

A Comparative International Study and Chinese Pathways for Integrating Education for Sustainable Development into the Curriculum

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Abstract

In the context of global efforts to address sustainable development challenges, education has been entrusted with the role of a key driver. How to effectively integrate Education for Sustainable Development (ESD) into national curriculum systems has become a core issue in education policy across countries. This article employs case analysis and policy text analysis methods, selecting Australia, England (hereinafter referred to as "the UK"), and Finland, three countries with distinct educational philosophies and governance structures, as comparative subjects. It systematically examines their differentiated paths in integrating sustainable development education into curricula. The study finds that these three countries have developed three typical models: "Cross-disciplinary Infusion" (Australia), "Cross-disciplinary Practice Guided by a National Framework" (UK), and "Implicit Integration into Transversal Competences" (Finland). The selection and evolution of these models are deeply rooted in their respective traditions of educational decentralization, the intensity of national curriculum control, and fundamental perceptions of teacher professionalism. Through an analysis of the three countries' policy texts, curriculum vehicles, implementation logics, and typical cases, this paper reveals that the success of ESD curriculum integration depends not only on top-level design but more crucially on the "supportive ecosystem" provided for schools and teachers. Based on this, the paper argues that China, in advancing related reforms, should move beyond the binary debate of "establishing an independent subject" versus "adding extracurricular activities." Instead, it should focus on constructing a flexible policy space for schools, systemically empowering teachers as curriculum designers, and promoting an intrinsic alignment between assessment culture and sustainability competencies. This approach will help explore a deeply rooted, vibrant, and locally grounded integration pathway.

Keywords: Education for sustainable development (ESD); Curriculum integration; International comparison; Education policy; Teacher professionalism

Introduction

The severe ecological and social challenges of the Anthropocene necessitate that education assumes the historical responsibility of cultivating sustainable lifestyles, values, and capacity for action in future citizens. This mission has become a global consensus through the 2030 Agenda for Sustainable Development and its educational target (SDG 4.7), and continues to be reinforced by international policy. UNESCO launched the Global Action Programme on Education for Sustainable Development (2015-2019) in 2014 and released its subsequent implementation framework in 2019, aiming to mobilize forces worldwide to fully integrate ESD

into learning systems (UNESCO, 2019). The OECD has also incorporated the SDGs into the core of its policy deliberations (OECD, 2016), and in its Education Policy Outlook 2022, explicitly stated that educational transformation must respond to the urgent demands of the green transition and the aspirations of younger generations for a fairer, greener society (OECD, 2022). The 2022 UN Transforming Education Summit further called for the integration of ESD into mainstream educational systems, underscoring its central position in the global education reform agenda (Bian, B et al., 2022).

However, translating this grand global policy vision into the daily, systematic teaching practices of schools across nations is a complex, systemic undertaking (Asrifan et al., 2025; White et al., 2025). The core practical dilemma lies in: in already saturated curriculum systems, in what form should ESD be "housed"? Should it be established as an independent, emerging subject, or permeate existing disciplines? If the latter, how can we move beyond the simple addition of knowledge to achieve a deep integration of competencies? Different nations, based on their political systems, educational philosophies, and cultural traditions, have provided varied answers, forming distinctive pathways for curriculum integration.

Since the integration of "ecological civilization construction" into the overall national layout, China has clarified the direction of integrating sustainable development education into the national education system at the policy level through the joint issuance of guidance guidelines by multiple ministries and commissions (Kan, Y., & Xu, B, 2020). Correspondingly, grassroots schools have also emerged with numerous practical explorations carried out through themed class meetings, extracurricular projects, and school-based courses. However, existing research mostly focuses on summarizing the experiences of these scattered "highlights", and there is a scarcity of research that can reveal the deep structural reasons behind the common dilemma of current practices being "prominent in activity but lacking in systematicness and varying in depth" from a systems theory perspective (Hammond, 2023; Orendorff et al., 2024). Therefore, to solve the local problem of how to transform sustainable development education from a "plug-in" to a "gene", it is urgent to move beyond imitating single practices and adopt an international comparative perspective to deeply investigate the systematic solutions formed by different countries in facing the same challenges, as well as the institutional logic behind them.

This paper selects Australia, England (UK), and Finland as comparative cases—three countries with divergent educational philosophies and governance structures. They are not only representatives of high-quality educational development but have also formed three highly representative models of ESD curriculum integration, corresponding respectively to the approaches of "Cross-curricular Permeation," "National Framework-Guided Interdisciplinary Practice," and "Implicit Integration within Transversal Competencies." Through a systematic comparison of the generative logic, implementation conditions, and key similarities and differences of these three pathways, this paper aims to transcend the mere imitation of specific practices. It seeks to reveal the deep-seated connections between curriculum integration models and national educational governance ecosystems, thereby providing strategic insights and practical wisdom for China to explore a localized, vibrant integration pathway.

Methodology

This study adopts a comparative case study method, supplemented by policy text analysis and literature analysis, aiming to systematically reveal the underlying logic and institutional motivations of different countries' sustainable development education curriculum integration models.

The comparative case study method is suitable for exploring research questions of the "how" and "why" types, especially for holistic examination of multiple institutional factors within the context of complex educational systems. This study follows the principle of "maximum variance sampling" and selects Australia, England (hereinafter referred to as "the UK"), and Finland as comparative cases. The selection criteria are as follows. Firstly, all three countries are representatives of high-quality education and have accumulated rich policy and practical experience in the field of sustainable development education. Secondly, there is a stark contrast in the educational governance structures of the three countries - Australia adopts a federal decentralization system, the UK (England) emphasizes both centralization and supervisory accountability, while Finland features a high degree of local autonomy and teacher professional trust. Lastly, the curriculum integration paths of the three countries correspond to three typical models: "cross-disciplinary penetration," "interdisciplinary practice guided by national frameworks," and "implicit integration into cross-cutting competencies," respectively, constituting ideal types for comparative analysis.

The data sources of this study mainly include three categories: Official policy documents: Systematically collect relevant strategic plans, national curriculum standards, implementation guidelines, and evaluation frameworks related to sustainable development education issued by the central government (or federal level) and education authorities of the three countries. These mainly include the cross-priority documents in Australia's "National Statement for Education towards a Sustainable Future" and "Australian Curriculum"; the "Sustainability and Climate Change Strategy" issued by the UK Department of Education, as well as the curriculum standards for science and geography subjects in the national curriculum; and Finland's "National Core Curriculum Outline" and related supporting documents.

International organization reports: Citing global monitoring reports on sustainable development education, country policy review reports, and comparative studies issued by organizations such as UNESCO and the Organization for Economic Cooperation and Development, to gain a comparable perspective from third-party assessments.

Academic literature and case studies: Search for research papers and case study reports by scholars from the three countries on their respective countries' sustainable development education practices, as well as practical cases at the school level (such as the "Sustainable Schools Project" in New South Wales, the "Eco-Schools Program" in the UK, and phenomenological teaching cases in Finland), to supplement the implementation details that cannot be presented in policy texts.

This study constructs a three-dimensional analytical framework of "institutional logic integration path supportive ecology" to systematically compare the three-country model: Institutional logic dimension: Examining the educational governance structure of various countries (central-local power distribution), the intensity of curriculum control (prescriptiveness and flexibility of national curriculum), the professional role orientation of teachers (executors/designers/creators), and the orientation of evaluation system (high-stakes exams/process evaluation/comprehensive quality evaluation).

Integration path dimension: Analyze the carrier forms of sustainable development education in the curriculum system (independent discipline/cross-cutting theme/transversal competency), implementation characteristics (top-down/bottom-up/endogenous integration), and teaching forms embodied in typical cases (subject penetration/project practice/phenomenon teaching). Supportive ecological dimension: Examine the policy space, professional development mechanisms, resource support, and evaluation and incentive mechanisms provided by countries for schools and teachers, and reveal the moderating effect of "enabling conditions" on integration effectiveness.

The research follows an analytical path of "description-explanation-comparison-abstraction". Firstly, a systematic review of the policy evolution and current practices of the three countries is conducted to form a clear description of the patterns. Secondly, based on the analytical framework, the internal correlation between each pattern and its institutional logic is explained. Thirdly, through cross-case comparison, the similarities and differences between the three patterns and the structural factors behind them are identified. Finally, common elements of successful integration are abstracted from the comparison, and potential limitations of each pattern are reflected upon, providing theoretical references for exploring the Chinese path.

This study primarily relies on national-level policy texts and public literature, lacking verification from first-hand data regarding the implementation process and actual effectiveness at the micro-level of schools. In the future, methods such as field research, classroom observation, and teacher interviews can be integrated to further deepen the understanding of the dynamic process of integrated practice.

Results and Discussion

Analysis Of Practical Pathways

Australia: The "Cross-Curricular" and Flexible Permeation Model

Australia's pathway for ESD curriculum integration is consistent with its federal structure of educational decentralised governance, and its conceptual evolution has a clear policy trajectory. As early as the 1990s, Australia established its educational direction focusing on the natural environment and fostering knowledge and skills related to sustainable development through the Adelaide Declaration. Entering the 21st century, policy concepts deepened further, shifting from broad "Environmental Education" towards shaping "behavioral patterns conducive to ecological sustainable development". The 2000 National Action Plan for Environmental Education for a Sustainable Future explicitly proposed that environmental education principles should be more "integrated into mainstream education". This series of policy groundwork culminated in a key document in 2005, coinciding with the launch of the UN Decade of Education for Sustainable Development (2005-2014): *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools*. This Statement provided a unified curriculum guidance framework for primary and secondary schools nationwide, marking the formal reorientation of Australia's ESD from a relatively independent environmental focus towards a more comprehensive "education for a sustainable future" emphasizing integration with mainstream curricula (Ministerial Council on Education, Employment, Training and Youth Affairs, 1999).

Building upon this historical and policy foundation, Australia's current curriculum integration exhibits a distinct "cross-curricular" character. The federal government provides a national framework through the Australian Curriculum, but states and territories retain considerable autonomy for adaptation and implementation. Within the national curriculum, sustainable development is not an independent learning area but is explicitly listed as one of eight "Cross-curriculum Priorities." This positioning is crucial: it signifies that sustainability is an important theme related to multiple learning areas (subjects) that needs to be "woven" in.

- **Policy Philosophy and Curriculum Carriers:** The core philosophy is "permeation and connection." Sustainability concepts are systematically embedded within the achievement standards and content descriptions of multiple learning areas, including Geography, Science, Technologies, Health and Physical Education, and Humanities and Social Sciences. For instance, in Geography, students investigate resource management, the impacts of and responses to climate change; in Science, they study ecosystems, energy transformation, and environmental protection. This approach ensures ESD has a broad disciplinary base but simultaneously poses the challenge of effective integration—it relies heavily on the awareness and capability of individual subject teachers, risking fragmentation into scattered knowledge points.
- **Implementation Characteristics:** This model exhibits a marked "bottom-up" driving force. The national curriculum provides direction and space, but the depth of integration, teaching methods, and even resource development depend largely on state-level curriculum guidance, school-wide planning, and individual teachers' professional enthusiasm. Consequently, implementation outcomes vary significantly. The strength lies in encouraging local innovation and close ties with community issues; the weakness is the difficulty in ensuring consistent quality and coverage nationwide, making it susceptible to school leadership priorities and teacher workload.
- **Typical Case:** The "Sustainable Schools Program" in New South Wales vividly embodies this model. The program is not a directive mandate but provides schools with a supportive platform comprising a framework, tools, resources, and professional learning opportunities. Participating schools set their own improvement targets in areas like energy, water, waste, and biodiversity, and link these targets to curriculum learning. For example, a primary school might undertake a "school water audit" project where students calculate water usage in Math, study the water cycle and conservation technologies in Science, design awareness posters in Art, and finally submit the audit report and recommendations to the school administration. This authentic, problem-driven project-based learning serves as a natural bridge connecting disciplinary knowledge with sustainability action.

Overall, the core of the Australian model lies in the flexible permeation of sustainability as a "Cross-curriculum Priority," its success highly dependent on local and school-level autonomous agency. This flexible, decentralised pathway contrasts sharply with an educational environment possessing a strong national curriculum and inspection system. The analysis of the UK model that follows will demonstrate how ESD integration manifests different implementation logic and characteristics within a more structured national framework.

England (UK): The "National Framework-Guided Interdisciplinary Practice" Model

The policy orientation of sustainable development education in the UK (England) is deeply rooted in its unique historical context and socio-economic development process. As the birthplace of the Industrial Revolution, the UK was the first to enjoy the benefits of industrialization, but also the first to suffer from severe environmental pollution and ecological degradation. The catastrophic "Great Smog of London" in 1952 became a key turning point, giving rise to the world's first Clean Air Act (1956) and promoting public awareness of environmental protection (Hansell, A *et al.*, 2016). This environmental concern, shaped by profound historical lessons, constitutes an important social foundation for its educational policy response, and climate change was first incorporated into the UK's national science curriculum in 1995. Since the establishment of the UK Sustainable Development Education Group in the late 1990s, the government has successively formulated documents such as "Seizing the Future: Implementing the UK Sustainable Development Strategy," committed to incorporating sustainable development into the education system (UK Parliament, Environmental Audit Committee, 2003). In the 21st century, especially in the face of the global climate crisis and the statutory goal of achieving net-zero emissions by 2050, the UK's policy response has become more systematic. Following the hosting of the 26th United Nations Climate Change Conference in 2021, the Ministry of Education released its landmark "Sustainability and Climate Change: Strategy for Education and Children's Services Systems" in 2022, explicitly requiring the comprehensive integration of sustainable development and climate change education into the national education system (Howard-Jones, P *et al.*, 2021).

- **Policy Concepts and Curriculum Carriers:** The UK's strategy has a dual nature of "explicit regulations and implicit incentives." In the national curriculum, sustainable development content is clearly and specifically stipulated in subjects such as geography (e.g., the interaction between humans and the environment, resource management) and science (e.g., ecology, environmental science). This constitutes the "rigid" foundation for integration. Meanwhile, sustainable development is considered a crucial component of students' "spiritual, moral, social, and cultural development," a statutory responsibility of all schools, and is assessed through supervision by the Education Standards Agency, creating an implicit yet powerful driving force. Furthermore, the government's long-term support for the non-mandatory "Eco-Schools Program" provides schools with an internationally accredited, student-led framework for campus action, forming a broad range of "soft" incentives.
- **Implementation Characteristics:** This model can be summarized as "proactive engagement within a framework." The national curriculum sets the baseline requirements and content anchors for subject teaching, while projects like the "Eco-Schools Program" provide schools with popular action tools and recognition incentives. The Education Standards Agency's supervision acts as a "commanding baton," ensuring that schools fulfill their responsibility for the holistic development of students. Therefore, school practice often combines "subject teaching" (completing national curriculum requirements) with "school-wide action" (participation in eco-schools and other projects), demonstrating the school's proactive engagement within the nationally defined framework.
- **Typical Case:** A secondary school that received the "Eco-School Green Flag" award serves as a representative example. The school established an "Ecology Committee" composed of students, teachers, and staff. At the curriculum level, geography classes delve into global supply chains and carbon emissions, while science classes investigate local river pollution. At the action level, students

spearheaded waste sorting, implemented "Car-Free School Week," and created a "Food Forest" on campus. These actions are not only educational in themselves, but their planning and evaluation processes also provide real-world contexts for subjects like mathematics (data statistics), English (writing initiatives), and civic education. The "required actions" of the national curriculum and the "optional actions" of school-wide initiatives effectively synergized.

The core of the British (England) model lies in "national framework guidance," constructing a systematic and integrated baseline guarantee through "curriculum regulations, supervision and evaluation," while simultaneously stimulating interdisciplinary practice at the school level through extensive projects such as "eco-schools." This combination of standards-driven and empowering incentives contrasts with the Australian model, which heavily relies on local autonomy.

Finland: The "Implicit Integration within Transversal Competencies" Model

Finland's path to sustainable development education is deeply rooted in its unique social and environmental consensus and its tradition of actively participating in the international agenda. Finland was not born an environmental model; it too experienced the painful process of "pollute first, clean up later." Rapid industrialization after World War II, undertaken to pay war reparations, caused severe pollution and ecological damage to its waterways and forests. This profound lesson prompted Finland to embark on systematic environmental governance with a forward-thinking approach starting in the 1960s, establishing a comprehensive legal system and, in 1983, one of the world's earliest environmental ministries. Decades of effort have fundamentally improved its environmental quality, but have also fostered a clear understanding of the fragility of ecosystems and the reality of climate change (Finland's warming rate far exceeds the global average). At the same time, Finland has consistently been an active responder and regional leader to the global agenda of sustainable development education. From responding to Agenda 21 in 1992, to leading the signing of the Hagar Declaration in 2000, which emphasizes the core role of education, and then transforming the UN Decade for Education for Sustainable Development into national action, Finland's educational reforms have consistently resonated with the initiatives of international organizations. In particular, the Baltic region, where Finland is located, has provided a platform for intensive regional cooperation and experience exchange through mechanisms such as the Baltic Agenda for Education in the 21st Century. This consensus on sustainable development, driven by the local environmental crisis and continuously strengthened through international cooperation, has laid a solid social and ideological foundation for in-depth reforms in the field of education.

Based on this profound social consensus and high level of educational confidence, Finland's curriculum integration path exhibits a unique model of "implicit integration into cross-functional competence". Finland's education system is renowned globally for its high level of trust in teachers' professionalism, its low-stakes assessment culture, and its focus on student well-being and comprehensive abilities. Its integrated path for sustainable development education profoundly reflects this "trust-based" educational philosophy.

- **Policy Concepts and Curriculum Carriers:** The essence of the Finnish path lies in "internalizing the concept, rather than adding content." In the latest national core curriculum, there is no separate chapter or rigid list of topics for sustainable development education. Conversely, promoting

"sustainable lifestyles and a better future" has been established as one of the seven "cross-cutting competencies" comprehensive competencies that permeate all subject learning and aim to cultivate general literacy for future citizens. This means that sustainable development is not a course or a project, but a perspective and a result that all teaching should uphold. Its carrier is all school life and all subjects, and it is centrally embodied through the famous "phenomenon-based learning" method.

- Implementation characteristics: This model requires teachers to become "reflective curriculum designers." The national core curriculum provides broad goals and value guidance, while the specific teaching content, methods, and class schedules are jointly determined by the school and the teaching team based on the local context. During the phenomenon-based learning cycle, students conduct in-depth interdisciplinary research for several weeks around real and complex sustainability issues such as "the health of the Baltic Sea," "Arctic climate change," or "the circular economy of local communities." In this learning, the boundaries of disciplines are consciously blurred, and students use multidisciplinary knowledge to understand and attempt to solve real problems. The focus of evaluation has also shifted to students' inquiry abilities, teamwork, knowledge integration, and value reflection demonstrated during the process.
- Typical Case: A school in Helsinki conducted a phenomenon-based learning project centered on the local issue of "urban sprawl and green space conservation." Students were divided into groups and approached the topic from different perspectives: researching urban planning regulations (history, social studies), investigating green space biodiversity (biology, geography), interviewing community residents about their needs (native language, ethics), and ultimately attempting to design a balanced solution (art, technology). The entire process naturally integrated the environmental, social, and economic dimensions of sustainable development. Teachers, as designers and facilitators of learning, assessed students' comprehensive abilities to understand complex systems, participate in negotiation, and propose responsible solutions.

The core of the Finnish model lies in deeply internalizing sustainable development as part of national educational goals and teachers' professional awareness. Through a framework of "cross-cutting competencies" and phenomenon-based learning methods, it achieves a "de-formalized" organic integration. This contrasts sharply with paths that rely on external curriculum regulations (UK) or cross-thematic integration (Australia). It demonstrates how education for sustainable development can transcend specific policy tools and become a pervasive educational culture when a high degree of professional trust and internalized values are established throughout the education system.

Comparative Analysis

Through an in-depth analysis of the curriculum integration paths of Sustainable Development Education in Australia, the United Kingdom, and Finland, we can clearly see how different national institutional logics have shaped vastly different practical forms (Zhu, Z., & Yuan, D et al, 2023; Pokala, A, 2021; Xie, Y, 2017). The differences in the three countries' paths are not accidental, but rather an inevitable manifestation at the school curriculum level of their respective political systems, educational governance traditions, and fundamental beliefs in teacher professionalism. A thorough comparison of their institutional logic and key

similarities and differences provides a valuable framework for understanding the deep-seated driving forces and constraints of curriculum integration ([GOV.UK](https://www.gov.uk), 2024).

Institutional Logic: Governance Structure Determines Integration Form

- **Comparison of Governance Logic:** The integration models of the three countries are a direct reflection of their education governance structures. Australia's federal decentralization and state autonomy have given rise to a "flexible penetration model" characterized by "cross-curricular priority." The national curriculum provides an "optional menu" rather than a "mandatory list," and the depth and breadth of integration highly depend on the interpretation of local education departments and the initiative of schools, exhibiting a significant "bottom-up" characteristic. The advantage of this model lies in its flexibility and local adaptability, but the cost is uneven implementation quality across the country. The United Kingdom (England) embodies a "standards-driven balanced model." Its strong national curriculum and unified education standards bureau supervision system constitute the "rigid" framework and accountability basis for integration. However, the state does not take over everything, but provides incentives through non-mandatory projects such as the "Eco-Schools Programme," encouraging schools to conduct interdisciplinary practices within the framework. This is a logic of "setting the track from top to bottom and running the race from bottom to top," ensuring basic standards while preserving space for innovation at the school level. Finland represents an "endogenous model of trust-empowered development." Its highly autonomous municipal education management and a culture of extreme trust in teachers' professionalism mean that the national core curriculum only provides broad goals and value guidance (such as "cross-cutting competencies"). The integration of education for sustainable development is not achieved through external regulations, but by internalizing the concepts as part of teachers' professional competence and school culture. This is a near-"de-formalized" integration, relying on a high-level professional teacher community and a consistent consensus on social values.
- **The Key Positioning of the Teacher's Role:** The presuppositions of the teacher's role in integration in the three countries are micro-level manifestations of institutional logic. In Australia, teachers are primarily "implementers" within the national curriculum framework and "potential developers" of local curricula; their initiative and personal capabilities are key variables for the successful implementation of integration. In the UK, teachers are first and foremost "faithful transmitters" of the national curriculum content, and simultaneously "project organizers" responding to school initiatives; their roles are shaped by both external standards and incentives. In Finland, teachers are given the core roles of "co-designer of the curriculum" and "professional judge." The responsibility and ability to integrate are considered intrinsic components of teachers' professional autonomy, rather than externally imposed requirements. This difference in role positioning fundamentally determines the design direction of teacher training, support, and evaluation systems.
- **The Synergistic Effect of Evaluation Systems:** Evaluation acts as a guiding force; its orientation and the degree of synergy with the integration model determine the ultimate effectiveness of implementation. Finland's low-stakes, process-oriented, and competency-driven evaluation culture perfectly matches its internalized integration model. It allows teachers and students to engage in lengthy phenomenon-based teaching and in-depth inquiry without fear of losing points

in standardized tests. The UK's assessment system has a dual nature: the high-stakes GCSE/A-Level exams primarily anchor subject knowledge, potentially constraining interdisciplinary integration; however, the Education Standards Agency's oversight and assessment incorporates students' holistic development (including sustainability-related competencies) into the overall school quality evaluation, forming an important compensatory lever. Australia, on the other hand, lacks a strong, nationally unified assessment lever to drive integration. Its NAPLAN tests primarily focus on basic literacy and numeracy skills, making the quality of sustainable development education implementation rely more on schools' self-awareness and educators' convictions, lacking a systematic external accountability and incentive mechanism.

Common Wisdom Beyond Differences: Successful Integration

Despite their different paths, the practices of the three countries reveal some common core elements for successfully promoting the integration of sustainable development education curricula:

- Close connection with the real world and local issues: Whether it's Australia's school audits, the UK's Eco Commission, or Finland's phenomenon-based teaching, all three countries strive to avoid turning sustainable development education into empty rhetoric. All three countries emphasize using real, local, and student-relevant sustainability challenges (such as local water resources, community planning, and Baltic ecology) as the starting point and center of learning, cultivating problem-solving abilities and a sense of responsibility through "action and reflection."
- Building a school-wide culture of practice involving community interaction: Successful integration rarely extends to classroom knowledge transmission. The experiences of all three countries demonstrate the crucial importance of building schools themselves as micro-communities of sustainable development. This includes green campus operations, student participation in campus management decisions, and interaction with families, local businesses, and environmental organizations. This "whole school" approach elevates sustainability from a "course" to a "lifestyle" and "organizational culture."
- Explicit requirements for interdisciplinary thinking and teacher collaboration: Whether presented in the form of subject integration (Australia), interdisciplinary projects (UK), or transdisciplinary phenomena (Finland), all three countries acknowledge that solving complex sustainable development problems requires transcending the limitations of single disciplines. This is not only a requirement for student learning methods but also a challenge to traditionally isolated teacher working models. Therefore, establishing effective teacher collaboration mechanisms (such as shared lesson preparation time and professional learning communities) is an implicit common success factor in the practices of various countries.

Critical Examination: Challenges and Applicability of Each Model

No model is perfect. The flexibility of the Australian model may lead to the "fragmentation" and "marginalization" of integration, making it difficult to succeed in schools with limited resources or weak leadership. The British model achieves a balance between standards and incentives, but the tension between

high-stakes subject examinations and interdisciplinary practices may lead schools to engage in "symbolic" compliance rather than "substantive" integration. The Finnish model places extremely high demands on teachers' professional competence and school culture; its success is built on a high degree of trust in education and teachers throughout society, a condition not present in many countries (including China), thus its direct transplantability is relatively low.

In conclusion, this comparative analysis shows that curriculum integration in education for sustainable development is a systemic transformation deeply intertwined with a country's educational governance ecosystem. Choosing or designing an integrated path essentially involves finding the most effective combination of levers and innovative space within the "constraint set" constituted by a country's political traditions, education management system, teacher professional development level, and evaluation culture. This provides crucial insights for my country's exploration of localized paths: the important thing is not to imitate the external form of a certain model, but to understand its internal logic and, on this basis, build a supportive ecosystem adapted to the "soil" of its own education system.

International experience acts like a multifaceted prism, reflecting not only the paths of other countries but also the strengths and blind spots of one's own practices. A comparative analysis of the paths taken by Australia, the UK, and Finland reveals the complexity and conditionality of integrating education for sustainable development curricula. Placing this analytical framework within the Chinese context allows us to more clearly identify our own position and the structural challenges we face, and on this basis, plan a transformation path that both absorbs international wisdom and is rooted in local realities.

Lessons and Reflections: The Core Dilemmas and Deep-seated Motivations of China's Integration Practice

Currently, China's education for sustainable development has made significant progress in both policy advocacy and grassroots exploration, with widespread activities such as "ecological civilization education" and the creation of "green schools." However, measured by the standards of "systematic integration" and "deep cultivation of literacy," several prominent dilemmas remain, underpinned by profound institutional and cultural motivations.

- "Activity-based" and "Fragmented": The Marginal Dilemma of Curriculum Status In practice, sustainable development education often takes the form of "themed activity weeks," "extracurricular activities," or "school-based elective courses." While lively and engaging, these often exist separately from or even compete with the core knowledge systems and teaching time of national core courses such as Chinese, mathematics, and science. This situation of "extracurricular brilliance, in-class silence" makes it difficult to have a sustained and profound impact on students' cognitive structures and values. The underlying reason is that in the current highly structured curriculum and evaluation system, which focuses on the mastery of subject knowledge, any content that does not directly contribute to entrance examinations is easily relegated to the margins.
- "Dependency" and "Superficiality": The Dilemma of Superficial Subject Integration. Even when integrating within a subject, it often manifests as "adding" an environmental case or energy-saving initiative after established knowledge points, which is "icing on the cake" rather than "reconstructing understanding." For example, mentioning solar energy when discussing energy in a physics class,

rather than using the systemic challenges of energy transition as the core context for reconstructing the energy teaching unit. This "labeling" approach to integration stems from a general lack of systematic training and support for teachers in interdisciplinary curriculum design, as well as a lack of mature methodologies for deeply integrating Social Science Issues (SSIs) into subject teaching.

- "Administrative Driven" and "Professional Deficiency": The Passive Dilemma of the Teacher's Role. Many integration practices are initiated by higher-level documents or school administrative orders, with teachers playing the role of "executor" rather than "designer." They often face challenges such as limited time, scarce resources, and insufficient professional preparation, making it difficult to translate external requirements into creative teaching practices. This contrasts sharply with Finland's view of teachers as "key designers." The root cause lies in the fact that Chinese teachers' professional autonomy has long been limited by heavy teaching loads, uniform teaching and research requirements, and the pursuit of "teaching certainty," resulting in insufficient willingness and ability to address complex and open sustainable development issues.
- "Disconnected Evaluation" and "Lack of Incentives": The Lagging Dilemma of Systemic Collaboration. The most fundamental challenge lies in the significant measurement gap and value tension between the high-stakes examination and evaluation system, whose core function is selection and streamlining, and the critical thinking, interdisciplinary problem-solving abilities, values, and action-oriented qualities advocated by education for sustainable development. When students' academic fate is almost independent of their performance in sustainable development, no matter how exquisite the curriculum design, it is difficult to obtain sustained and serious investment from schools, parents, and even the students themselves. The lagging reform of the evaluation system is the most critical "weak link" in the entire integration project.

Path Exploration: Constructing a Locally-Based "System-Empowering" Integrated Ecosystem in China

Based on an analysis of its own challenges and a critical consideration of international experience, China's efforts to integrate sustainable development education curricula should not simply copy the "model" of any particular country. Instead, it should strive to build a "system-empowering" ecosystem that can stimulate endogenous motivation and provide continuous support. This means that the policy focus should shift from "issuing directives" to "creating enabling conditions."

- Constructing a three-tiered flexible policy framework: "National Standards - Local Guidelines - School-Based Toolkits."
 - 1) At the national standards level: When revising the national curriculum scheme and the curriculum standards for each subject, the focus should be on "core competencies," clearly and structurally embedding sustainable development-related concepts, abilities, and values. For example, "ecological literacy" or "sustainable development competence" can be considered an important component of students' core competencies, with clear "relevance points" and "performance expectations" established in the content standards of subjects such as science, geography, and moral and legal education.
 - 2) At the local and school levels: Develop a supporting "Guideline for the Integrated Implementation of Sustainable Development Education Curriculum" and a rich "Teaching Case Resource Library,"

providing a "toolbox" of optional integration models ranging from subject integration and thematic units to interdisciplinary projects. Policies should encourage rather than prescribe specific practices, leaving ample space for local and school-based innovation and supporting the development of distinctive courses that integrate local ecological, cultural, and developmental issues (such as the Yangtze River protection, rural revitalization, and urban renewal).

- Launch a professional empowerment revolution focusing on "teachers as curriculum transformers and creators."
 - 1) Pre-service training reform: Incorporate compulsory or core elective modules in teacher education, such as interdisciplinary curriculum design, project-based learning, and teaching social science issues, enabling future teachers to master the basic "skills" of integrated teaching.
 - 2) In-service development transformation: Thoroughly transform the lecture-based training model and promote "workshop-style" school-based professional development. Establish interdisciplinary teacher collaboration teams around specific sustainable development teaching themes, and, under the guidance of curriculum experts, jointly experience the complete cycle of "design-implementation-reflection-iteration." Educational management departments need to provide institutionalized time guarantees (such as fixed interdisciplinary teaching and research time) and professional support (such as hiring external experts and establishing inter-school alliances) for this in-depth collaboration.
 - 3) Recognition and incentives: Incorporate teachers' curriculum development achievements and innovative teaching cases in sustainable development education into substantive evaluation indicators for professional title assessment and awards, establishing professional benchmarks.
- Seek a key breakthrough in "evaluation-oriented collaborative reform."
 - 1) Integrate into academic proficiency examinations: Gradually and cautiously increase the number of comprehensive questions based on real and complex sustainable development scenarios in key examinations such as the middle school entrance examination and the college entrance examination. This will assess students' ability to analyze problems, argue viewpoints, and propose solutions using multidisciplinary knowledge, thereby "forcing" a change in teaching methods.
 - 2) Strengthen and deepen comprehensive quality assessment: Reform the current comprehensive quality assessment, which often becomes merely a formality. Develop scientific, simple, and reliable process recording and assessment tools to objectively describe and grade students' actual performance and achievements in sustainable development-related project research, community service, and social practice. Ensure that these assessments have a visible and perceptible weight in high school and university admissions, forming a powerful positive incentive loop.

The educational transformation toward sustainable development is a silent yet profound cultural revolution. China's path is destined to be a hybrid innovation route, blending the British approach of national strategic guidance, the Finnish pursuit of professionalization and endogenous motivation, and the Australian respect for local diversity. Its success will ultimately depend on whether we can move beyond mere technical curriculum adjustments and instead undertake a profound systemic empowerment—unleashing innovation through flexible policies, empowering teachers through professional development, and guiding change through collaborative assessment. Only in this way can education for sustainable development truly transform from an external "educational task" into the core DNA of Chinese education, shaping the future and nurturing new generations.

Conclusion

The integration of education for sustainable development into the curriculum represents a profound restructuring of the curriculum and a transformation of school culture. This paper, through a systematic comparison of the models of Australia, the UK, and Finland, reveals that an effective integration path is not simply the transplantation of "best practices," but rather an "adaptive construction" process deeply coupled with national education governance logic, curriculum traditions, and teachers' professional positioning. Australia's "interdisciplinary penetration" demonstrates the flexibility and diversity under a decentralized system; the UK's "framework-guided interdisciplinary practice" reflects the goal-oriented force within a standards and accountability system; and Finland's "implicit integration into cross-functional capabilities" highlights the potential for endogenous change based on high professional trust. These three paths all point to a core principle: successful integration lies not in formal uniformity, but in building a "supportive ecosystem" that enables schools and teachers to engage in continuous exploration and innovation.

For China, the value of international experience lies not in providing directly replicable templates, but in inspiring us to undertake a systematic ecological reconstruction. Future policy focus should shift from pursuing short-term, fragmented "project highlights" to building a long-term mechanism that can stimulate broad and lasting educational innovation. This includes providing a clear competency framework and flexible policy space, implementing an empowerment-oriented new model of teacher professional development, and promoting a gradual shift in assessment culture towards competency-based approaches. Simultaneously, schools at all levels should be encouraged to conduct "localized" curriculum experiments based on their local contexts, ensuring that education for sustainable development is truly rooted in the realities and future needs of Chinese society.

This study focuses on analyzing national-level policies and mainstream models in the three countries. Future research can delve deeper into the micro-level of schools, exploring specific teaching processes, teacher-student interactions, and learning outcomes under different integrated models. Long-term follow-up studies can also assess the actual impact of different pathways on the formation of students' sustainable development competencies. Against the backdrop of the deepening global sustainable development agenda, how to cultivate responsible citizens with both a global perspective and localized action through education will remain a persistent challenge for education researchers and practitioners worldwide.

References

- Asrifan, A., Sudirman, R., & Tasni, N. (2025). Embracing Diversity: Innovative Approaches to Global Learning in Higher Education. In *Higher Education Institution Strategies for Internationalization* (pp. 191–222). IGI Global. <https://doi.org/10.4018/979-8-3373-1092-3.ch007>
- Bian, B., Song, J., & Zhang, M. (2022). Common commitment and collective action: Transforming education for sustainable development on the occasion of the United Nations Transforming Education Summit. *Education Research*, (11), 136–148.
- Department of the Environment and Heritage. (1999). *Today shapes tomorrow: Environmental education for a sustainable future—A discussion paper*. Commonwealth of Australia.

- Department of the Environment and Heritage. (2000). *Environmental education for a sustainable future: National action plan*. Commonwealth of Australia.
- Department of the Environment and Heritage. (2005). *Educating for a sustainable future: A national environmental education statement for Australian schools*. Commonwealth of Australia.
- GOV.UK. (2024, March 4). £360 million to boost British manufacturing and R&D. <https://www.gov.uk/government/news/360-million-to-boost-british-manufacturing-and-rd>
- Hammond, D. (2023). CULTIVATING HEALTHY HABITS: Food, Gardens, and Community-Based Learning. In *Promoting Health and Wellness in Underserved Communities: Multidisciplinary Perspectives Through Service Learning* (pp. 44–54). Taylor and Francis. <https://doi.org/10.4324/9781003446538-5>
- Hansell, A., *et al.* (2016). Historic air pollution exposure and long-term mortality risks in England and Wales: Prospective longitudinal cohort study. *Thorax*, 71(4), 330–338. <https://doi.org/10.1136/thoraxjnl-2015-207450>
- Howard-Jones, P., *et al.* (2021). The views of teachers in England on an action-oriented climate change curriculum. *Environmental Education Research*, 27(11), 1660–1680. <https://doi.org/10.1080/13504622.2021.1988881>
- Kan, Y., & Xu, B. (2020). The Global Action Programme on Education for Sustainable Development: Motivation, mechanism and reflection—From the perspective of UNESCO's global governance. *Comparative Education Review*, 42(12), 3–10.
- Ministerial Council on Education, Employment, Training and Youth Affairs. (1999). *The Adelaide declaration on national goals for schooling in the twenty-first century*.
- OECD. (2016, June 2). *Better policies for 2030: An OECD action plan on the Sustainable Development Goals*. <https://www.oecd.org/dac/OECD-action-plan-on-the-sustainable-development-goals-2016.pdf>
- OECD. (2022). *Education policy outlook 2022: Transforming pathways for lifelong learners*. OECD Publishing. <https://doi.org/10.1787/c77c7a97-en>
- Orendorff, K. L., Merica, C. B., & Egan, C. A. (2024). A Grassroots Initiative to Engage Classroom Teachers in Increasing Physical Activity. *Journal of Teaching in Physical Education*, 43(4), 597–606. <https://doi.org/10.1123/jtpe.2023-0219>
- Pokala, A. (2021). *The Finnish model: Leadership and management in school education* (M. Ma, Trans.). Shanghai Education Publishing House. (Original work published in English)
- UK Parliament, Environmental Audit Committee. (2003, July 31). *Tenth report*. <https://publications.parliament.uk/pa/cm200203/cmselect/cmenvaud/472/47204.htm>
- UNESCO. (2019, September 3). *Framework for the implementation of Education for Sustainable Development (ESD) beyond 2019*. <https://unesdoc.unesco.org/ark:/48223/pf0000370215>
- White, R., Lowery, C., & Johnson, J. (2025). Enhancing high-quality education through systemic school leadership: a systematic review. *Quality Education for All*, 2(1), 227–244. <https://doi.org/10.1108/QEA-09-2024-0096>
- Xie, Y. (2017). Research on education for sustainable development in Finnish primary and secondary schools. *World Education Information*, 30(5), 58–63.

Zhu, Z., & Yuan, D. (2023). The development of UNESCO's education for sustainable development concept and its dissemination in China. *World Education Information*, 36(6), 76–80.