

Role of Education in Developing Ethical Values, Sustainable Behaviour and Environmental Awareness: A Systematic Review

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Abstract

Education has a fundamental role in developing ethical values, sustainable behaviour, and environmental awareness among learners. Increasing climate change, biodiversity loss, pollution, waste generation, resource depletion, and unsustainable consumption demonstrate the need for education systems that extend beyond academic achievement and develop responsible citizens. The present study systematically reviews literature concerning the role of education in developing ethical values, environmental awareness, and sustainable behaviour among learners and young people. The review was structured in accordance with the principles of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020). Literature was examined around four interconnected dimensions: ethical values, environmental knowledge and awareness, sustainability attitudes, and sustainable behaviour. Relevant peer-reviewed research, systematic reviews, meta-analyses, and authoritative international reports were considered. The synthesis indicates that education has a significant positive contribution to environmental knowledge, attitudes, intentions, and behaviour. A large meta-analysis of environmental education involving 169 studies, 512 effect sizes, and 176,007 participants from 43 countries reported positive effects on environmental knowledge ($g = 0.953$), attitudes ($g = 0.384$), intentions ($g = 0.256$), and behaviour ($g = 0.410$). Evidence also indicates that sustainability education can influence student knowledge, attitudes, and behaviours, with attitudes partially mediating the relationship between knowledge and behaviour in research involving Indian university students. A systematic review of digital environmental education identified 21 studies and found generally positive effects of digital tools on sustainability awareness, with virtual reality and climate-change education being prominent themes. The findings indicate that knowledge alone is insufficient for sustainable action. Ethical values, attitudes, perceived responsibility, practical skills, institutional culture, experiential learning, and opportunities for participation are important mediating conditions. The review concludes that educational institutions should integrate ethical education, environmental education, Education for Sustainable Development (ESD), experiential learning, community engagement, and sustainable institutional practices. Education should consequently be understood

not simply as preparation for employment but as a transformative process for developing responsible, ethical, environmentally conscious, and sustainability-oriented citizens.

Keywords: Education, ethical values, environmental awareness, sustainable behaviour, environmental education, Education for Sustainable Development, sustainability, environmental ethics, youth, sustainable development, PRISMA.

1. Introduction

Education is one of the most important mechanisms through which societies transmit knowledge, values, attitudes, skills, and cultural practices from one generation to another. Traditionally, educational success has been associated with academic achievement, examination performance, employment, and economic development. However, contemporary global challenges require a broader understanding of the purpose of education. Climate change, biodiversity loss, pollution, deforestation, water scarcity, waste generation, social inequality, and unsustainable consumption patterns demonstrate that human development cannot be separated from environmental responsibility.

The role of education is therefore increasingly understood in relation to sustainable development. Education can help learners understand environmental problems, develop ethical reasoning, acquire sustainability competencies, and participate in practical solutions. UNESCO's Education for Sustainable Development: Towards achieving the SDGs (ESD for 2030) framework identifies education as a key enabler of the Sustainable Development Goals and emphasizes policy, learning environments, educator capacity, youth and local action.

Environmental problems are not exclusively scientific or technological problems. They are also behavioral and ethical problems. The excessive consumption of resources, improper waste disposal, pollution, destruction of biodiversity, and irresponsible use of energy are strongly influenced by individual and collective decisions. Therefore, environmental sustainability requires individuals who possess not only environmental knowledge but also responsibility, self-discipline, empathy, respect for nature, cooperation, and concern for future generations.

Education can potentially develop these qualities through curriculum, pedagogy, teacher behaviour, institutional culture, family participation, community engagement, and experiential learning. However, an important question remains: Does environmental education actually lead to sustainable behaviour?

Research suggests that it can. A major meta-analysis by van de Wetering et al. synthesized five decades of environmental education research and found significant improvements in

environmental knowledge, attitudes, intentions, and behaviour among children and adolescents. At the same time, the relatively smaller effect for behavioral outcomes compared with knowledge demonstrates that the movement from knowledge to action is complex.

The present systematic review therefore examines the relationship between education, ethical values, environmental awareness, and sustainable behaviour.

2. Background and Rationale

The need for sustainability-oriented education has become particularly important because environmental challenges are increasingly interconnected with social and economic conditions.

For example:

- Climate change affects agriculture and food security.
- Water scarcity affects health and livelihoods.
- Pollution disproportionately affects vulnerable communities.
- Biodiversity loss threatens ecosystem services.
- Unsustainable consumption contributes to resource depletion.
- Digitalization creates both sustainability opportunities and environmental costs.

Education can help learners understand these interconnections.

The United Nations 2030 Agenda places education at the center of sustainable development. Target 4.7 of SDG 4 emphasizes that learners should acquire knowledge and skills needed to promote sustainable development, including sustainable lifestyles, human rights, gender equality, peace, global citizenship, and appreciation of cultural diversity.

Consequently, education for sustainability should not be restricted to environmental science. It should be interdisciplinary and value-oriented.

3. Conceptualization of Key Terms

3.1 Ethical Values

Ethical values are principles that guide individuals in determining responsible and appropriate behaviour. Important values relevant to sustainability include:

- Responsibility;
- Honesty;
- Integrity;
- Justice;
- Respect;
- Empathy;

- Compassion;
- Cooperation;
- Self-Discipline;
- Accountability;
- Tolerance;
- Concern For Future Generations.

3.2 Environmental Awareness

Environmental awareness includes:

1. Environmental Knowledge;
2. Awareness Of Environmental Problems;
3. Understanding Of Causes and Consequences;
4. Environmental Concern;
5. Positive Environmental Attitudes
6. Knowledge Of Possible Solutions
7. Willingness To Participate in Environmental Action.

3.3 Sustainable Behaviour

Sustainable behaviour refers to actions that minimize environmental harm and contribute to long-term ecological, social, and economic well-being.

Examples Include:

- Water Conservation
- Energy Conservation
- Waste Reduction
- Recycling
- Reuse
- Sustainable Transportation
- Biodiversity Protection
- Responsible Consumption
- Reduction Of Plastic Use
- Participation In Environmental Activities.

4. Theoretical Framework

The present review is informed by three complementary theoretical perspectives.

4.1 Constructivist Learning Theory

Constructivism proposes that learners actively construct knowledge through interaction with their environment and experiences. Sustainability education therefore becomes more meaningful when students investigate actual environmental problems.

4.2 Experiential Learning Theory

Kolb's experiential learning model emphasizes experience, reflection, conceptualization, and experimentation. Environmental projects provide opportunities for students to learn through direct interaction with environmental problems.

4.3 Theory of Planned Behaviour

Ajzen's Theory of Planned Behaviour proposes that attitudes, subjective norms, and perceived behavioral control influence behavioral intentions and actions.

This theory is relevant because environmental knowledge does not necessarily produce sustainable behaviour. Students also require positive attitudes, supportive social norms, and confidence that they can make a difference.

5. Objectives of the Study

The systematic review was guided by the following objectives:

1. To examine the role of education in developing ethical values.
2. To assess the contribution of education to environmental awareness.
3. To examine the relationship between environmental education and sustainable behaviour.
4. To identify effective educational approaches for developing sustainability competencies.
5. To examine the role of teachers in promoting ethical and sustainable behaviour.
6. To analyse the contribution of experiential and project-based learning.
7. To examine the role of educational institutions in sustainability.
8. To identify barriers between environmental knowledge and sustainable behaviour.
9. To examine the contribution of digital technology to environmental education.
10. To develop an integrated educational framework for ethical and sustainable behaviour.

6. Research Questions

The review addressed the following questions:

RQ1: What does the literature reveal about the role of education in developing ethical values?

RQ2: What effect does environmental education have on environmental knowledge and awareness?

RQ3: Does environmental education contribute to sustainable behaviour?

RQ4: Which educational approaches are associated with stronger sustainability outcomes?

RQ5: What factors mediate the relationship between environmental knowledge and sustainable behaviour?

RQ6: How can educational institutions strengthen ethical and sustainable practices?

RQ7: What role can digital technologies play in sustainability education?

7. Research Methodology

7.1 Research Design

The study adopted a **systematic literature review approach**. Reporting was structured according to PRISMA 2020 principles. PRISMA 2020 provides 27 reporting items covering identification, eligibility, selection, synthesis, reporting, and transparency.

Because the reviewed literature included quantitative studies, systematic reviews, meta-analyses, qualitative research, and conceptual studies, a narrative and thematic synthesis was used rather than combining all findings statistically into a new meta-analysis.

7.2 Information Sources

The literature base was developed from peer-reviewed academic literature and authoritative institutional sources, particularly:

- Scopus-indexed literature
- Web of Science literature
- ERIC
- ScienceDirect
- SpringerLink
- PubMed-indexed literature where relevant
- UNESCO publications
- United Nations publications.

The review focused particularly on literature addressing education, sustainability, environmental awareness, ethical values, environmental behaviour, Education for Sustainable Development, and digital environmental education.

7.3 Search Terms

Search combinations included:

- "Education" AND "Ethical Values" AND Sustainability
- "Environmental Education" AND "Sustainable Behaviour"
- "Environmental Awareness" AND Students
- "Education For Sustainable Development" AND Behaviour

- "Environmental Education" AND Youth
- "Sustainability Education" AND Attitudes
- "Education" AND "Pro-Environmental Behaviour"
- "Digital Tools" AND "Environmental Education"
- "Ethical Education" AND Environmental Responsibility

8. Inclusion and Exclusion Criteria

Inclusion Criteria

Studies were considered relevant when they:

1. Addressed Education, Environmental Awareness, Sustainability, Ethical Values, Or Sustainable Behaviour
2. Included Students, Learners, Children, Adolescents, Young People, Teachers, Or Educational Institutions
3. Reported Empirical Findings, Systematic Reviews, Meta-Analyses, Or Theoretically Relevant Evidence
4. Were Published in Peer-Reviewed Academic Sources or Authoritative International Reports
5. Were Available in English
6. Provided Sufficient Information for Thematic Interpretation.

Exclusion Criteria

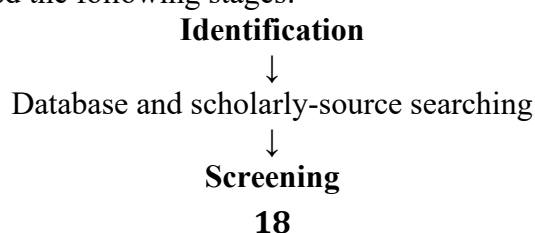
Studies were excluded when they:

- Focused Exclusively on Non-Educational Environmental Interventions;
- Did Not Address Education or Learning
- Were Unrelated to Environmental or Sustainability Outcomes
- Were Opinion Pieces Without Substantive Evidence
- Duplicated Evidence Already Represented by a More Comprehensive Review.

9. Study Selection and PRISMA Approach

PRISMA recommends reporting the movement of records from identification and screening to final inclusion through a transparent flow process.

The present review followed the following stages:



Removal of duplicate and clearly irrelevant records



Eligibility

Title, abstract, and full-text relevance assessment



Included Evidence

Studies and reviews addressing education, ethical values, environmental awareness, sustainability attitudes, and sustainable behaviour

Because the present paper synthesizes evidence from previously published systematic reviews and meta-analyses rather than claiming a newly registered database-level meta-analysis, the PRISMA framework is used principally as a reporting and transparency structure.

10. Data Extraction Framework

Information was organized under the following categories:

Category	Information extracted
Publication	Author, year, journal
Population	Children, adolescents, university students, learners
Educational intervention	Environmental education, ESD, digital learning
Outcomes	Knowledge, attitudes, intentions, behaviour
Method	Survey, experiment, systematic review, meta-analysis
Educational approach	Experiential, project-based, digital, classroom
Major finding	Direction and strength of evidence
Limitation	Major methodological issue
Relevance	Implication for sustainable education

11. Results

11.1 Overall Evidence

The systematic synthesis indicates a generally positive relationship between education and environmental outcomes.

The strongest evidence comes from the meta-analysis by van de Wetering et al., which synthesized 169 studies, 512 effect sizes, and 176,007 participants across 43 countries and six continents. Environmental education significantly improved:

Outcome	Effect size
Environmental knowledge	$g = 0.953$
Environmental attitudes	$g = 0.384$
Environmental intentions	$g = 0.256$
Environmental behaviour	$g = 0.410$

The authors reported substantial heterogeneity between effects, indicating that educational interventions do not produce identical outcomes in all contexts.

The pattern is significant because the largest effect was observed for knowledge, while effects on intentions and behaviour were smaller. This supports the conclusion that **knowledge is necessary but not sufficient for sustainable behaviour**.

12. Result 1: Education and Environmental Knowledge

The evidence strongly supports the role of education in increasing environmental knowledge.

Environmental education can help learners understand:

- Climate Change
- Ecosystems
- Biodiversity
- Natural Resources
- Pollution
- Waste
- Renewable Energy
- Environmental Health
- Sustainability.

The large effect size for knowledge reported in the meta-analysis demonstrates that education can substantially improve students' understanding of environmental issues.

This is important because knowledge is the cognitive foundation upon which attitudes and decisions can develop.

However, the review also indicates that educational programme should not stop at knowledge transmission.

13. Result 2: Education and Environmental Attitudes

The evidence also indicates positive effects on environmental attitudes.

The meta-analysis reported an effect size of $g = 0.384$ for environmental attitudes.

Positive environmental attitudes may include:

- Concern For Environmental Degradation
- Appreciation Of Nature
- Willingness To Conserve Resources
- Concern For Future Generations;
- Perceived Responsibility for Environmental Protection.

Educational approaches that connect environmental information with personal experiences and real-world problems may be particularly useful for developing such attitudes.

14. Result 3: Education and Sustainable Intentions

The meta-analysis found a positive effect on environmental intentions ($g = 0.256$).

Environmental intention refers to willingness or planned readiness to perform sustainable actions.

Examples include intentions to:

- Recycle
- Conserve Water
- Reduce Energy Consumption
- Reduce Plastic
- Use Sustainable Transportation
- Participate In Environmental Campaigns.

The relatively smaller effect compared with knowledge and attitudes indicates that intention formation may require additional motivational and social factors.

15. Result 4: Education and Sustainable Behaviour

One of the most important findings is that environmental education also improves environmental behaviour.

The meta-analysis reported an effect size of $g = 0.410$ for behaviour.

This demonstrates that environmental education is capable of influencing actual behaviour rather than only increasing knowledge.

However, the evidence also indicates considerable heterogeneity. Consequently, educational interventions should be designed according to learner characteristics, context, duration, institutional support, and the type of behaviour targeted.

16. Result 5: Knowledge-Behaviour Gap

The review identifies a significant knowledge-behaviour gap.

A learner may know:

"Water is a scarce resource."

but still waste water.

Similarly, a student may understand climate change but continue to engage in unsustainable consumption.

Therefore:

Knowledge → Attitude → Intention → Behaviour

should not be assumed to occur automatically.

Social norms, accessibility of sustainable alternatives, institutional conditions, personal motivation, perceived behavioral control, and ethical values may influence the transition from knowledge to action.

17. Result 6: Role of Sustainability Education in India

Evidence from Indian higher education is particularly relevant.

A 2025 study of senior undergraduate students in India examined sustainability education using knowledge, attitude, and behaviour measures and structural equation modelling. The study found that sustainability education was important for knowledge, attitudes, and behaviour. Knowledge had a direct relationship with behaviour and was also partially mediated through attitudes.

This finding strengthens the conceptual argument that education influences behaviour through both cognitive and affective pathways.

It also demonstrates the importance of examining sustainability education in Indian educational settings rather than relying exclusively on evidence from Western contexts.

18. Result 7: Digital Technology and Environmental Awareness

Digital technology is becoming increasingly important in environmental education.

A systematic review by Hajj-Hassan, Chaker, and Cederqvist examined **21 studies published between 2013 and 2023** on digital tools for environmental education and sustainability awareness. The review reported that virtual reality and climate-change topics were particularly prominent and that digital tools generally had positive effects on students' sustainability concern.

The review also found that:

- 76.2% of included studies used quantitative methods
- 14.3% used qualitative methods
- 9.5% used mixed methods
- Research increased substantially between 2020 and 2023.

These findings indicate growing interest in technology-supported sustainability education.

19. Result 8: Experiential Learning

The literature supports the importance of experiential learning.

Environmental learning becomes more meaningful when students:

- Visit Ecosystems
- Conduct Biodiversity Surveys
- Measure Pollution
- Perform Energy Audits
- Investigate Waste
- Maintain Gardens
- Conduct Water Audits
- Participate In Community Programme

Such activities combine knowledge with experience and responsibility.

Experiential learning may therefore help address the knowledge-behaviour gap.

20. Result 9: Project-Based Learning

Project-based learning provides opportunities for learners to identify environmental problems and develop solutions.

Examples include:

Project 1: Plastic-Free Campus

Students measure plastic consumption and design alternatives.

Project 2: Water Conservation

Students conduct a water audit and develop conservation recommendations.

Project 3: Energy Audit

Students calculate electricity consumption and identify energy-saving measures.

Project 4: Biodiversity Mapping

Students document plant and animal diversity on campus.

Project-based learning develops:

- Environmental Knowledge
- Teamwork
- Leadership
- Communication
- Problem-Solving
- Responsibility

- Sustainability Behaviour.

21. Result 10: Ethical Values as a Foundation for Sustainability

The literature synthesis indicates that ethical values provide an important foundation for sustainable behaviour.

The following values are particularly relevant:

Ethical value	Sustainability contribution
Responsibility	Encourages responsible resource use
Respect	Promotes respect for nature
Justice	Addresses environmental inequality
Empathy	Encourages concern for affected communities
Self-discipline	Reduces excessive consumption
Cooperation	Supports collective environmental action
Accountability	Encourages responsibility for environmental consequences
Intergenerational responsibility	Protects resources for future generations

Thus, environmental education should include an explicit ethical dimension.

22. Result 11: Role of Teachers

Teachers emerged as an important factor in developing sustainability competencies.

Teachers influence students through:

- Classroom Instruction
- Role Modelling
- Environmental Projects
- Discussion
- Feedback
- Encouragement
- Classroom Norms
- Community Engagement.

A teacher who practices energy conservation, avoids unnecessary waste, respects students, and encourages responsible behaviour provides a practical model of sustainability.

Therefore, teacher education should include Education for Sustainable Development and environmental ethics.

23. Result 12: Role of Educational Institutions

Educational institutions influence student behaviour through their institutional culture.

A sustainability-oriented institution can implement:

- Renewable Energy
- Rainwater Harvesting
- Waste Segregation
- Composting
- Paper Reduction
- Biodiversity Gardens
- Energy-Efficient Buildings
- Sustainable Procurement
- E-Waste Management.

The institution can therefore function as a **living laboratory for sustainability**.

Teaching sustainability while institutional practices remain unsustainable may create inconsistency between theory and practice.

24. Result 13: Community Participation

Community participation provides an important bridge between classroom knowledge and social action.

Students can work with:

- Local Communities
- Municipalities
- Environmental Ngo
- Farmers
- Local Government
- Health Organizations
- Civil Society Groups.

Community-based environmental projects can develop:

- Leadership
- Communication
- Responsibility
- Empathy
- Civic Participation

- Problem-Solving.

25. Result 14: Major Themes Identified

The systematic synthesis identified seven major themes:

Theme 1: Knowledge Development

Education strongly improves environmental knowledge.

Theme 2: Value Formation

Education can develop responsibility, respect, justice, and concern for nature.

Theme 3: Attitude Formation

Environmental education can strengthen environmental concern and positive attitudes.

Theme 4: Behavioral Change

Education can positively influence sustainable behaviour, although effects are generally smaller than knowledge effects.

Theme 5: Experiential Learning

Direct experience and practical projects strengthen the connection between knowledge and action.

Theme 6: Institutional Culture

Educational institutions can reinforce or undermine sustainability learning.

Theme 7: Digital Innovation

Digital tools, including immersive technologies, offer new possibilities for environmental education.

26. Integrated Results Framework

The findings can be summarized as follows:



This relationship can be moderated by:

- Family Support
- Peer Norms
- Socioeconomic Conditions
- Access To Sustainable Alternatives
- Institutional Policies
- Teacher Competence
- Digital Access
- Cultural Context.

27. Discussion

The results demonstrate that education has substantial potential to contribute to environmental sustainability.

The strongest evidence concerns knowledge development. The effect size reported by van de Wetering et al. ($g = 0.953$) indicates a large improvement in environmental knowledge.

However, sustainable development requires more than knowledge. Environmental attitudes, intentions, and behaviour also improved, although with smaller effects.

This pattern is theoretically important. If knowledge were sufficient to produce sustainable behaviour, behavioral effects would be expected to be comparable to knowledge effects. The difference indicates that behavioral transformation is more complex.

The findings from India provide additional support for this interpretation. Sustainability knowledge was associated with behaviour both directly and through attitudes.

Consequently, effective sustainability education should address three levels:

Cognitive

"What do I know?"

Affective

"What do I value and care about?"

Behavioral

"What do I actually do?"

A complete educational programme must connect all three.

28. Education as a Mechanism for Ethical Transformation

Education can transform sustainability from an external rule into an internal ethical commitment.

For example:

Rule-based approach:

"Do not waste water."

Knowledge-based approach:

"Water resources are limited."

Ethical approach:

"Wasting water can deprive other people and future generations of an essential resource; therefore, I have a responsibility to conserve it."

The third approach represents deeper sustainability education.

29. Implications for Curriculum

Curriculum should integrate sustainability across disciplines.

Science

Climate change, biodiversity, pollution and ecosystems.

Geography

Natural resources, land use, climate and population.

Economics

Sustainable production and consumption.

Social Science

Environmental justice and citizenship.

Mathematics

Environmental data and energy calculations.

Language

Environmental communication and advocacy.

Computer Science

Digital sustainability and technology for environmental monitoring.

Teacher Education

Environmental pedagogy, ethical values and sustainability competencies.

30. Implications for Teaching-Learning

The findings support greater use of:

- Project-Based Learning;
- Experiential Learning;
- Inquiry-Based Learning;
- Problem-Based Learning;

- Service Learning;
- Field-Based Learning;
- Collaborative Learning;
- Digital Simulations;
- Virtual Reality;
- Citizen Science.

Teaching should move from:

"Learning about sustainability"

toward

"Learning through sustainability problems."

31. Implications for Teachers

Teacher preparation should include:

1. Environmental Literacy;
2. Sustainability Competencies;
3. Environmental Ethics;
4. Climate Education;
5. Experiential Pedagogy;
6. Project Management;
7. Digital Environmental Education;
8. Community-Based Learning.

Teachers should also be encouraged to model sustainable practices.

32. Implications for Educational Institutions

Institutions should adopt whole-school or whole-campus sustainability approaches.

A sustainable campus should aim to:

- Reduce Waste;
- Conserve Energy;
- Conserve Water;
- Promote Biodiversity;
- Manage E-Waste;
- Reduce Unnecessary Paper;
- Encourage Sustainable Transportation;
- Promote Responsible Consumption.

UNESCO's ESD 2030 roadmap specifically identifies education environments and local action as important areas for strengthening sustainability education.

33. Implications for Policy

Educational policy should:

1. Integrate ESD Across Curricula;
2. Strengthen Teacher Training;
3. Provide Environmental Infrastructure;
4. Support Sustainability Research;
5. Encourage Green Campuses;
6. Develop Environmental Competency Frameworks;
7. Support Community Engagement;
8. Encourage Digital Environmental Education;
9. Strengthen Sustainability Assessment;
10. Promote Youth Environmental Leadership.

34. Limitations

Several limitations should be acknowledged.

First, the literature reviewed includes studies using different populations, educational interventions, outcome measures, and research designs. Therefore, direct comparison between all studies is difficult.

Second, the meta-analysis by van de Wetering et al. reported substantial heterogeneity, indicating variation in educational effects across contexts.

Third, some environmental behaviour outcomes are self-reported, which may produce social-desirability bias.

Fourth, the present article does not conduct a new statistical meta-analysis. Instead, it synthesizes published systematic reviews, meta-analyses, empirical research, and authoritative reports.

Fifth, the majority of international evidence may not fully represent the cultural, socioeconomic, and educational diversity of India. More Indian longitudinal and intervention studies are therefore required.

35. Future Research Directions

Future studies should investigate:

1. Long-term effects of environmental education.
2. Relationship between ethical values and sustainable behaviour.

3. Environmental education among Indian university students.
4. Rural and urban differences.
5. Gender differences in sustainability behaviour.
6. Digital environmental education.
7. Artificial intelligence and sustainability education.
8. Virtual reality for environmental learning.
9. Green-campus interventions.
10. Sustainability education and teacher competency.
11. Family influence on sustainable behaviour.
12. Youth climate activism.
13. Environmental education and sustainable consumption.
14. Environmental ethics and citizenship.
15. Longitudinal changes in sustainable behaviour.

Future research should particularly distinguish between **self-reported intention** and **observable behaviour**.

36. Conclusion

The present systematic review demonstrates that education has a significant and multidimensional role in developing environmental awareness, ethical values, sustainability attitudes, and sustainable behaviour.

The strongest evidence concerns environmental knowledge. A large meta-analysis involving 169 studies and more than 176,000 participants demonstrated significant positive effects of environmental education on knowledge, attitudes, intentions, and behaviour. The evidence therefore supports environmental education as an important mechanism for sustainable development.

However, the review also demonstrates that **knowledge alone does not guarantee sustainable behaviour**. The smaller effects observed for intentions and behaviour indicate that sustainable action requires additional factors, including ethical values, attitudes, social norms, perceived responsibility, practical skills, institutional support, and opportunities for participation.

Evidence from India further demonstrates that sustainability education can influence knowledge, attitudes, and behaviour and that attitudes may partly mediate the relationship between knowledge and behaviour.

Digital technology provides an additional opportunity. A systematic review of 21 studies found that digital tools can positively contribute to sustainability awareness, particularly through immersive technologies and climate-change education.

The central conclusion is therefore:

Education → Knowledge → Ethical Values → Awareness → Attitudes → Skills → Responsible Action → Sustainable Behaviour.

Education should consequently be transformed from a predominantly knowledge-oriented system into a **value-based, competency-oriented, experiential, participatory, and action-oriented system.**

Schools, colleges, universities, teachers, families, governments, communities, and civil-society organizations must work collectively to create learning environments in which sustainability is not merely taught but practiced.

The ultimate objective of education should be to develop citizens who are:

Knowledgeable + Ethical + Responsible + Environmentally Aware + Socially Engaged + Sustainability-Oriented.

Such an education system can make an important contribution to the achievement of the Sustainable Development Goals and to the development of a society in which human well-being and environmental protection are pursued together.

37. Research Contribution

The principal contribution of this review is the integration of three dimensions that are often studied separately:

- 1. Ethical values**
- 2. Environmental awareness**
- 3. Sustainable behaviour**

The proposed framework suggests that environmental education becomes more effective when ethical values are integrated with knowledge, attitudes, competencies, and practical action.

The paper therefore provides a conceptual foundation for future empirical research among school students, university students, teachers, and young people.

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