

An Exploration of Patterns in the Practice of Education for Sustainable Development in China: Experience and Reflection

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Abstract

China began to promote the project on Education for Environment Population and Sustainable Development (EPD) in 1998 and obtained significant gains. After that, in response to the global-scale implementation of the United Nations Decade of Education for Sustainable Development (DESD), China, on the basis of a local concept interpretation of education for sustainable development (ESD), as well as its specific national condition, continually explored education practice models for more than ten years. The main features of ESD innovative practice in China are as follows: exploring and forming an ESD development model based on the Chinese native experiences, creating an organization mechanism for the continuous improvement of ESD projects, and building a school curriculum system with the concept of ESD. However, ESD in China has many problems such as funding deficiency, lack of teacher training, and other support system issues.

Keywords

Education for Sustainable Development (ESD), Practice Exploration, Educational Development Mode, China

1. Introduction

Since the 1970s, the world environment has been deteriorating, the environmental crisis deepening, and the related social, economic, and cultural issues making problems increasingly complex. Against this global background, education for sustainable development (ESD) is raised with great expectations [1]. ESD, emerging with the advent of sustainable development strategy (SDS), is an important part of SDS and a means to achieve it.

In 1994, in response to *Agenda 21*, the United Nations Educational, Scientific and Cultural Organization

(UNESCO) put forward “education for sustainability” that was required to integrate environmental education, development education, and population education into a single environment, population, and development program, namely, the EPD project. The EPD project is considered to be a scaled-down version of ESD [2]. In 1996, at the 4th Meeting of the United Nations Committee on Sustainable Development, the target and characteristics of ESD were proposed, and the concept of ESD was formally developed. In 2002, at the World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa, countries reviewed global actions for the Sustainable Development Plan after *Agenda 21* (1992) and fully affirmed the importance of ESD. They asked the United Nations (UN) Assembly to consider adopting the United Nations Decade of Education for Sustainable Development (DESD), with 2005 as the beginning year. In December 2012, the 57th UN Assembly passed Resolution 254, identifying 2005-2014 as the DESD. It also specified UNESCO would organize “ten years’ activities” and draft the *International Implementation Plan* [3]. In 2005, UNESCO officially published the *International Implementation Plan*, clarifying the overall objective and specific goal of the DESD, and this plan became a programmatic document for guiding practice [4].

However, the concept of sustainable development is broad, vague, and evolving. Moreover, each area of the world has different developmental levels and cultural backgrounds, which can cause considerable differences in their understanding of ESD. Global understanding of ESD has not reached a consensus. Although many countries recognize that ESD has an important value, their actions are very slow, and thus, progress is limited [5]. In the second half of the DESD, people no longer pursue a uniform understanding of ESD. Instead, they gradually realize that we need to explore the education practice mode and mechanism of sustainable development according to local conditions [6].

UNESCO is the main promoter of ESD research and practice worldwide. The search term *education for sustainable development* yields 219 related works of literature in the UNESDOC database [7]. Since 1992, UNESCO has studied ESD that provides mass materials for ESD research and practice. In China, the search term *education for sustainable development* (Chinese retrieval) yields 1667 works of literature, including 657 academic periodicals and 85 theses and dissertations in the China National Knowledge Infrastructure (the largest database in mainland China).

Based on an analysis of the existing research and literature, the authors propose that sustainable development includes three key elements, namely, humans, the environment, and the relationships between the two. This means that sustainable development needs to deal with the relationship between “man and nature” and “people and society.” It ultimately contributes to the integrated relationship of man and himself. In correct handling of the relationship between humans and the environment, education and learning play a central role.

Just as Irina Bokova, Director-General of UNESCO, advocated in the ESD Decade Summary Meeting held in Aichi-Nagoya, Japan, in November 2014, what the current and future situations urgently need are actions and interactions from both researchers and practitioners [8]. China, as early as 1996, recognized sustainable development as a national development strategy, and ESD was a strategic topic in the *National Plan for Medium and Long-Term Education Reform and Development* (2010). This paper aims to summarize China’s experience with ESD, which is over a decade long, to contribute to international communication on this topic.

The purpose of this article is to discuss the practical exploration of ESD in China, which can provide suggestions for the longitudinal practice of ESD. Furthermore, in addition to cases of ESD practice in China, the researchers explore the design and various elements of the ESD system, such as the educational objective, curriculum, textbook compilation, teaching method, and teacher training. These elements constitute the horizontal dimension of the system. On this basis, the researchers summarize and discuss the experiences and lessons learned from ESD in China. In the following pages, we shall deal with each of the following questions in turn.

- From EPD to ESD: How have Chinese ESD projects evolved?
- What are the constituent elements of ESD in China? How are these elements conceived and designed? How do they work?
- Are there any meaningful experiences of ESD in China? What lessons can we draw from them?

2. From EPD to ESD: The Implementation Process of ESD in China

Even in ancient China, there was a plain and hazy awareness of sustainable development. This is reflected in the works of ancient Chinese philosophers like *Lao Tzu* (老子) and *Mencius* (孟子). For example, *Lao Tzu* described the idea of “*imitation of nature* (道法自然).” Such ideas show understanding about the relationship

between the environment, resources, and humans' needs in Chinese traditional culture [9]. Due to China's foundation of traditional culture, when the international communities focus on ESD problems again, China's government can respond quickly and actively to participate in the global education campaign.

2.1. Fifteen Years of ESD Development in China

The large-scale initiation of ESD in China began in 1998. Since then, ESD has gone through the following phases (as shown in **Figure 1**).

In 1992, Chinese Premier Li Peng participated in the *United Nations Conference on Environment and Development (UNCED)* held in Rio de Janeiro, Brazil, and promised to execute all documents the meeting passed. On March 25, 1994, the China State Council, at its 16th Executive Meeting, discussed and passed *China's Agenda 21: White paper on China's population, environment, and development in the 21st century (Agenda 21)*. The sixth chapter of this agenda discusses the construction of ESD and abilities for sustainable development. The agenda clearly points that we need to start ESD in schools and universities in order to raise public awareness of sustainable development. In 1998, the Chinese Educational, Scientific and Cultural Organization gave Beijing Education Science Institute the task of starting UNESCO's EPD project. In the project's early stage, Beijing, Shanghai, Jiangsu, Shandong, Zhejiang, Guangdong, Hunan, Hebei, and Inner Mongolia's nine provinces (municipalities and autonomous regions) implemented the EPD project in the field of basic education. Currently, there are more than 1000 member schools and 10,000 teachers participating in the project, and the number of students directly educated through it is about one million [10].

In the last 15 years, with guidance from the Chinese National Commission for United Nations Education, Science and Culture Organization and Chinese Ministry of Education, Beijing Education Science Institute organized nine ESD national workshops and four ESD international forums in Beijing, Shanghai, Guangdong, and Hong Kong. They have had an effective and long-term impact on ESD. Currently, more than 1000 experimental school principals and teachers actively participate in this education project, it receives good reviews from local education administrative departments and social sectors. The project renews the idea of education, generates innovation in the curriculum and education in general, popularizes sustainable development values, gradually implements a sustainable lifestyle, leads energy conservation and emissions reduction in schools, and promotes teachers' professional development [11].

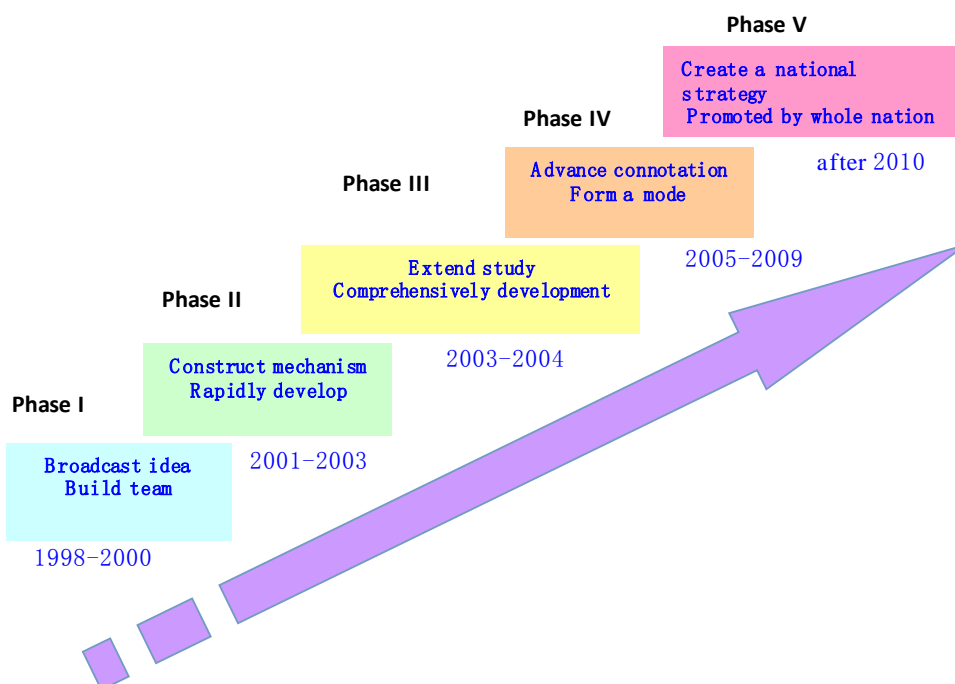


Figure 1. Development phases of ESD in China.

2.2. The Transformation of China's EPD to ESD

In 2005, while the world promoted the *United Nations Decade of Education for Sustainable Development: International Implementation Scheme*, the National Committee of China Educational, Scientific and Cultural Organization officially approved renaming the UNESCO Project on Education for Environment Population and Sustainable Development (EPD) to the Education for Sustainable Development (ESD) Project [12]. From EPD to ESD, ESD in China keeps forging ahead.

In the process of this transformation, there are two key event schedules. First of all, since 2005, the United Nations has promoted the DESD plan. The concept and policies of sustainable development and ESD, which are advocated by the United Nations, have brought new ideas as well as policy-oriented and practical challenges for the development of China's EPD projects [13].

Traditionally, the Chinese concept of sustainable development focuses on environmental protection, and active development of ESD is implemented mainly through environment education. Since the implementation of the DESD plan, these traditional concepts have encountered challenges and begun to change. The new definition of ESD includes social, environmental, and economic aspects that are intertwined as the platform for a sustainable world [14]. Simultaneously, the implementation of ESD should change the traditional exam-oriented approach to teaching.

Secondly, following more than 10 years of experience exploring methods of ESD in China, in the first half of 2010, after listening to opinions from many experts and society, ESD finally entered the phase of the *National Plan for Medium and Long-Term Education Reform and Development (2010-2020)*. The "strategic theme" section of the plan includes explicit instructions to "attach great importance to ESD" [15]. In China, ESD has been a national strategy of education development.

3. Exploration of the Patterns of Practice in ESD in China

3.1. Core Elements of China's ESD System

Based on the local interpretation of the concept of ESD, China's ESD system includes six elements: educational concept, educational objective, educational content, teaching method, teacher training, and school governance (as shown in **Figure 2**).

The Chinese interpretation of ESD can be briefly summarized by a road map. "Road map" here means that to understand and practice ESD, firstly, we need to understand the two meanings it has, as well as its (one) core content and three basic contents. Secondly, we need to grasp the approach of three-level curriculum construction, two-type thematic education, and three-level construction of schools. Finally, we must clearly understand the four goals of ESD. We can depict this notion of ESD as a "2-1-3-3-2-3-4" road map (as shown in **Table 1**) [16].

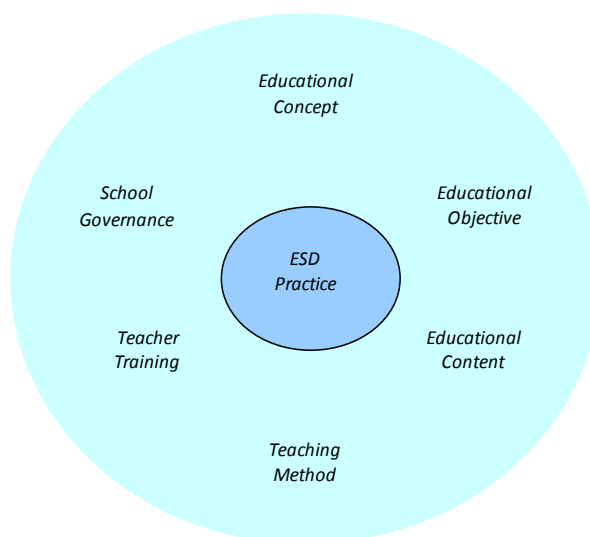


Figure 2. Core elements of China's ESD system.

Table 1. The “2-1-3-3-2-3-4” road map of ESD development in China.

2	Two meanings of ESD	Education serves the sustainable development of the society, economy, environment, and culture. Education serves human sustainable development.
1	Core content	Sustainable development values (four types of respects: respect for others, differences, diversity, and the environment).
3	Three basic contents	Scientific knowledge of sustainable development (society, economy, environment, and culture). Abilities needed for ESD. Sustainable ways of life (e.g. low carbon lifestyle).
3	Three-level curriculum construction	National curriculum: ESD teaching model experiment. Local curriculum: development of local ESD curriculum and textbook compilation. School-based curriculum: development of school-based ESD curriculum and textbook compilation.
2	Two-type thematic education	Thematic education on resources and the environment (e.g., energy conservation, emissions reduction, low carbon lifestyle, and innovation education). Society-culture education projects (e.g. multicultural education and education for international understanding).
3	Three-level school construction	Experimental school. Model school. National experimental school.
4	Four goals	Significantly improve regional education function (administrative department for education). Significantly revise educational concepts (principal and leadership). Significantly improve teachers' level of professional development. Significantly improve student achievement.

3.2. Chinese Concept of ESD Practice

In the practice of ESD in China, sustainable development is a comprehensive concept. It encompasses not only the preservation and protection of the environment, but also the development of economic, social, and cultural aspects. The current concept of sustainable development has greatly exceeded the past interpretation paradigm, which only paid attention to environmental protection. That is, it has been extended from ecology and the environment to human well-being connected to the economy, society, and culture.

In China, sustainable development is a new development paradigm that embodies the core principles of the Scientific Outlook on Development put forward by the Chinese government. The Scientific Outlook on Development urges putting people first and aiming at comprehensive, coordinated, and sustainable development. It reveals the four-in-one dialectical relationship of “population, resources, the environment, and development.”

Accordingly, ESD has shaken off the old thinking patterns that simply emphasize environmental protection. The realization of the concept of ESD must be based on the harmonious development of man and nature, economy, culture, and society. Therefore, we think that ESD in China includes at least three layers of meaning:

- Education to promote the sustainable development of persons;
- Education to promote the sustainable development of society, economy, the environment, and culture;
- The sustainable development of the education system itself.

3.3. The Target for ESD in China

The biggest promoter of ESD-related research is UNESCO. However, there is no unified target system of ESD in the UNESCO published literature. There are two reasons for this: One is that the theory and practice of ESD should take local culture into account, which means practices in different areas should be implemented according to the specific situation. The other is that sustainable development and the concept of ESD are self-evolved and not static—which becomes simultaneously their shortcoming (as they cannot be handled specifically) and their advantage (by providing huge space for theory interpretation and practice exploration). As discussed above, people around the world have different interpretations of ESD. In recent years, they have stopped looking for a uniform

understanding of ESD and instead increasingly recognize that the learning process and innovation mechanism of ESD depend on the specific circumstances [6].

In spite of this, there are still general contents in knowledge, skills, attitudes, and values included in the target system of ESD. With more than ten years' exploration of ESD in China, a preliminary ESD target system based on China's national conditions has already been built (as shown in **Figure 3**). This system mainly includes the following: sustainable development values, learning sustainable development scientific knowledge, cultivating abilities in foundation studies, developing sustainable learning abilities, and practicing sustainable lifestyles [17]-[19].

3.4. The Development of a School-Based ESD Curriculum and Textbook Compilation

Based on experiences with experimental schools, the development of a school-based curriculum and school-based teaching materials should be carried out mainly in three lines:

- 1) Determining the basis of developing a school-based curriculum. This mainly has three sources: ESD documents from education authorities, school ideas and thoughts about ESD, and the ESD curriculum resources featured in and outside school.
- 2) Formulating a school-based curriculum program. This mainly includes three steps: determining ESD school-based curriculum goals, selecting school-based curriculum contents, and clearly implementing forms of the school-based curriculum.
- 3) Compiling school-based teaching materials. This mainly includes compiling guidelines, teaching principles and use requirements, teaching contents (core part), documentation of successful cases, document literature, and related website links.

3.5. The Teaching Methods of ESD

3.5.1. The ESD Teaching Model Experiment

Practice in China shows that integrating ESD into the subject teaching reflects the vitality of the ideas of modern education. Its operation platform is the ESD teaching model experiment. Two tracks to build this teaching mode are below (as shown in **Figure 4**).

To formulate this teaching method, two strategies are essential: adopting ESD teaching principles, and designing and adopting the "subjectivity inquiry-comprehensive penetration" teaching mode process. First, the operating principles of the ESD teaching method are as follows: subjectivity inquiry, comprehensive penetration,

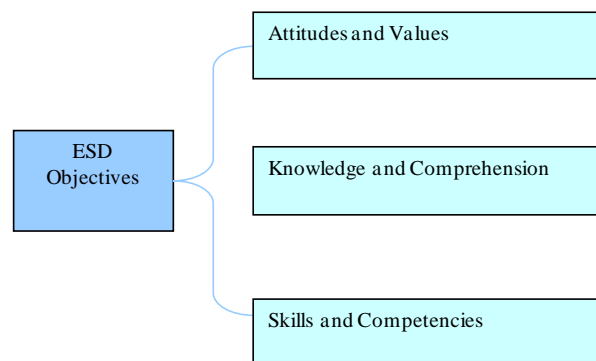


Figure 3. Framework for ESD goals.

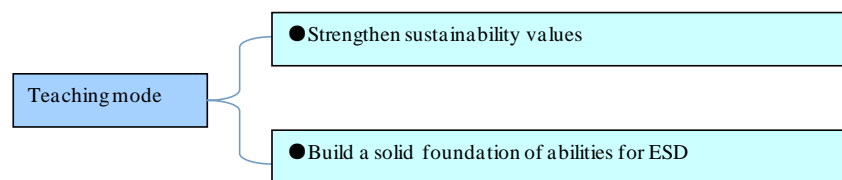


Figure 4. Two tracks to formulate the ESD teaching method.

cooperative activities, and knowledge advancing together with practice (referred to as the ESD teaching principles) (as shown in **Figure 5**) [16]. Second, as the traditional teaching mode in which teachers hold an absolutely dominant role predominates, it is essential to construct the “subjectivity inquiry-comprehensive penetration” teaching mode process.

3.5.2. Teaching Mode Design of ESD

Ten years’ progress of ESD has brought significant changes to ESD teaching methods, among which the main change is that new teaching and learning methods are emerging in quantity [20]. Global monitoring and evaluation distinguished nine types or forms related to ESD: discovery learning, transmissive learning, participatory/collaborative learning, problem-based learning, disciplinary learning, interdisciplinary learning, multi-stakeholder social learning, critical thinking-based learning, systems thinking-based learning [6]. In China, based on experiences with experimental schools, we can identify six effective teaching methods (as shown in **Table 2**).

3.6. Teacher Training

At present, the main teacher training method for ESD in China includes national ESD workshops, international forums, special subject training, academic lectures, publications on ESD, and the establishment of specialized websites, etc.

3.6.1. National ESD Workshops

Since 1998, UNESCO’s ESD project has held 11 national workshops on ESD, staged in Beijing, Shanghai, Guangzhou, and Hong Kong, etc. For example, the most recent national workshop, held in September 2012 in Shanghai, featured the theme “Education for Sustainable Development: The Road Map of Quality Education” (as shown in **Figure 6**).

3.6.2. International Forum

In order to publicize and promote ESD in pilot schools in China, since 2003, the Chinese UNESCO National

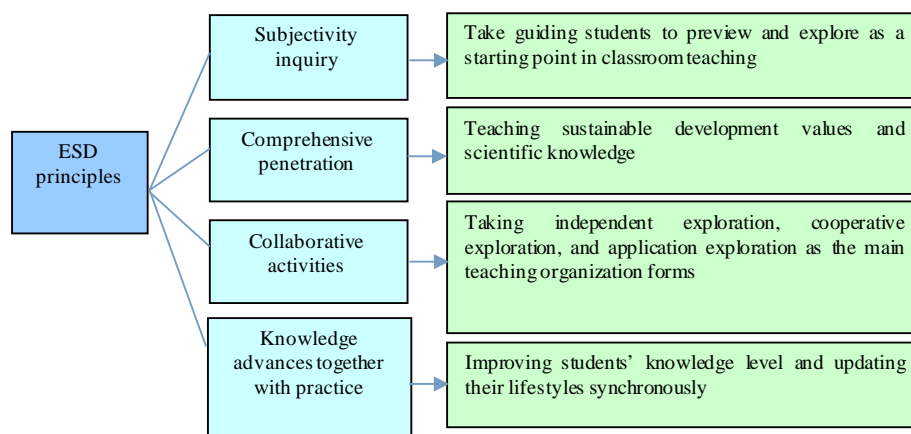


Figure 5. National ESD workshops of China [22].

Table 2. Teaching approach design of ESD in China [21].

Teaching approach	Practice
Model-centered teaching method	Teachers use their actions to influence students.
Experience-based teaching method	Teachers give students firsthand experiences and teach corresponding knowledge.
Integrated case teaching method	Teachers introduce students to specific cases to analyze and solve problems.
The game teaching method	Teachers introduce games that allow students to feel the harmony of man and nature, and man and society.
Debate teaching method	Teachers introduce a debate mechanism into teaching.
Experimental exploration method	Students test and verify hypotheses through experiments.

The 11th National ESD Workshop of China September 19–21, 2012	
Training Target:	<ul style="list-style-type: none"> ● Communicate and implement the latest experiences in ESD under the <i>National Plan for Medium and Long-term Education Reform and Development</i>. ● Share the latest documents on ESD from the UN Rio Summit. ● Present successful cases of ESD in China. ● Determine an effective mechanism and key works to promote ESD in the future.
Training Theme:	● “Education for Sustainable Development: The Road Map of Quality Education”.
Training Content:	<ul style="list-style-type: none"> ● Promotion of quality education through ESD. ● Promotion of ESD in schools. ● Characteristics of ESD curriculum and instruction. ● Education for climate change and campus construction of energy conservation and emission reduction.
Training Form:	● Keynote speeches, Symposium, Experimental school visit and investigation.

Figure 6. National ESD workshops of China [22].

Committee Secretariat and the *China National Working Committee for UNESCO Project on Education for Sustainable Development* have launched five consecutive sessions of the Beijing International Forum on Education for Sustainable Development. The International Forum has implemented training for education administrators and teachers, and it has also become an important platform for China and the international community to discuss and display the theoretical and practical achievements of ESD.

3.7. School Governance Practice of ESD

3.7.1. The Whole-School Approach

Sterling’s (2004) research on global ESD practices shows that there are usually four methods to the challenge of ESD in the world: denial (*i.e.* It is not a real problem; therefore, there is no need to reform), bolt-on (*i.e.* We should add sustainable development to our work), built-in (*i.e.*, it is very important and should be included in the current system), and whole-system redesign (It is very important, and we need to establish a new system to deal with it) [23]. UNESCO’s research shows that in practice, the built-in and whole-system redesign methods are mostly used. At present, the best practice is to introduce whole-institution approaches into ESD. This means that for education institutions, innovation should involve courses, campus work, organization culture, leadership and management, community relations, research and evaluation, etc., to create “ecological schools,” “green schools,” “sustainable schools,” and so on [24] [25].

Since the late 1990 s, China has implemented ESD projects, which are carried out over roughly a dozen provinces and municipalities. On the basis of the exploration of ESD practices and cumulative experiences, a method of ESD with Chinese characteristics has been preliminarily formed.

3.7.2. Integration of ESD Ideas into School Education

Based on the concept of ESD, school development has four stages [12]:

- 1) Qualified: Schools are run in accordance with the law, and teaching tasks accord with the regulations;
- 2) Featured: One aspect of education shows prominent achievement; school characteristics are formed;
- 3) High quality: Excellence is achieved in many areas of education;
- 4) Sustainable development: On the basis of completing the education tasks of this period, teachers focus on students’ lifelong sustainable development as well as the sustainable development of society, economy, culture, and the environment. They strive to cultivate values, learning ability, scientific knowledge, and lifestyle for sustainable development and to create a sustainable operation mechanism. The development trend is toward high quality education.

Four thoughts to integrate ESD ideas into school education are as follows:

- 1) Accurately determine the “function”: Recognize school education is a service for sustainable development;
- 2) Establish the “educational target”: Cultivate students’ formation of values, learning ability, scientific knowledge, and lifestyle for sustainable development;
- 3) Develop “education characteristics”: Integrate sustainable development values with the four types of re-

spects as core content into education. Pay attention to cultivating the students' fundamental abilities for ESD. Establish the characteristics of the school curriculum system;

4) Control "direction": Set balance, high quality, and sustainable development as the developmental direction of the school.

4. Successful Experiences of ESD in China

The ESD projects in China combine development idea and development strategy. Its success will be ensured by the integration of sustainable development principles, targets, and action guidance from the *Rio Declaration on Environment and Development, Agenda 21, United Nations Decade of Education for Sustainable Development: International Implementation Scheme*, China's actual conditions, and ESD basic ideas, and China's SDS [26]. In a memo signed by Zhou Ji, Minister of Education of China, and Koichiro Matsuura, Executive Director of UNESCO, in Paris in 2003, China's ESD projects were evaluated as "flagship projects," and the nation's successful experiences were fully affirmed. There are three main reasons for China's success, summarized in the sections below.

4.1. Organization Construction of ESD in China: The Basic Guarantee to Project Success

The successful implementation of China's ESD projects benefits from the relatively robust organization construction and management mechanism. In practice, China has built three-level macroscopic management institutions for ESD and a project school management mechanism with hierarchical guidance and propulsion (as shown in Figure 7) [27].

4.2. Progression Pattern of China's ESD Projects: The Basic Strategy of Project Success

The progression pattern of ESD in China is geographically based. With experience in regional management of ESD, China has a pattern of practices in which projects are promoted and managed geographically. The district of China's ESD project is within the administrative region, with the education system as the core and community

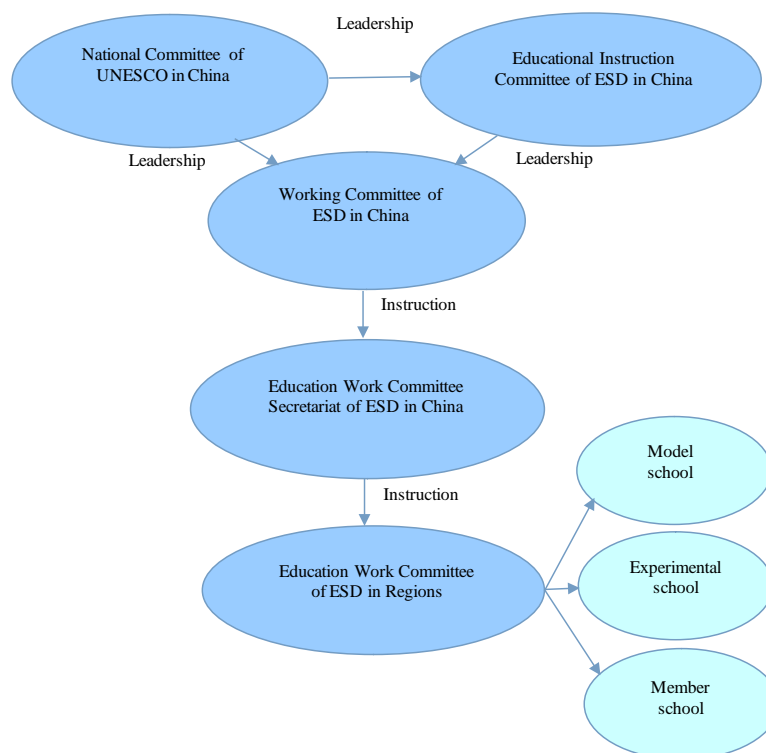


Figure 7. Organization structure diagram of the ESD projects in China.

and environment protection sectors participating. The progression pattern of ESD in China is shown in detail in **Figure 8** [26].

The core of capacity building for ESD is teacher training. In China, since ESD has begun, teacher training has been the focus. In the nearly 15 years of project promotion, the ESD projects in China have offered national, regional, and school training that effectively improves the quality of participating members. At present, it implements teacher training in the following ways.

The first method is national training. The ESD projects regularly organize national workshops, international forums, and an annual national training course to train education administrative officials, principals, and backbone teachers. The second method is region training. This is done with a regional progression method, on the one hand, to arrange region tour workshops, on the other hand, to take full advantages of remote education for teacher training. The last method of teacher training is school-based training. Regular school ESD site meetings are an effective way to promote teachers' and students' development [28].

5. Conclusions and Reflection

ESD was written into the *National Plan for Medium and Long-Term Education Reform and Development* in 2010, which marked a major development for ESD in China. Since then, it has been popularized throughout China with the support of nation policies. Through more than ten years of exploration, China has accumulated abundant experience, which it has shared with the international community through various channels. In the meantime, ESD in China confronts new opportunities and challenges.

Firstly, the global rise of sustainable development and ESD will create new opportunities for China's development. As a developing country with the largest population in the world, China now confronts serious social problems such as a population explosion, environmental degradation, and resource depletion. Therefore, a development path for ESD is needed.

Secondly, ESD development in China also confronts great challenges. On the one hand, improving ESD requires sufficient financial resources. ESD does not just take place within the education system, but also needs efforts from countries, regions, and all other stakeholders [29]. On the national level, investment in courses, management, and teacher education is needed; on the regional level, in addition to training teachers, we need resources for curriculum development and related materials. However, the material and financial security of ESD in China is very deficient. On the other hand, there is a lack of pre-service education and in-job training for ESD in China. The current training mode mainly aims at experimental regions and experimental schools without nationwide popularity. What is more serious, there are very few courses related to ESD in most normal universities' curriculum systems. In primary and secondary school teachers' post-career training, with the exception of the special ESD training program, the concept and practical curriculum of ESD are difficult to implement. Therefore, China needs to build a teacher training mechanism at the institutional level [30]. This should include the pre-service training and in-service training in normal colleges and the school-based training in primary and secondary schools.

Finally, as an important participator, China will actively join next Global Action Programme on ESD and keep exploring local practical experience.

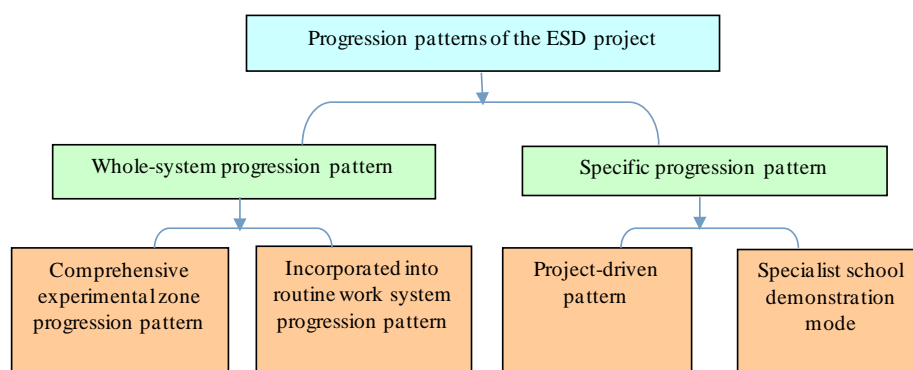


Figure 8. Progression pattern diagram of the ESD projects in China.

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Conflicts of Interest

The authors declare no conflict of interest.

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