

**Exploring the Role of Visual Eco-Art Education  
in promoting Human-Nature Connectedness: A Scoping Review**

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## Abstract

Human-nature connectedness plays a crucial role in promoting eco-friendly behaviour. However, despite the urgency of the environmental challenges, humanity is witnessing a gap between the desired sustainability goals and the current human behaviours. Visual eco-art education is a promising way to bridge this gap by increasing human-nature connectedness through integrating environmental education with visual art education. This scoping review aims to explore what the extent and nature of empirical research is on how the implementation of visual eco-art education programs foster human-nature connectedness and how successful these programs are. The review systematically examines eleven articles, analysing their conceptual frameworks, methodologies, findings, and limitations. Results show a diverse range of conceptualization within this field, encompassing varied terminology and concepts. However, underlying definitions often align, emphasizing the essence of integrating cognitive, affective, and experiential elements to embed human-nature connectedness in the participants. Findings indicate a positive relation between participating in visual eco-art education programs and human-nature connectedness. However, there are limitations such as sample group biases, methodological challenges, and unclear cause-and-effect relationships identified across the included studies. It is concluded that there is a need for standardized terminology, further exploration of the relationship between concepts, and longitudinal studies to assess long-term program effects.

## **Exploring the Role of Visual Eco-Art Education in promoting Human-Nature Connectedness: A Scoping Review**

Humans depend on earth throughout their entire lifetimes and are currently faced with some of the most difficult ecological issues (National Academy of Science, 2020; World Watch Institute, 2016). Scientific evidence concerning climate change have been present since 1900 and entered public debate during the 1970s with the introduction of Earth Day (Freeman III, 2002). In 1992 the Union of Concerned Scientist and more than 1700 independents scientists expressed concerns and called on humankind to curtail environmental destruction (Ripple, et. al, 2017). Despite the scientific evidence that is available to explain the ecological crisis, the behaviours, and attitudes responsible for the problems that we face have not fundamentally changed yet, as explained by the study of Ripple and his colleagues (2017). Instead of reaching the globally endorsed sustainability goals, humanity is witnessing the increasing gap between the desired and actual state of the earth (Steffen et al., 2018). This increasing gap shows the insufficiency of the approaches that have been used in addressing these challenges to promote sustainability (Santos-Martín et al., 2013). Parallel to this, the disconnect between humans and nature is increasing, which is arguably one of the main drivers to unsustainability (Zylstra et al. 2014; Pett et al. 2016). There is a growing interest in reconnecting humans to nature as it has shown to be positively related with pro-environmental behaviour (e.g., Schultz 2001; Mayer and Frantz 2004; Nisbet et al. 2009; Gosling and Williams 2010; Hoot and Friedman 2011; Geng et al. 2015). Reinforcing human-nature connectedness may foster system transformations towards more sustainable pathways (Muhr, 2020).

Human-nature connectedness is seen as a ‘core construct’ that encompasses several concepts such as connectivity with nature or nature relatedness (Bogdon, 2016; Dutcher et al., 2007), love and care for nature (Perkins, 2010) and dispositional empathy with nature (Tam,

2013). Human-nature connectedness is thus a broad concept and clear conceptualization is critical while conducting research on this topic. Zylstra et al. (2014) provides an operationally useful definition of human-nature connectedness as ‘a stable state of consciousness comprising symbiotic cognitive, affective, and experiential traits that reflect a realization of the interrelatedness between oneself and the rest of nature’. This definition is operationally useful since offers a clear and measurable framework for understanding the connection between human and nature, which is applicable on individuals of groups, and it provides specific traits namely: cognitive, affective, and experiential which is helpful in researching the concept. Since, human-nature connectedness is shown to positively influence pro-environmental behaviour research on how it is imbedded is worthwhile.

Environmental education is an educational framework which aims to connect people with nature and increase human-nature connectedness. Stapp (1969) argues that environmental education intends to make humans cognizant of nature and their responsibility for the biophysical environment, with the goal of making them aware of how to solve environmental problems and motivating them to therefore adopt environmentally friendly behaviours. Thus, environmental educational approach predominantly employs cognitive methods, such as classroom instruction and problem-based learning, in order to encourage the adoption of environmentally friendly behaviours (Stapp, 1969).

Environmental education researchers argue that in the field of environmental education there has been more success in inducing learners’ attitudinal shifts than in changing their behaviours (Hungerford & Volk, 1990 and Leeming, et al., 1993). An explanation for this is the lack of a more emotional/affective approach to environmental education as expressed by many other environmental education researchers (Graff, 1990; Adams, 1991; Lindholdt, 1999; Gurevitz, 2000; McKibben, 2005; Gradle, 2007; Palmer, 1998; and Graham, 2007). Additionally, in environmental education programs the increase in human-nature-

connectedness is often only for a short period of time. Art education is seen as an important means to make people aware of the environmental problems we encounter nowadays, through a more creative, affective, and sensory approach, which therefore can fulfil the lack of this in environmental education (Sunassee, 2020). The integration of art education with environmental education seems worthwhile in developing human-nature connectedness. When environmental education is combined with art education the effect of ecological learning can be strengthened (Sunassee, 2020).

This combination is referred to as eco-art education, art based environmental education or ecological art education (Tereso, 2012; Anderson & Guyas, 2012; Inwood, 2010). Inwood (2010) defines Eco-art education as balancing the cognitive approach of environmental education with the more creative, affective, and sensory approach through the making of art in art education. Anderson & Guyas (2015) use the term embodied experience for this more creative, affective, and sensory approach. The mere perception of art will not establish this embodied experience which is critical to re-engaging our relationship with the natural world. However, the *making* of art is a practice which does support immediate and embodied experience, which seems to be essential of establishing human-nature connectedness because it covers the embodiment part which is lacking in traditional environmental education (Anderson & Guyas, 2015).

It is necessary to do more research on Eco-art educational programs to provide knowledge on working mechanisms of these programs and how they can be implemented (Liukkonen et al., 2023). Current research is lacking the understanding of the longevity of the increase of human nature connectedness. Additionally, previous researchers on Eco-art education, recommended to focus on specific aspects of the programs to enable comparison and get insights in the differences or similarities regarding the embedding of human-nature connectedness, since their findings were not significant but suggested that the programs that

included art were more successful (Staples et al., 2019). A study done by Renowden (2022) suggest that the embodied experience through the making of art is essential in increasing human-nature connectedness, however their study did not have its focus on creating evidence for this. Additionally, Renowden (2022) also advises that future research should make it possible to create evidence and to compare multiple types of eco-art education, such as visual eco-art education, musical eco-art education, among others. Given these needs for understanding and comparison, this literature review will focus on visual eco-art education programs specifically.

To examine the extent and nature of the existing research concerning visual eco-art education programs in regards of human-nature connectedness, a scoping review was conducted. Scoping reviews serve multiple purposes, including assessing the size, variety, and characteristics of evidence on a topic, evaluating the need for a systematic review, summarizing heterogeneous findings, and pinpointing gaps in literature for future research (Tricco, et al., 2018). In regards of this research a scoping review is fitting since it maps out this rather new field by identifying and summarizing available literature. It helps defining the scope of the field, highlight gaps in knowledge, understand methodologies used, promote interdisciplinary understanding, and lays a basis for future research. By systematically reviewing relevant research, this study seeks to identify key themes, methodologies, and findings across a range of disciplines, including visual eco-art education and human-nature connectedness. This study aims to gain insight in the field of visual eco-art education, with a focus on what is known about how *making* visual art, can foster human-nature connectedness. The research question is:

*‘What is the extent and nature of empirical research on how visual eco-art education programs foster human-nature?’*

Additional sub questions will be answered in order to create a clear overview and a structured framework in answering this research question. These questions are:

1. *How are visual eco-art education and human-nature connectedness conceptualized?*
2. *What are the key components and characteristics of visual eco-art education programs and their relation and potentiality regarding human-nature connectedness?*
3. *What methodologies have been used to study how the implementation of visual eco-art making in educational programs fosters human-nature connectedness?*
4. *What empirical evidence has been found about the relationship between the implementation of visual eco-art education programs and the development of human-nature connectedness?*

## **Methods**

### **Study Design**

This section outlines the systematic search and selection criteria for the used literature along with the strategy for synthesizing and analysing the collected information. To ensure minimal risk of bias and reliable meaningful results the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) extension for scoping reviews by Tricco et al. (2018) was used. All the summarized insights can be found in the tables 1, 2, and 3 of the results.

### **Information Sources and Search Strategy**

Three databases, viz. Scopus, PsychInfo, and Web of science, were used to identify relevant research. The search strategy used title, abstract and keyword searches. Two separate search strings were created and combined into one broad search query, consisting of terms related to the research question, keywords, and conceptualization from previous relevant studies. During the process of developing the search query it became apparent that more

specific terms led to a narrower search that excluded relevant studies. Therefore, more broad terms were used which resulted in the following search query:

*("art based" OR "environmental art education" OR "visual art education" OR "Eco-art education" OR "art education") AND ("environmentalism" OR "human nature" OR "nature connectedness" OR "environmental awareness" OR "pro-environmental" OR "eco-centric" OR "ecological" OR "sustainability")*

### **Exclusion Criteria**

As shown in Figure 1, eight exclusion criteria have been applied. The articles that did not include the key variables important for this research have been excluded. Furthermore, all studies without visual art making as part of the art educational program were excluded, as the primary interest of this literature review what the extent and nature of empirical research is on how the implementation of visual eco-art education programs foster human-nature connectedness and how successful these programs are. For example, the article of Li (2019) investigated the current music curriculum reform of preschool education with an ecological perspective. However, since music falls outside of the definition of visual art this source was excluded. Additionally, because of this exclusion criteria, 99 other sources were excluded due to the usage of another form of art, such as poetry, mindfulness, drama, amongst others.

Articles that did use visual art in an educational form but did not include the “eco” part, indicating the ecology/nature connection component, were as well excluded. One of the 16 articles that were excluded by this criterion for example focussed on visual art education with the goal of increasing wellbeing in children (Chan et. al, 2021).

On the contrary, there were multiple articles that did include the “eco” part in their studies about educational programs but did not use any form of art as a means to their programs. 24 articles were excluded for this reason.



Another exclusion criterion was the lack of an educational component in form of a program. There were 77 articles that were excluded through this criterion, most of them were similar and contained an activism education component, which lays the focus more on viewing/reception of art instead of an art making educational component in the form of a program. One example of this is the article of Purwasito and Wijawa (2021) in which the cultural role visual art activists have, in regard to the environmental movement, got analysed. So, the aim of this study was researching the impact of the environment on the reception of visual art for the sake of sustainability rather than the actual participation in an educational program through eco-art making.

Twelve articles were excluded since they focused on visual eco-art education in the form of aesthetic experience, which focuses on creating more natural surroundings through visual art. For example, the article of Schröder (2018) about how visual Eco-Art and nature components at a university could increase students' awareness of nature to increase their sustainable behaviours. The design of the university buildings and its surroundings consist of artistic and natural elements with the aim of creating a natural environment with the goal of inducing sustainable behaviour through human-nature connectedness.

Additionally, some literature regards visual eco-art education programs, not for the sake of human-nature connectedness but rather as an expression of emotions that arise while dealing with climate change problems, for instance (Ribeiro & Silva, 2021). In these articles the authors often aimed to measure the emotions perceived through environmental problems, which was done through visual artwork. 53 articles were excluded through this exclusion criterion.

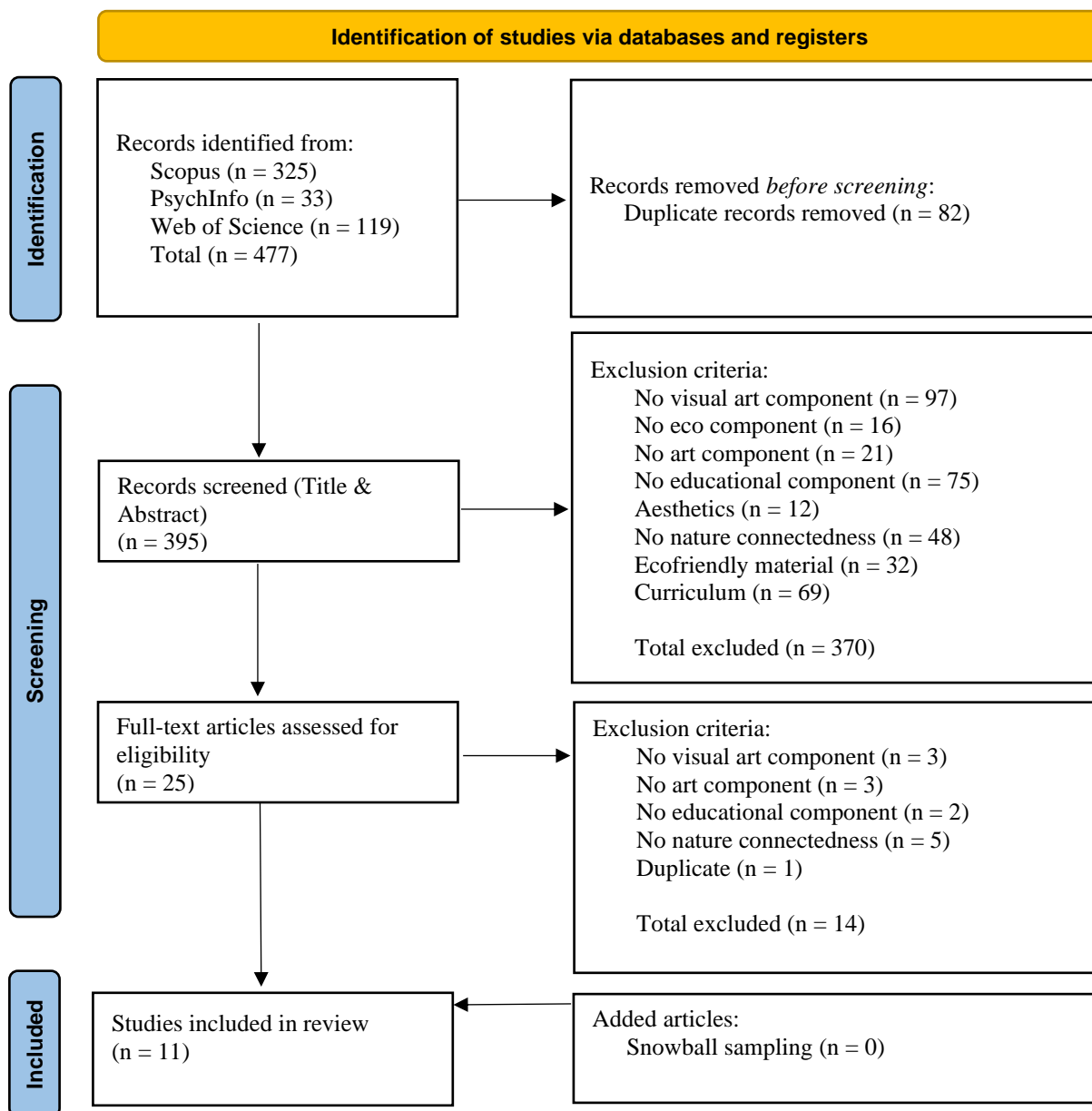
Other articles were excluded because they focussed on making visual art in an ecofriendly way, by using for example waste to create art. Since the focus of these articles lays on making art from eco-friendly material and how it could increase nature connectedness,

rather than how the educational program could influence nature connectedness, they were excluded. 32 articles were excluded through this criterion.

Lastly, 69 articles on this topic were quantitative studies by art school students or art teachers about their opinions and experiences and possibilities of teaching visual Eco-Art as part of a curriculum. The development of the programs, which was often done in these studies, are not applicable for answering the research question of this paper and were therefore excluded.

Figure 1

PRISMA flow diagram



## **Study Selection**

Duplicates were removed. A single coder reviewed the titles and abstracts of all articles obtained from the databases. If these articles did not meet the exclusion criteria, the complete text was obtained. The same single coder examined and evaluated the retrieved full-text articles according to the exclusion criteria. The screening process finally resulted in the inclusion of eleven articles as shown in the flow diagram, Figure 1.

## **Data analysis**

All of the eleven included articles were read and reviewed. Participant characteristics, study design characteristics, and findings are among the data items that were extracted. All data was extracted by the measures of one researcher.

Initially, data related to the authors, the publication year of the study, the type of study, the aim of the study, the general findings, and the participant characteristics were extracted and organized into tables. Subsequently, data regarding the methodologies were extracted including research design, data collection methods, data analysis methods, and the duration of the programs in the studies, all of which were also compiled into tables.

After the extraction of this numerical data, the descriptive data was extracted. This included identifying the underlying concepts of the implemented programs, descriptions of these concepts, employed visual art practices, definitions of human-nature connectedness, and the (proposed) working mechanisms. This data was summarized and put in tables.

Once all of the necessary data to address the research question and sub-questions was extracted and documented, the data was compared to each other in regards of similarities and contrasts. The tables of the data were then categorized and organized according to these similarities and contrasts in order to provide a clear overview.

## Results

With the aim of providing a clear overview of the included articles and the answers to sub questions, Tables 1, 2, and 3 were created. Firstly, there will be a short sample description. The rest of the results are organized into four sections based on the sub questions. The first section focuses on the conceptualization found in the articles, which is subdivided into the conceptualization of visual eco-art education programs and the conceptualization of human-nature connectedness. The second section presents the results related to the program characteristics, encompassing the working mechanisms and key components of the programs. The results of these first two sections can also be seen in Table 2. Next, the results of sub question 3 are discussed, which includes the study design, data collection methods, and data analysis employed in the included articles. Additionally, these are portrayed in Table 3. Lastly, there is a section presenting the results about the evidence found in the articles, aligning with sub question 4. These can be found back in Table 1 and 3.

### Sample description

The sample, as portrayed in table 1, consists of studies conducted between 2013 and 2023, spanning various geographical locations including the United States, Australia, Canada, Finland, Sweden, The Netherlands, Japan, Iran, Nigeria, Belgium, Guyana, Belarus, Austria, Korea, Türkiye, Poland, Spain, and England. The included studies contain a diverse range of participants, including students from elementary school to university level, teachers, domain experts, and adults attending workshops. The age ranges vary from 4 to 35 years old, reflecting a broad spectrum of developmental stages and educational backgrounds. The included studies consist of a wide range of visual art practices to engage the participants and promote their human-nature connectedness. Drawing was mostly used; nine out of the eleven studies used it as a visual art practice. The second most used technique is painting, which was used in seven out of eleven studies. After this came photography which mostly involves

making pictures of nature or objects from nature, it is used in five out of the 11 studies.

Sculpting was used as a technique in three of the studies. The program of the study from Inwood (2013) additionally used frame building, collage dying, printmaking, videography, planting, and weaving.

**Table 1***General overview of the included studies.*

Author	Study description	Sample size	Specific sample group	Age	Nationality	Findings	Used visual art practices
1. Bertling (2015)	A partly visual partly place-based eco-art curriculum was implemented.	18 students	Middle school students	12-13	US	Results showed an increase in drawing empathy, awareness, and responsibility towards the natural environment	
2. Gray et al. (2015)	The “touched by the earth” program, consisting of multi-model creative place-based methods, was examined.	19 students	Young adolescents	10-19	Australia	Results showed that art plays a crucial role considering nature awareness and human-nature connection	Photography, drawing, painting
3. Inwood (2013)	The article investigates the integration of Eco-art education into school curriculum to enhance environmental awareness.	4 elementary schools (around 4000 students)	Elementary EcoSchool students	4-13	Canada	Findings recognize that visual eco-art education had the ability to strengthen human-nature connection.	Sculpturing, drawing, photographs, frame building, collage dying, printmaking, videography, planting, weaving
4. Juntunen (2022)	This research explored the role of art education in regard of global citizenship.	89 students	Students of art education	18-30	Finland	The findings emphasize how art education with global education goals has a transformative role in ethical awareness and global citizenship.	Drawing, crafting, painting

5.	Liukkonen et al. (2023)	The paper looks at the changing interaction between humans and nature in regard of bioart-making as a way of understanding Eco-art education.	2 students, 2 teachers, 2 domain experts	Secondary school students, teachers and domain experts	-	Finland	The results show that the program enables participants to engage with nature through various levels, including cognitive understanding, emotional connection, and philosophical reflection.	Photography, crafting
6.	Raatikainen et al. (2020)	The study looks at the effectiveness of arts-based practices concerning human-nature connectedness.	6 children	Fifth grade students	10-11	Sweden	The results indicate that art based environmental education plays a key role in this.	Painting, crafting
7.	Renowden et al. (2021)	The study implements an ArtScience workshop and through that explores human-nature connectedness.	6 adults	Adults attending ArtScience workshop	-	Australia	The findings show a potential in cultivating ecological mindfulness and human-nature connection through the program.	Photography, painting, drawing, crafting
8.	Schneller et al. (2019)	This case study focusses on the effectiveness of an art- and place-based experiential environmental education curriculum.	14 children	Fifth-sixth graders	10-12	US	The results show improvement in environmental knowledge and attitudes possible through human-nature connection.	Sculpturing, drawing, painting
9.	Staples et al. (2019)	The article looks at the impact of art-based activities into environmental education camp programs on eco-awareness and environmental knowledge.	285 campers	Children	6-12	US	The findings suggest that visual eco-art education programs offer valuable opportunities in increasing human-nature connection.	Drawing

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10. Walshe et al. (2022)	This project addresses concerns about children's wellbeing and environmental disconnection.	101 children	Primary school students	7-10	England	The results show that art in nature practice enhances multiple variables which promote wellbeing and nature connectedness.	Drawing, photography, painting, sculpturing
11. Windsor et al. (2023)	This study implemented a course tilted "teaching sustainability from a global perspective", consisting of activities that aim to enhance environmental awareness and sustainability.	97 students	University students	18-35	15 different countries (Germany, the Netherlands, Japan, etc.)	The results show a succeeding in increasing students' sensory awareness of the natural world around them.	Painting, drawing

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## **Sub question 1: Conceptualization**

The result of the first sub question *How are visual eco-art education and human-nature connectedness conceptualized?* are shown in Table 2. The results will be split into conceptualization related to visual eco-art education and related to human-nature connectedness. Additionally, there will be a short conclusion of these results.

### ***Visual eco-art education***

As shown in Table 2, almost all the included studies use a different concept which the visual eco-art education program is built upon. Only two studies use the same concept, namely art-based environmental education. However, when looking at how these concepts are defined several of them overlap especially in their focus on integrating art with environmental education, in the context of environmental awareness and engagement. Three categories were identified based on the approach of the concepts, place-based approach, pedagogical approach, and global approach. The concepts differ slightly from each other within the category and there is also overlap between the categories.

Place-based art education and Art- and place-based experiential environmental education both contain outdoor components, by centring art education directly within place in the local context and content. (Bertling, 2015 & Schneller et al., 2019). In their programs the participants created visual art in nature and/or with objects from nature. Additionally, they both focus on experiential learning and sensory engagement, which is learning through direct experience, and engagement through using one or more of the senses (e.g., sight, hearing, touch, etc.). Eco-art education and Art-based environmental education both employ a comparable method of integrating knowledge, skills, and values within visual art practices and environmental education (Inwood, 2013; Raatikainen et al., 2020; Staples et al., 2019). They also fit into the place-based approach category since their programs partly use place-

based aspects. Their shared aim is to increase awareness, and foster engagement with environmental issues.

Art-based pedagogy overlaps with these two concepts, by its experiential learning and sensory engagement, but has a more explicit pedagogical approach since it included teachers' perspectives within the study (Windsor et al., 2023). Bio-art making, ArtScience framework, and Empathetic education overlap in their approach of integrating art and science while highlighting the interconnectedness between these domains in aspects of learning, understanding, and affinity (Liukkonen et al., 2023; Renowden et al., 2021; Gray et al., 2015). These three articles have in common their approach is more pedagogical, therefore they form the category pedagogical approach.

Charity Cambridge Curiosity and Imagination adopts a more holistic approach to cultivate creativity, environmental awareness, and emotional connection (Walshe et al., 2022). It is more holistic since it goes beyond individual developments by incorporating the empowerment of the wider community through the participants. Through this they aim at creating collective responsibility and acknowledges that positive change requires addressing multiple layers of engagement and empowerment (Walsche et al., 2022). Global competence, which is the education program in one of the studies, overlaps with this concept since it also focusses on the interconnectedness of elements such as local, global, and intercultural significance and additionally has an approach of integration knowledge, skills, and attitudes (Juntunen, 2022). These two articles form the category of global approach.

### ***Human-Nature Connectedness***

The concept of human-nature connectedness often is not stated directly in the articles but referred to by using the definition, or a part of the definition of human-nature connectedness. There is a slight difference in the way it was referred to or the way it was defined when it was mentioned, there is a variation in how elaborative the definitions are.

Therefore, the articles are categorised into one of the three categories: minimal definition, elaborative definition, extensive definition.

Five articles do not clearly state a direct definition, but indirectly define characteristics of one. Gray and colleagues (2015) in their article refer to it as a connection with the natural world. It is also referred to as humans' relationship with the earth or the forming of connection with the natural world (Bertling, 2015; Inwood, 2013; Schneller et al., 2019; Staples et al., 2019). These five articles together form the category minimal definition.

Three articles have a more elaborated definition/explanation. Raatikainen et al. (2020) defined human-nature connectedness as a deep recognition of the interconnectedness of all living things. Windsor and his colleagues (2023) add to the more minimal definition that one should have a clear understanding as oneself as part of nature. Renowden et al. (2021) also elaborated more by adding a form of recognition, understanding or awareness to their definition. Together they form the second category of elaborative definition.

Liukkonen et al. (2023) refers to human-nature connectedness as an umbrella concept that encompasses a broad range of terms from different disciplines which all come down to either connectedness, relatedness or (re)connection with nature/environment/biosphere. The definition used in the article of Juntunen (2022) includes a proactive aspect by not only emphasizing awareness but further mentioning responsible action towards nature as well as justice, care, and sustainability for the whole ecosystem. These two articles form the category of extensive definition since they not only add a form of understanding/awareness/recognition but additionally add the act of reconnecting with nature and responsible action towards nature, which are both a behavioural aspect.

The results considering the exploration of the conceptualization in the field of visual eco-art education in relation to promoting human-nature connectedness, show three different approaches namely, place-based approach, pedagogical approach, and global approach.

However, there is also similarities between the conceptualizations. They all integrate artistic practice with environmental learning. Considering the conceptualization of human-nature connectedness itself, the definitions range from a simple explanation to an extensive definition. In the first category, minimal definition, the definition is not so much specific to and individual but its more about the fact that human and nature are connected without saying anything about cognitive, emotional, or behavioural aspects on this. The category of elaborative definition adds the recognition/understanding/awareness of an individual about this connection, which thus focusses more on the cognitive aspect. The last category, extensive definition, adds an emotional and behavioural aspect to this either in a way that the individual reconnects with nature or is behaving responsible towards nature. The categories are different in regards observing, recognition and understanding, and behaviour towards nature. However, they are overlapping since all of the definitions at least use the minimal definition of humans' connection with the natural world.

### **Summary**

Three categories were found in regards of the used concepts for visual eco-art educational programs, namely place-based approach, pedagogical approach, and global approach. Additionally for the definition of human-nature connectedness in the studies also three groups were identified. One minimal definition, an elaborative definition, and an extensive definition. A connection between the approach and the used definition is observed. In the place-based approach, most of the studies (4 out of 5) use the minimal definition which focusses on the fact that human and nature are connected, rather than focussing on the individual. The more elaborative definition, which focusses more on the cognitive aspect of human-nature connectedness, is mostly (3 out of 4) used in the category of pedagogical approach in which the focus is more on the individual. In regards of the global approach all

studies used the extensive definition by adding an emotional and behavioural aspect to it which could be due to their more global instead of individual focus.

**Table 2***Conceptualization of included articles.*

Approach	Author	Concept of the program	Description of the concept	Visual art practices	Level definition human-nature connectedness	Working mechanisms
Place-based approach	Bertling (2015)	Place-based art education	Art centred education directly within place.	drawing	Minimal	Empathy, enjoyment, sense of oneness and responsibility, experiential engagement, perspective
	Schneller et al. (2019)	Art- and place based experiential environmental education	An innovative approach to ecological education, one that balances the traditional roots of these disciplines (found in the cognitive, positivist approaches of science education), with the more creative, affective, and sensory approaches of art education.	Sculpturing, drawing, painting	Minimal	Creativity, critical thinking, problem-solving
	Inwood (2013)	Eco-art education	An educational form that integrates knowledge, skills, values and pedagogy from the visual art, art education and environmental education as a means of developing awareness of and engagement with environmental concepts and issues	Sculpturing, drawing, photographs, frame building, collage dying, printmaking, videography, planting, weaving	Minimal	Sense of place, ecosystem thinking, human impacts

			such as place, interdependence, systems-thinking, biodiversity, and conservation.			
	Raatikainen et al. (2020)	Art-based environmental education	pedagogical approaches that utilize art-based practices as levers for transformative learning on sustainability.	Painting, crafting	Elaborative	Material, experiential, cognitive, emotional, philosophical
	Staples et al. (2019)	Art-based environmental education	Educational learning through art that affects environmental attitudes and awareness.	drawing	Minimal	Physical, emotional, and spiritual engagement through art stimulation, eco-affinity
Pedagogical approach	Windsor et al. (2023)	Art-based pedagogy	A teaching methodology in which an art form is integrated with another subject matter to impact student learning.	Painting, drawing	Elaborative	Reflection, experiential, sensory activities, non-human perspective
	Liukkonen et al. (2023)	Bio-art making	An artistic practice that merges art and natural sciences and utilizes scientific methods for artistic purposes.	Photography, crafting	Extensive	Material, experiential, cognitive, emotional, philosophical
	Renowden et al. (2021)	ArtScience framework	participatory approaches that integrate the practice of scientific modes of discovery and artistic expression.	Photography, painting, drawing, crafting	Elaborative	Discovery, flow, attunement
	Gray et al. (2015)	Empathic education	A way in which emotional literacy is privileged in the same way that cognition has been to date in educational systems.	Photography, drawing, painting	Minimal	Empathy, compassion, embodied learning, affinity



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Global approach	Walshe et al. (2022) Art based charity Cambridge Curiosity and Imagination	Aims to create opportunities for children's creative adventures in local, familiar, outdoor places, empowering young people (and others in their wider community) with the agency to act in relation to the spaces that matter to them.	Drawing, photography, painting, sculpturing	Extensive	Emotional expression, affinity, 'slowness'
	Juntunen (2022) Global competence	A multidimensional entity that incorporates abilities related to various interconnected and partially overlapping elements, such as the understanding of issues of local and global significance, as well as intercultural knowledge, skills, and attitudes.	Drawing, crafting, painting	Extensive	Global citizenship

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## **Sub question 2: program characteristics**

Table 2 gives an overview of the results relevant to the sub question: *What are the key components and characteristics of visual eco-art education programs and their relation and potentiality regarding human-nature connectedness?* These key components and characteristics include both key components as well as the working mechanisms that contribute to the embedding of human-nature connectedness.

### ***Working mechanism and key components***

The key components in the visual eco-art education programs used in the articles serve as working mechanisms that promote human-nature connectedness. The components include empathy, compassion, experiential, affinity, among others. Luikkonen et al. (2023) and Raatikianen et al. (2020) referred to material, experiential, cognitive, emotional, and philosophical components as the working mechanisms for human-nature connectedness in their study. Material and experiential components enabled the emotional, philosophical, and cognitive components via physical and sensory experience. New perspectives through the experience lead to cognitive connecting and increased understanding and philosophical interaction. By the appreciation and amazement through the visual eco-art making an emotional connected additionally emerged. The component 'experiential' is mentioned in two other studies together with reflection, sensory activities, non-human perspective, empathy, enjoyment, sense of oneness and responsibility, and perspective (Bertling, 2015; Windsor et al., 2023). Gray et al. (2015) added besides empathy compassion, embodied learning, and affinity. Affinity was referred to by the study of Walshe et al. (2022) together with emotional expression and 'slowness' (defined as a commitment to making time for creative practices, thinking, and exploration). Similarly, discovery, flow, and attunement were stated as working mechanism components (Renowden et al., 2021). In the study of Staples et al. (2019) physical, emotional, and spiritual engagement through art stimulation, and eco-affinity were

mentioned as the working mechanism components. Adding to this, sense of place, ecosystem thinking, human impacts, and global citizenship were shown to promote human-nature connectedness (Inwood, 2013; Juntunen, 2022). Lastly, in the study of Schneller et al. (2019) creativity, critical thinking, and problem solving were the key working mechanism components. Even though the wide range of key components and characteristics there is a base set of working mechanisms components that resonates with all studies namely, emotional, cognitive, and experiential. Most programs particularly focus on the experiential aspect, as it is anticipated to be cultivated through art making, distinguishing their program form non-art environmental education initiatives. Additionally, in the studies it is explained that the experiential aspect enables the cognitive and emotional aspects and that the components are all interconnected.

### **Summary**

Concluding, the results from Table 2 the studies identified multiple working mechanisms and a base set of working mechanisms was found that resonates with all of the studies namely working mechanisms that target emotional, cognitive, and experiential processes. Looking at these working mechanisms while considering the definition of human-nature connectedness as stated in the introduction ‘a stable state of consciousness comprising symbiotic cognitive, affective, and experiential traits that reflect a realization of the interrelatedness between oneself and the rest of nature’ (Zylstra, et al., 2014), the base set of working mechanism components are in line with the traits stated in the definition. Additionally, the trend seen in which almost all programs particularly focus on the experiential aspect could be related back to the embodied experience that is mentioned in the introduction and is suggested to be important in embedding these working mechanisms. Additionally, the studies suggest that the working mechanisms are interconnected which relates back to the definition of human-nature connectedness since it mentions “symbiotic”.

### **Sub question 3: methodologies**

Sub question 3: *What methodologies have been used to study how the implementation of visual Eco-Art making in educational programs fosters human-nature connectedness?*

will provide an overview of the different research methods, including study design, data collection techniques, and data analysis approaches that have been applied to investigate the relationship between visual eco-art education and human-nature connectedness. The results are shown in Table 1 and Table 3.

#### ***Study Design***

All included studies have a case study design. The study of Inwood (2013) additionally has an action research design, which is an approach that aims to simultaneously investigate and solve encountered problems. The sample groups that are used in the studies can be divided into three groups. The first group, which was the sample group in the majority of the studies, were children (n=5). This group consists of Elementary EcoSchool students, fifth grade students or fifth/sixth grade students, children, and primary school students ranging from age 4 up to 13 years old (Inwood, 2013; Raatikainen et al., 2020; Schneller et al., 2019; Staples et al., 2019) Walshe et al., 2022). The second group consisted of adolescents and middle school students which were the sample group in three studies (Bertling, 2015; Gray et al., 2015; Liukkonen et al., 2023). The third group, which was focused on in three studies, were adults. This group consisted of university students, students of art education, and adults attending ArtScience workshops (Juntunen, 2022; Renowden et al., 2021; Windsor et al., 2023).

#### ***Data Collection methods***

As seen in Table 3 the studies vary in the used data collection techniques. These included, self-report measures, observational measures, interview measures, and created artefacts. All of the studies included multiple data collection methods.

7 out of the 11 studies used self-report measurements, consisting of pre and/or post surveys and questionnaires. In the study of Renowden (2021), qualitative surveys were given at the end of the workshop including (a) a four item, 5-point Likert scale seeking to capture workshop enjoyment and engagement, (b) 10 open-ended questions to provide opportunity to expand on workshop experiences and perceptions, (c) Demographic questions, and (d) questions regarding expression of interest to participate in the interview process. This survey was used to gain a more nuanced understanding of participants attitudes, values, beliefs and opinions towards, and perceived outcomes from, the workshop. Luikkonen et al. (2023) and Windsor et al. (2023) had a similar survey to understand the attitudes, values, beliefs and opinions of the participants taking part of the study. However, in the article there is not elaborated on what the survey consisted of. Walshe and colleagues (2022) used The Personal Wellbeing Index-School Children (PWI-SC) questionnaire because they were interested in changes in children's well-being before and after visual eco-art education sessions. Before and after every session the participants filled in the questionnaire. Three of the studies used another used pre and post survey namely the 16-item Children's Environmental Perception Survey (CEPS) (Inwood, 2013; Schneller et al., 2019; Staples et al., 2019). This survey is designed by Larson, Green, and Castleberry (2011) and measures interest in nature, environmental stewardship behaviour, importance of nature, and awareness of environmental issues, among others. To determine students' ecological paradigms (pro-environmental orientations), Bertling (2015) used the New Ecological Paradigm (NEP) Scale for Children by Manoli, Johnson, and Dunlap (2007).

6 out of the 11 studies used observational measurements additionally to other measurement forms (Bertling, 2015; Gray et al., 2015; Inwood, 2013; Schneller et al., 2019; Walshe et al., 2022). The observational measurements in all these studies consisted of

researcher observations, such as notes, behaviours, interactions, etc., during the visual eco-art educational sessions.

Interviews were conducted in six of the studies, half of which were semi-structured. In the study of Renowden (2019) the semi-structured interviews added more in-depth insights about the personal background, understanding of biodiversity and motivations for participating in the workshop. The interview was formulated in accordance with the study's underlying transformative learning experience framework, including questions around the operating cognitive, emotional, and experiential principles. In the study of Bertling (2015), Gray (2015), and Windsor and colleagues (2023), interviews were conducted through the same motivation, gaining more in-depth insights. In two studies, not the participants but the teachers and the parents of the participants were interviewed (Walshe et al., 2019; Schneller et al., 2019). They were interviewed regarding their observations so that the researcher, the participants, and parents/teachers' observations were considered, leading to a more comprehensive understanding a higher validity.

The created artifacts, consisting of drawings, paintings, journals, photographs, videos, sculptures, craftworks, written diaries, and self-reflections throughout the program were also collected as data by 6 out of the 11 studies. In the study of Walshe et al. (2022), pre and post drawings from the participants about their happy place, and their creative diaries were collected as data. This data was included to see if there was any noticeable change in children's expressive artmaking regarding human-nature connectedness. The Draw-an-Ecosystem Test (DET) and Draw-an-Animal Test (DAT) were used by Staples et al. (2019). In these tests the participants had to draw an ecosystem and animal, which were used to examine their ecological knowledge and awareness, and their inherent affinity for animals. The outcomes were assessed by using the existing test rubrics described by Flowers et al. (2015). In two studies it was expressed created artefacts were collected as data, however it is

not explained what is done with the data (Gray, 2015; Raatikainen et al., 2020). Juntunen (2022) and Inwood (2013), state that the created artefacts were observed and interpreted and that these observations and interpretations were used in the thematic analyses.

### ***Data analysis***

For analysing the collected data, the study of Juntunen (2022) and Windsor et al. (2023) used a thematic analysis. Several other studies (n = 4) used a thematic analysis but combined with either statistical analysis, coding, concept-mapping, or visual data analysis (Bertling, 2015; Gray et al., 2015; Inwood, 2013; Raatikainen et al., 2020). Two studies (Bertling, 2015; Schneller et al., 2019) used statistical analysis in which Schneller et al., additionally applied coding. Liukkonen et al. (2023) used a theory driven content analysis based on a multilevel boundary crossing framework for identifying learning mechanisms. A similar approach of deductive analysis was used by Walshe et al. (2022).

### **Summary**

In conclusion, the exploration of used methodologies within the field of visual eco-art education regarding promoting human-nature connectedness revealed a variety of data collection and data analysis methods. However, concerning the study design, case studies were the most used design. The sample group varied from children, to adolescents, and adults.

### **Sub question 4: evidence**

The results sub question 4, *What empirical evidence has been found about the relationship between the implementation of visual eco-art education programs and the development of human-nature connectedness?* are shown in Table 1. The results about this sub question will provide insight into the evidence found about the relationship between participating in visual eco-art education programs and the development of human-nature connectedness. The limitations of the studies proposed in the included articles are additionally described to address this sub question. These results are provided in written text.

### ***Findings***

As shown in Table 1, most of the studies (n = 10) show an increase in human-nature connectedness. The article of Inwood (2013) states that human-nature connectedness was not measured in a valid way and therefore could not claim if there was a significant increase, nonetheless the study shows an indication for human-nature connectedness, since the artworks of the students showed an increase in awareness and knowledge about the natural world. Three studies showed that there was increase in human-nature connectedness even though this was not what they initially looked at. Instead, it increased indirectly since they claim that there first is an increase in awareness and empathy which leads to an increase in human-nature connectedness (Bertling, 2015; Juntunen, 2022; Windsor et al., 2023). Additionally, three studies found a direct increase in human-nature connectedness and identified awareness and empathy as important factors within this increase (Gray et al., 2015; Liukkonen et al., 2023; Renowden et al., 2021). The studies of Raatikainen et al. (2020), Schneller et al. (2019), and Walshe et al. (2022), not only found an increase in human-nature connectedness, but additionally found an increase of care and pro-environmental behaviour, which they attribute to the increase in human-nature connectedness. One out of the 11 studies found that there was no significant difference between visual eco-art education programs and environmental education programs regarding behavioural change (Staples et al., 2019). However, the research states that this could be due to the limitations. Despite the absence of behaviour change, Staples et al. (2019) emphasizes that visual eco-art education programs have the potential to strengthen the connection between people and the natural world.

### ***Limitations of studies***

A limitation in all the studies is that they are designed for and carried out with a specific sample group and therefore do not form a representative portion of the general population. In the study of Bertling (2015), the sample group overrepresented girls, and it is



argued that this should be taken into consideration, in regards of generalizability, because girls tend to have more affective attitudes towards the environment. However, this also confirmed the gendered expectations of learning. The study of Gray et al. (2015) used a thematic analysis for analysing quotes by the students and express that in terms of human-nature connectedness. The quotes are quite general and do not reveal exactly what is meant by human-nature connectedness (reference). Furthermore, in the study of Inwood (2013) the main limitation was the little focus on tracking the attitudinal of behavioural shift in students. In three studies the included participants either expressed a desire to increase human-nature connectedness or volunteered for a workshop on human-nature connectedness (Juntunen, 2022; Renowden et al., 2021; Staples, 2019). The motivation and engagement levels of the participants could have influenced the study results. It is possible that since the participants live in urban areas, more detached from nature, had a greater desire to increase their connection to nature (Juntunen, 2022). In the study of Liukkonen et al. (2023) it is stressed that the analysis is based on the interpretation of the participants rather than direct observations, which would create a more nuanced view. Raatikainen et al. (2020) discussed that the embedding of human-nature connectedness can furthermore lead to eco-anxiety, since the individual can become more aware of the environmental crisis. Additionally, it is stated as a main limitation that the program would have benefited from a more defined link between the underlying abstract concepts and the intervention exercises, since the current linkage is unclear, leading to a lack of clear explanations and conclusions. This limitation was found in one other study as the main limitation (Schneller et al., 2019). However, all studies experienced the limitation of definitions and the unclarity of abstract concepts and terminology. In the study of Walshe et al. (2022) it was shown that the children struggled when the visual eco-art education program was implemented, since it shifted from a highly structured and controlled classroom to one with more agency and 'flow' (Walshe et al. 2022).

They express this as a limitation since the needed time to become used to new way of being taught was not considered. In the study of Windsor et al. (2023) a similar transition occurred, however this was within the program due to the Covid-19 pandemic which resulted in the continuing of the program through an online learning environment. This rapid transition and the online learning environment, as compared to an in-person environment could have influenced the found results. Additionally, majority of the studies combined visual eco-art education with other educational approaches such as Place-based education, emphatic education, etc. (see Table 2). It is therefore difficult to identify the precise educational approach that contributed to these outcomes.

### **Summary**

The results of the studies show evidence of the positive relationship between participating in visual eco-art education programs and the development of human-nature connectedness. While the majority of the studies (10 out of 11) show a positive relation between participation and human-nature connectedness, it is important to consider the limitations such as sample group biases, unclarity in cause-and-effect relationships, and challenges in measuring outcomes accurately. The study by Staples and colleagues (2019) compared an environmental education program with art practices to one without art practices. In comparison to the control group the one with art practices included showed an increase in human-nature connectedness. However, there was no significant differences between the one with art practices and the one without art practices. The other studies did not make such a comparison and therefore the findings do not provide enough evidence about the comparability of visual eco-art education and environmental education. However, this does not preclude the findings of the increase in human-nature connectedness.

**Table 3***Methodologies of included articles.*

Author	Research design	DATA collection method(s)	data analysis method(s)	Increase in human-nature connectedness	Duration of programs
Renowden et al. (2021)	Case study	Semi-structured qualitative interviews, surveys	Thematic analysis	yes	1 day
Raatikainen et al. (2020)	Case study	Pre and post self-reflection of participants	Thematic analysis, visual data analysis	yes	4 days
Liukkonen et al. (2023)	Case study	Semi-structured interviews	Theory driven content analysis based on a multilevel boundary crossing framework for identifying learning mechanisms	yes	5 days
Walshe et al. (2022)	Case study	Drawings, focus group, questionnaire, observation, reflection, diaries, interviews	Deductive analysis	yes	8 days
Staples et al. (2019)	Case study	Pre and post survey (16-item Children Environmental Perception Survey (CEPS) and two art-based drawing prompts	Statistical analysis; 2x3x4x2 factorial analysis of variance, chi-square tests, 3x2x4x3 factorial analysis of covariance,	yes	8 weeks

Schneller et al. (2019)	Case study	Pre and post questionnaires, semi-structured interviews, observations	Statistical analysis, Coding	yes	9 weeks
Bertling (2015)	Case study	Interviews, surveys, journals, observations	Coding, thematic analysis, statistical analysis	yes	18 weeks
Gray et al. (2015)	Case study	Journals, interviews, photographs, artworks, observations	Statistical analysis, thematic analysis	yes	1 year
Inwood (2013)	Case study, action research	Questionnaires, observations, reflective journals, photographs, artworks	Concept-mapping, coding, thematic analysis	Not measured	1 year
Juntunen (2022)	Case study	Observations, personal reflections, artefacts	Thematic analysis	yes	1 year
Windsor et al. (2023)	Case study	Reflections, selected assignments, interviews, surveys	Thematic analysis	yes	2.5 years

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## Discussion

The eleven included studies are reviewed systematically in order to map the extent and essence of existing research concerning the implementation of visual eco-art education in regard to human-nature connectedness. After having collected and reviewed the results, in this section they are further discussed regarding critically assessment of the main findings, the recommendations for future research, and the limitations of this research, leading to an overall conclusion.

### Main findings

The main findings show a diversity in the conceptualization concerning visual eco-art education aimed at human-nature connectedness. Three categories were identified, place-based approach, pedagogical approach, and global approach. All programs share the common goal of promoting human-nature connectedness through visual art, therefore they still all fall in the definition of visual eco-art education. The differences could be an explanation by the difference in used terminology. For instance, in the programs that took place outdoors, this was emphasized in the terminology e.g., 'Place-based art education' or 'Art- and Place-based education'. The use of specifying the program names in this way serves the purpose of giving clarity about the focus and content of the program. Nevertheless, using different names can be counterproductive because it can cause confusion and fragmentation within the field.

Similarly, inconsistencies became apparent through the analysing of the results in reference to human-nature connectedness. Three categories were identified concerning the used definition: minimal definition, elaborative definition, and extensive definition. In research by Ives and colleagues (2017) a multidisciplinary review on the concept of human-nature connectedness was done. They reviewed 475 publications and identified three subgroups: human-nature connectedness as mind, as experience, and as place. Human-nature connectedness as mind is the most occurring in research and characterised by studies that

address cognitive and philosophical aspects of human-nature connectedness at the individual level. They claim that studies who see human-nature connectedness like this often explain, describe, and predict psychological dynamics and pro-environmental behaviour. This subgroup can be linked to the elaborative definition group identified in this research. Human-nature connectedness as experience, focusses more on individual's experience so the awareness, recognition, understanding which is also in line with the more elaborative definition identified in this research. Human-nature connectedness as place refers to emotional connections and studies that used human-nature connectedness in this way were often also providing policy guidance to address sustainability issues (Ives, et al., 2017). This is more in line with the behavioural aspect in the category of extensive definition identified in this research. Ives and colleagues (2017), argue that when human-nature connectedness is used in studies often the nature aspect is not defined which could be the reason that the whole concept is more fluid and therefore lacking one fixed definition.

In the conceptualization of the programs this trend is also seen. The programs names are specified to their characteristics. Specificity can offer clarity; however, a consistent use of key concepts and terminology is essential for coherence and facilitating collaboration among researchers and practitioners. Additionally, this inconsistency extends to the identification of working mechanisms, where terms range from empathy to spiritual engagement to global citizenship. These differences could be explained by the differences in the conceptualization of the programs. Studies that used a more specified naming in their educational program used more specific conceptualization in regard to expressing the working mechanisms their program was built upon. While investigating how these working mechanisms are defined throughout all the included studies, common themes were revealed. All the mentioned working mechanisms were underlain by emotional, cognitive, and experiential aspects, which thus seem to be essential for embedding human-nature connectedness through visual eco-art

education. This is also in line with the seen trend in the usage of human-nature connectedness in studies by Ives and colleagues (2017). Human-nature connectedness as mind, experience, and place in which mind is the cognitive part, experience the experiential part, and place the emotional part.

Visual art practices serve as the mean to embed these working mechanisms in all the studies and bridges the gap between traditional environmental education and human-nature connectedness for the sake of behavioural change, instead of only attitudinal change. Anderson and Guyas (2016) argue that art is able to do this since it is biologically driven since it has been existing in all cultures, in all times. Arts make it possible to explore ways of being, knowing, and doing by engaging senses, emotions, bodies, and intellect through the creating, receiving, and experiencing. In some studies, the created artworks were used as data to analyse, while other studies used other data analysis methods such as thematic analysis, statistical analysis, among others. The interdisciplinary nature of the research in this field was highlighted by this, next to the diverse data collection techniques. This, together with the fact that all studies had a case study design, provides in-depth insights into specific programs, and facilitates a comprehensive understanding of human-nature connectedness. However, it could limit generalizability since all studies used sample groups of either children, adolescents, or adults. Nevertheless, this provides opportunities for comparing the effectiveness of visual eco-art education programs for different age groups. As seen in this scoping review, while comparing the found evidence of increasing human-nature connectedness, there is no significant difference in children, adolescents, or adults regarding the effectiveness of the visual eco-art education programs.

Returning to the definitions of visual eco-art education and human-nature connectedness as used in the introduction of this scoping review, they seem fitting as overarching definitions. All the studies are defined as visual eco-art education when it is

defined as Eco-art education which uses the method of visual art which are means to discover, respond, and understand the world visually, by painting, shading, drawing, etc. Additionally, the definition of human-nature connectedness, proposed by Zylstra et al. (2014), which served as a basis for this scoping review, can serve as an overarching term. Zylstra defined human-nature connectedness as ‘a stable state of consciousness comprising symbiotic cognitive, affective, and experiential traits that reflect a realization of the interrelatedness between one’s self and the rest of nature’ (Zylstra et al., 2014). When this is used as the key concept, it not only provides a definition but additionally hints at the underlying working mechanism and the symbiotic interaction between them.

Thus, the findings suggest that visual eco-art education programs increase human-nature connectedness through experiential learning. Experiential learning promotes cognitive and emotional awareness about human-nature connectedness and visual art making embeds this since it embodies this connection. This is in line with the suggested definition in the introduction, the suggestion that embodiment is necessary, and that embodiment is possible through visual art making.

However, Zylstra et al. (2014) also expresses possible causes for the disconnection between human and nature. Technology is one of the main causes he identifies. It could be that the increase of the desire to reconnected stems from the increase in technology use in society and it would explain that in western countries the disconnection is to a greater extent (Zylstra, 2014). However, it could also be explained by the occurrence of natural disasters caused by climate change. Disconnecting and distancing from nature can give a feeling of safety and security. Zylstra (2014) argues that modern urban society is filled with potent stimuli to creating an illusion of distance form nature. Perhaps reconnecting to nature therefore also requires more than individual visual eco-art education programs but also a cultural reprogramming.



## **Recommendations for future research**

In line with the main findings, it is recommended that standardized terminology within the field of visual eco-art education is used. It will facilitate clear communication, in regard to findings, shared resources, and collaboration on initiatives aimed at promoting human-nature connectedness. Consistent conceptualization additionally enhances the credibility and coherence of the field and promotes consistency in research since it ensures mutual understanding of concepts and terms. Further, it becomes easier to compare findings, programs, outcomes, and effectiveness since researcher do not have to in depth find out what these terminologies imply. It will therefore lead to a broader understanding of the field as a whole.

The differences in terms for the concepts were also experienced during the search process. A broad search query was needed since otherwise relevant studies were excluded. Despite the large number of articles initially, only a small subset was not excluded through the exclusion criteria. Through this process the complexity and diversity of the topic became more apparent.

Secondly, it is recommended to carry out research on the working mechanisms and how their relation to each other and to human-nature connectedness is. The existing literature is ambiguous in this regard, where one study says that human-nature connectedness is directly embedded in visual eco-art education, while other studies imply that visual eco-art education programs increase empathy and therefore human-nature connectedness. It is therefore recommended to investigate the relation between all these variables. For this, standardized terminology and conceptualization should be use since it could provide the opportunity to compare different Eco-art education programs in their effectiveness.

Lastly, it is recommended to study how the impact of visual eco-art education programs sustain over time. By tracking participants' experiences and behaviours beyond the

duration of the program through longitudinal studies, researchers can assess the long-term effectiveness. This information is essential for designing sustainable programs and the making of decisions related to environmental education. Perhaps it even provides other opportunities to embed long-term effects, such as motivating participants to continue using eco-art practices maintain their connection to nature.

Even though the PRISMA guidelines for scoping reviews were used, this scoping review has some limitations. Scoping reviews have a limitation because the focus is to provide a broad overview of the research field, therefore a meta-analysis is generally not conducted in a scoping review (Tricco et al., 2016). This results in an ongoing discussion about if width or depth is more important in literature reviews (Arksey & O'Malley, 2015). Additionally, the selection and data extraction of articles is a subjective process, which is usually done by at least two people to preserve its reliability. When two or more researchers work on one review it is more likely that all relevant articles are included (Stoll et al., 2019). Since this review was conducted by one researcher there is a higher possibility that valuable articles have not been included. Lastly, during the search process it became apparent how many different terms, concepts, definitions, names, and terminologies exist in the field of Eco-art education. Additionally, when looking into those it started to become apparent that despite the variation in conceptualization, the underlying definitions were often the same. Initially, this resulted in confusion and required a considerable amount of trial and error in formulating the search query. The inconsistency and lack of clarity in this field, in addition to the fact that this review was conducted by one reviewer, may have contributed to overlooking important articles.

## **Conclusion**

The aim of this scoping review is to map out what is the extent and nature of empirical research on how visual eco-art education programs foster human-nature connectedness, which

is achieved partially. This review reveals a diverse range of studies exploring various aspects of visual eco-art education programs, including their conceptual frameworks, conceptualization, methodologies, and outcomes. Despite the variations in conceptualization and methodologies, a common theme emerges. Visual eco-art education programs aim to integrate cognitive, affective, and experiential elements through visual art practices to promote human-nature connectedness. The existing research shows the potential of visual eco-art education since they show evidence in human-nature connectedness.

However, it is important to note that the majority of existing research is qualitative in nature, leading to context-specific findings. Additionally, many studies focus on specific sample groups and are often short-term in duration. Further research is needed to address these limitations, such as longitudinal studies assessing long-term program effects and comparative analysis across diverse populations. It is additionally recommended to use standardized conceptualizations. Nevertheless, the already existing research on visual eco-art education show promising findings concerning human-nature connectedness as a way of promoting and embedding environmentally friendly behaviour.

Nevertheless, questions about the causes of human-nature disconnection remain. It could be worthwhile to additionally conduct research on that in order to identify the causes since addressing the challenges of climate change may not only need individual education programs but also broader cultural shifts towards reconnection with nature.

Visual eco-art education seems promising in increasing human-nature connectedness which leads to more eco-friendly attitudes and behaviours. It can be worthwhile in cultivating a shift from viewing the natural habitat as a resource for human being to be exploited to an understanding that highlights the intrinsic and inherent value of nature and treats all forms of life with similar respect.

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