers and meanings [28]. Many of the articles analysed described reflection as an essential part of the holistic education process, as reflection connects new experiences with knowledge and understanding the interconnectedness of knowledge [45–51]. In summary, experiential education is an essential feature of holistic education, as active learners are more motivated, enthusiastic, and engaged in the educational process.

Caring relationships were defined by Rudge [14] as involving a strong sense of community, an atmosphere based on friendship and respect, cooperation and collaboration, universal love, and teachers' efforts to build and nurture relationships with students and their families. Miller [45] added that, at "Equinox," one teacher works with a group of students for five years to get to know the students closely, to see their developmental process, and to see the growth of moral values. Relationships are also built in this school through community celebrations, traditions, morning circle activities, and reflection. Lee et al. [47] supported the idea of community involvement in holistic schools and gave the example of a Finnish school in which grandparents come to the school as volunteers and help the teachers to teach the children. It has been shown that having caring relationships leads to better learning outcomes. Pan et al. [51] showed that encouragement and respect from teachers are factors that lead to the development of a productive learning environment. Learning is enjoyable when education is based on good relationships and when motivation and support prevail.

In holistic education, freedom or autonomy is defined as the ability to freely choose and flexibly adapt the educational paradigm [10]. However, with freedom comes responsibility [57]. For example, in the studies by Rudge [14] and Hedges and Cooper [44], liberty and autonomy were defined as the freedom of students to choose the subjects and projects that interest them and the freedom of teachers to design the curriculum and select their teaching methods. In the study by Lee et al. [38], two holistic education schools in Finland were compared. It was concluded that these schools differed, as unstructured play and freedom were emphasized in one school, while rules and discipline were used in the other. However, both schools fit the characteristics of holistic education.

Humanistic educational values such as experiential learning, caring relationships, community engagement, freedom and autonomy, and democracy shape holistic education.

3.3.3. Posthumanist Environmental Education in Holistic Education

Posthumanist ideas of a holistic view reflect the opposition between humanism and an anthropocentric world view, as the holistic view does not elevate humans above nature. Miller stated that:

If our collective future is to be one of harmony and wholeness, or if we are to even have a viable future to pass on to our children's children, it is imperative that we actively envision and implement new ways of educating for ecological thinking and sustainability [7] (p. xiii).

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Holistic education is based on the following ideas of posthumanist environmental education: human responsibility towards all living and non-living aspects of nature, the awareness of interconnectedness, and education based on the latest scientific knowledge [19]. Furthermore, an ecological worldview is directly linked to holistic education, as ecological literacy addresses climate change, sustainability, and the relationship of humans with nature [8]. Although holistic education focuses on ecology, sustainable development, and interconnectedness, the empirical studies included in the sample were found to be the least concerned with posthumanist environmental education issues.

Education on ecology in holistic education is realised through the development of an understanding of interconnections and an integrated curriculum [14]. Rudge [14] defined interconnectedness as the perception that everything in the world is interconnected and influences all other aspects. This world is a vast network in which our actions impact other people, economies, policies, democracies, or even the entire planet. Holistic education encourages us to become aware of this interdependence and to take responsibility for our actions. Miller [45] stated that, at "Equinox Holistic School," children develop a relationship with nature through outdoor education. The holistic curriculum should be designed to develop students' ecological and global awareness, focusing on sustainable development and connectedness [14]. The study by Renshaw and Wood [49] was based on the idea of interdependence in geography lessons, arguing that if students can understand interdependence in geography, their attitudes towards the subject will be transformed. Glenn [48] described connectedness as a web of relationships in which each person is connected to another person and nature, meaning that all of our actions have consequences for which we are responsible. Therefore, it is essential to talk about interconnectedness to foster deep holistic thinking, as it is a theme that encourages society to change and take responsibility for people's actions.

In holistic education, interconnectedness is implemented through the use of an integrated curriculum [10,28]. Miller [7] defined the term "integrated curriculum" as one with connections between subjects and different domains of knowledge. Rudge [14] argued that, in holistic education, interconnectedness is realised through having an integrated curriculum and transdisciplinary nature. In the schools studied, interdisciplinary learning is taught through problem-based, project-based, and place-based activities. Miller [45] highlighted that an integrated curriculum is an essential feature of holistic education and stated that "Equinox" achieves this through projects, research-based activities, and links to the arts in all subjects. Wang, Chen, and Levy [50] claimed that the term "holistic" reflects the context in which education takes place. They added that having an integrated curriculum that combines students' knowledge and skills into a coherent whole helps to ensure a balance between the different areas of education. Renshaw et al. [49] developed an integrated geography project called "HUGE" in which children explored the interconnectedness of the Earth's systems. The children first posed questions and then drew concept maps and carried out reflections. Through this project, children combined their knowledge of geography, physics, chemistry, and biology to understand phenomena occurring on Earth. The study showed that the children developed a holistic understanding of geography concepts. Thus, integrated education helps bring together areas of knowledge into a coherent whole and create a holistic understanding.

In summary, posthumanist environmental education solves global problems by promoting awareness and interconnectedness. This is achieved through having an integrated curriculum and incorporating interdisciplinary projects and outdoor education into holistic education.

4. Discussion

This study aimed to provide an overview of the empirical research on holistic education to encourage further research. In this study, we only identified nine empirical studies on holistic education in the Scopus database (see Table 2). We recommend that further in-depth analyses are carried out including more databases. The answers to the research questions are presented below.

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What do we know about the empirical outcomes of holistic education practices?

First, the selected articles in the Scopus database revealed that research on holistic education is prevalent in the European, North American, and Eastern contexts. It is recommended that research on holistic education be conducted in other continents. Second, it was found that quantitative case studies describing successful holistic practices were predominant. However, there is a lack of comprehensive quantitative research demonstrating holistic education's prevalence, demand, and benefits. It is recommended that comparative studies are carried out to determine the impacts of holistic and traditional learning on personal development. Investigation of the major holistic education features in traditional public schools is recommended. Third, holistic education practices face challenges, such as the use of a standardised curriculum, the changing role of teachers, the adaptability of students, and the immeasurability of holistic education outcomes. Further exploration of these areas and the identification of how these challenges affect holistic education practices is recommended. We also encourage research on holistic teacher education to be conducted. Andrzejewski [28], Clark [29], Lovat [37], and Oberski et al. [39] argued that the teacher takes on a new role in holistic education—that of educating the whole person. Thus, the question is, how well prepared are teachers to adapt to their new roles? Furthermore, the analysis of the empirical studies revealed a link between whole-person development and experiential learning approaches. It seems that balance among the different areas of knowledge is maintained through inquiry, projects, games, and outdoor and reflection-based education. However, there has been a lack of analysis of holistic educational curriculums to reveal how the balance among the different dimensions of human development (intellectual, physical, social, aesthetic, spiritual, and emotional) is maintained in the educational curriculum design. Finally, in the selected empirical studies, spirituality emerged as an essential holistic education feature in all the themes of holistic education. Ergas claimed that:

Working with the spiritual sphere is complicated by a wall of misunderstanding that prevents us from incorporating it into our everyday curriculum [31] (p. 166).

This misunderstanding comes from the mixing of spirituality with religious dogmatism and dualism. Miller [7], Ergas [31], and Bhatta [12] encouraged people to see themselves as spiritual beings who seek meaning and purpose in life. Ergas [31] argued that one way to realise spiritual education is through the use of yoga classes in schools, as yoga is not only a sport but also an inward-looking philosophy. The selected empirical studies confirmed the idea of Ergas [31], as yoga, mindfulness, and meditation practices are used in holistic education schools. It was also found that human spirituality is nurtured through art and connections with nature. Research suggests that children develop their identity and search for meaning in life through activities that foster spirituality. However, there is a lack of empirical evidence that these outcomes are actually achieved. Further research is recommended to determine whether holistic education graduates have a more profound sense of meaning than traditional school graduates.

How can holistic education contribute to the solving of global problems?

The theme of ecology in this study is linked to posthumanist environmental education, which aims to highlight the interconnectedness of all living and non-living organisms and to create awareness and respect. The following themes of posthumanist environmental education were identified by Blyth and Meiring [26]: (1) all actions have consequences; (2) respect for different points of view and constant dialogue with different members of the community; (3) environmental education requires "being in the world"; (4) ecoeducation requires the simultaneous development of aesthetic and moral skills; (5) environmental education should be universal; it should be interdisciplinary, integrated into all subjects and should be the basis for all education (pp. 112–113). We claim that holistic education reflects all of the themes of posthumanistic environmental education identified above. For example, the idea that all actions have consequences is fostered through problem-based projects, inquiry-based projects, and deep reflection on action. Respect for the opinions of others and the diversity of people is encouraged through cooperative learning, group

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work, group reflection activities, community volunteering, teachers' respect for students' opinions, and adherence to school values. In holistic education, the concept of "being in the world" is realised through outdoor learning activities, nature observation notes, and gardening. The aesthetic and moral aspects are promoted through integrating the arts into all educational activities and school environments, reflection activities, meditation, visualization exercises, diary keeping, and the promotion of school values and traditions. Finally, holistic education emphasises the development of holistic thinking through the use of an integrated, interdisciplinary, contextual curriculum. It is important that these issues are all taught according to the principles of holistic education: balance, inclusion, and connectedness [7].

While the topic of ecology is particularly relevant in today's context due to global climate change [60] and the socioeconomic challenges facing humanity, the issues related to posthumanist environmental education were the least discussed in the selected studies. Holistic education could help to change people's thinking because, as Guattari [2] pointed out, solving ecological or social problems requires a change in the way people think. However, more research in this area is needed to determine out how students' environmental awareness develops. What educational approaches promote these changes? Is holistic education more effective than other educational paradigms for fostering ecological awareness?

Can holistic education solve global problems? From a theoretical point of view, it seems that it can, because it promotes the development of holistic global citizens with shared human values. However, from a pragmatic point of view, it is difficult to answer this question, because there is no objective evidence that a person who has received a holistic education is different from a person who has received a traditional education. To summarise the systematic review of empirical studies, we emphasise our recommendation that extensive research on holistic education should be carried out to provide scientific evidence for this educational paradigm and show its benefits, diffusion, demand, and contrast with traditional education. Through this study, we encourage researchers to look into the issue of holistic education. The more this educational paradigm is explored, the more scientific evidence we will have, and the sooner we will be able to implement critical educational reforms.

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