Article

The Education for Sustainable Development, Online Technology and Teleological Rationality: A Game between Instrumental Value and Humanistic Value

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Abstract: The concept of education for sustainable development (ESD) belongs to the latter exogenous type. It was not put forward as an independent concept at first. At present, it is necessary to shift from the approach to an understanding concentrating on sustainable development to an interpretation that focuses on the structure of education. Under the guidance of online technology's pursuit of efficiency, effect, simplicity and materialization, the process of ESD embedded with online technology has highlighted its value of tools, while lacking rules and guidance of the teleological rationality, hence it cannot achieve the value tendency of humanism which accords with its reason and being good to it. In the course of realistic education, the instrumental value and humanistic value of ESD are always intertwined together, and the value choices of educational entities are often manifested as bounded rationality. Therefore, around the theme of ESD, any two of the players of educational organizations constitute the "evolutionary game with bounded rationality". Based on the result of an evolutionary game, ESD should pay more attention to the humanization of purpose, the contextualizing of content, the experience of process and the rationalization of technology, to fully realize the return of humanistic value of ESD.

Keywords: education for sustainable development; game theory; online technology; teleological rationality; instrumental value; humanistic value

1. Introduction

Since February 2020, the sudden pandemic has disrupted the rhythm of all educational institutions around the world, bringing unprecedented challenges to teachers, students and managers who were used to face-to-face teaching models. There is no doubt that the COVID-19 pandemic would bring opportunities for online education and provide opportunities for promoting educational informatization and future school reform. The transformation of school education is fundamentally to promote the sustainable development of students. Whether online technology can quickly achieve the effect of education widely is still unknown. The relationship between technology and education has once again become a hot issue in the educational field [1]. What is the role of online technology in sustainable development of education? What role technology should play, what nature of ESD and what kind of contradiction has appeared in ESD value orientation are the problems that need to be answered now.

ESD is the concept of sustainable development for future education. The United Nations General Assembly proclaimed the UN Decade of Education for Sustainable Development (2005–2014): International Implementation Scheme (IIS), which will encourage changes in behavior that will create a more sustainable future in terms of environmental integrity, economic viability and a just society for present and future generations [2]. Sustainability has been seen as an integration of different dimensions of ecological, economic

and social aspects [3]. Agenda 21 formed by the UN Conference on Environment and Development (UNCED) noted that education, raising public awareness and training are linked to virtually all areas in Agenda 21, and even more closely to the ones on meeting basic needs, capacity building, data and information, science and the role of major groups [4]. In effect, the Decade provided a proven concept for formal education and non-formal educational settings, including public awareness and training. Now, UNESCO and the ESD community are aiming towards expanding successful projects and involving more schools and institutions in ESD [5] with aims to ensure sustainable life opportunities, aspirations and futures for the younger generation through educational change [6].

As a latter exogenous concept, the academic understanding of ESD's connotation is still unclear. The ambiguity of connotation leads to the multiple modes of value realization and orientation. People tend to use information technology to accomplish the mission of sustainable development. Especially in current special context, online technology has become a priority and is considered to be the direction of educational development in the future. Therefore, how to interpret the connotation of ESD and how this connotation reflects values of sustainable development are an important basis of this study.

Regarding the ESD model's technology and efficiency as the main means of development will undoubtedly affect the value orientation of ESD. That is because the pursuit of interests, human rationality and unavoidable realistic logic will always affect ESD's realistic choices. At present, ESD can be more inclined to be translated into action plans that closely link to the development of subject education and direct learning outcome production. Based on this ESD model, how to ensure the scientific nature, long-term effect and human orientation of values is an unavoidable practical problem for the reconstruction of educational value theory and choices of ESD value. In the real situation, instrumental values and humanistic values always influenced each other, and the choices between them could not be separated. As a result, the main research question of this study will focus on: How are ESD instrumental value and humanistic value (teleological rationality) manifested, and what are the implications of the game equilibrium between instrumental and humanistic value on the implementation and policy development of ESD? Based on the construction of the game model, this paper will propose the development strategies of the expected value equilibrium.

2. Methodology

2.1. Study Design

This study belongs to normative research. It is a method of forming knowledge and theories by logical deduction from assumptions stemming from reality, combining the results of previous empirical research. The most typical normative research is model analysis, which makes logical analysis and deduction through theoretical model construction, then draws conclusions or makes feasible recommendations at the end. On the basis of analyzing and interpreting the connotation of ESD, the study delves into the instrumental value orientation of ESD, the veiling of online technology, the teleological rationality and human-oriented value of ESD in the view of relationships, hence laying a theoretical, as well as literature, foundation for the value orientation game.

Based on the theoretical model or mathematical formula abstracted from reality, this paper deduces and analyzes the equilibrium trend and phase diagram with an ESD value game analysis tool and puts forward the relevant implication. It should be said that game theory is a powerful tool for analyzing and explaining the relationship between things, and based on game analysis, it can reflect the disequilibrium of players. Using game theory as a dynamic, relatively systematic theoretical system and mathematical model to study ESD will help to expand our horizons and get rid of the closed mind of "being alone on this mountain" (Chinese proverb), thus widening the field of ESD research. With game theory, we can understand the causes of disequilibrium in value games clearly and deeply, solving problems towards expected equilibrium successfully.

2.2. Method of Game Model Analysis

As a normative analysis method, game theory is good at applying mathematical models. This method has been further extended from the field of economics to other fields such as social science, including the field of education. Traditional game theory assumes that players are completely rational in the game and take optimal actions. However, players usually play in a bounded rational manner and could not achieve the best actions in reality [7]. For example, evolution and behavior games believe that "mistakes" often occur in the game scenario, and then game players would replicate slowly or learn quickly like they are undergoing biological evolution and finally form an evolutionarily stable strategy (ESS). As the concept of evolutionary game theory emerged, it provided a common ground for a wide range of disciplines. Here, in this article, game theory methods are proposed to formalize the learning mechanisms as well as processes [8]. In this paper, with the help of calculus and derivation of probability theory and differential equations, as well as differential extreme value through the whole process of the game, it can reveal the causes of disequilibrium, the mechanism and characteristics of the game and the way to achieve the expected equilibrium in the process of ESD value selection.

3. Interpretation of the Connotation of ESD

There are numerous definitions as well as discussions about sustainable development, with one proposed by the Brundtland Commission defining it as a response to the crises of today and future being mostly accepted, and here education is seen as a tool to achieve the practical needs and maintain its pure nature of purpose at the same time [9]. The Decade of Education for Sustainable Development pursues a global vision: The vision of education for sustainable development is a world where everyone has the opportunity to benefit from quality education and to learn values, behavior and lifestyles required for a sustainable future and for positive societal transformation [2].

This is a kind of holistic and interdisciplinary education system that takes those important concepts of ecology, politics and society into consideration [10]. Additionally, education for sustainable development is a vision of education that seeks to balance human and economic well-being with cultural traditions and respect for the Earth's natural resources [11]. There is no doubt that ESD is essentially a "linked education" and worthy of "respect", and contains a transformation of the overall model of education discipline. It contains five key dimensions: The value of sustainable development, personal and social values, teaching methods, curriculum, structure and organization. Additionally, the design of ESD should be: New needs of education working as the logical starting point of design, values as the main line, activities as the focus and resource integration should be the vitality source.

From the above analysis, the connotation of ESD is still not very clear. The reason is that, firstly, international society has always emphasized sustainable development, while education is barely used as a supporting means and learning tool for it. Secondly, ESD is mainly initiated by people outside the education sector, and they do not know basic functions of education from a deeper level and tend to restrict the connotation and the construction of the theoretical system. Thirdly, sustainable development itself is a very complex and constantly evolving concept that is difficult to define, and the education concept derived from sustainable development involves almost all disciplines and requires participants to have extensive and interdisciplinary knowledge. Furthermore, the integration of ESD needs to be integrated with various disciplines that have their own system. Under this premise, the integration and identification of ESD becomes difficult, which can easily lead to the alienation of ESD value orientation and the simplification of value realization. In truth, the implementation of ESD activities within an overall structure mode can promote the improvement of its connotation development. Education on sustainable development, education for sustainable development and education in sustainable development almost fully integrate sustainable development and education. However, if we just organize and implement in an abstract sense, it will easily cause uneven

education content, standard, quality and level, neglecting long-term immersive experiences while only focusing on short and quick technical realization.

Therefore, the understanding of the ESD connotation should be decomposed from the educational structure. Firstly, the purpose of ESD should be about disseminating knowledge and theories about sustainable development, promoting students' sustainable development ethics and humanistic consciousness and improving their awareness, skills and practical ability to implement sustainable development. Secondly, the learning contents of ESD cannot be independent from each other. This requires teachers to organically connect and integrate various fields while teaching. People in different professional fields are also asked to strengthen cooperation, learn from each other and enhance understanding of different aspects of knowledge. Furthermore, in the methods of learning and teaching, we should pay more attention to learners' personal feelings and experiences, implementing an immersive teaching method that emphasizes exploration and practice. Faced with various challenges in the world today, our educational activities become ESD when we deal with certain problems in front of us [12]. Finally, ESD should be related to school education. Education for sustainable development contributes holistically to the transformative meaning of education, and it has played an irreplaceable as well as unique role in the development of school education [13]. Adaptation is important since what ESD lacks is not the construction of a theoretical system, but value orientation and a way to solve problems.

4. Application of Online Technology and Instrumental Value Orientation of ESD

4.1. The Integration of ESD Online Technology

Understanding education for sustainable development from the pedagogical perspective also contains some problems. ESD demands on teacher literacy, teaching content as well as learning methods undoubtedly challenge the discipline paradigm that has been formed in institutes/schools. Many school education models cannot adapt to the interdisciplinary nature of ESD. If teachers from different disciplines could learn from each other, as a problem-solving method, there are still many problems in organization, management, coordination and technical operations. Research into UK teachers' values demonstrated that at a practical level, technology teachers prioritized technical, aesthetic and economic values over environmental, social, cultural, moral and political values [14]. In the context of the current pandemic, ESD implementers are more willing to adopt convenient and effective educational methods (such as the wide application of online courses) for learners to be exposed to sustainable development content instead of immersing learners in the learning environment, such as achieving the meaning of sustainable development from the immersive experience of educational content. Echoing this, many countries tend to apply numerous online technologies related to ESD. In this context, many online technologies have begun to be widely applied to ESD around the world.

The development of online technology has also triggered a profound educational revolution. Various kinds of technology-based learning resources and new types of teaching models have emerged in an endless stream. MOOCs, SPOCs, blockchains, cloud technologies, flipped classrooms, micro lessons and mixed teaching have all became the new favorites of research and educational practice, one after another [15]. Intelligent evaluation based on big data provides scientific support for precise teaching, accurate learning, accurate management and precise decision making [5]. Technology today has revolutionized the field of education so its importance in schools cannot be ignored [16].

The integration of technology in teaching is complex and diverse. In terms of its function and role in ESD, online technology can be mainly classified as three types of teaching: First, online technologies are used to improve ESD teaching since the auxiliary tools play an important role in improving teaching. Second, as an indispensable component of ESD teaching, online technologies have changed or even constructed the teaching itself. Third, online technologies have been used as tools to shape the teaching environment or the field of ESD, building new educational fields for teaching and learning. Online technology has been embedded in different aspects of ESD teaching and plays an irreplaceable role.

Some technologies affect the presentation and characterization of teaching content, while others affect the communication of teaching. Some affect the design and organization of teaching while some help to construct new educational fields.

However, by examining and analyzing existing practices and processes of integrating technology into teaching, there has been an implicit habitus in the appearance of integration. Technology is introduced into or embedded in ESD teaching due to some of its certain attributes (such as MOOCs covering a wide range of subject fields or the feasibility of online technology in the pandemic situation) to meet certain needs of teaching (such as ESD's appeal for interdisciplinary issues or the continuous generalization of e-learning), which means that it has focused on the impact of the specific role of teaching, as well as the usefulness and availability of technology.

In terms of purpose, the utility, instrumentality and effectiveness of technology for teaching have been emphasized. That is, whether the introduction of technology in teaching really improves teaching efficiency. The improvement of teaching quality as well as pursuits of high efficiency, high effect and high quality of technology are the ultimate purposes. Obviously, this is a kind of logical educational thinking. When it comes to educational purpose and epistemology, online technology is always a good choice while logical sufficient educational research and practice would often overlook the different aspects of human beings and ignore the inherent dynamism and complexity of education [17]. Under the guidance of such efficiency, effect and single entity logic, the integration of online technology into ESD highlights the value of tools.

4.2. The Relationship Theory of Value and ESD's Instrumental Value Orientation

Value refers to the utility and meaning of the object to the subject, which means whether the object satisfies or corresponds to the needs of the subject, serving the subject [18]. From this, we can see that value is a relational category that indicates the intentionality between the subject and the object which never exists in isolation. It can only be grasped by the inherent attributes in relationships. Based on the definition of "relationship" education value, the definition as well as understanding of the value of sustainable development education is also a matter of course. According to the above definition of value, the value of education for sustainable development means that educational activities related to sustainable development must have some special attributes that are combined with the needs of educators. The essence of the value of sustainable development education is its usefulness in meeting the sustainable development needs of educated individuals and society [19].

The original idea of ESD value can be traced back to the 1987 General Assembly document "Our Common Future". The report emphasizes the responsibility of individuals and collectives towards the environment to promote a harmonious relationship between humans and the environment. Although the report does not directly refer to the term "education value for sustainable development", it is clearly aware of the value of sustainable education and affirms the importance of sustainable education activities. The relevant statements also contained some basic ideas of the value of sustainable development education.

In 1992, Agenda 21 clearly defined the orientation of sustainable development's educational value. The report discusses the importance and practicability of education for the realization of sustainable development goals. "Both formal and non-formal education are indispensable to changing people's attitudes so that they have the capacity to assess and address their sustainable development concerns. Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues" [4]. Here, Agenda 21 highlights ESD's instrumental value orientation, namely education's effectiveness towards promotion of sustainable development.

Under the premise that ESD itself is guided by the value of tools, the embedding of online technology in ESD teaching focuses more on whether technology is used or not and its efficiency and effectiveness while it often overlooks the consideration of the ultimate purpose of technology. Relevant research shows that the current application

of information technology teaching is still dominated by low-level "presentation" with few "creating situation" and "providing model" applications. In particular, explanations that help cultivate students' higher order thinking as well as principles about "questions of thinking" and other aspects of application are lacking [20]. The simple, one-sided, utility-oriented technology has been used to obscure the original concept of "humanity" in ESD teaching, ignoring and eliminating the complexity of teaching. It is difficult to directly observe the role of dynamically generated implicit instructional elements [21], since they have obscured the educational value that ESD textbooks should contain. The most important thing is that the instrumentality of online technology has weakened the actual interaction and communication between students and teachers, downplaying the role of interaction working as the generation of knowledge and life meaning. Without interaction, there would be no authentic education. Teachers are not so much using technology as they are being used by technology. It even seems that the supposed "technological artefacts" have been upgraded to be the main body of education [22].

Looking back at the process of teaching technology integration, "The true state of humanity is hidden in the charm and glitz of the internet. If society wants to move forward, people must be emancipated from their reified consciousness of reality and situate themselves in the true conditions of human society that beyond the virtual online world" [23]. Why take online technology? Only when the adoption of technology can achieve the goals in teaching more easily, directly and practically will people use it without hesitation. As to whether the connotation of the goal is alienated or whether education has reached the heart of humanity, these are not considered by the online technology. There are only objects, facts and tools in this field of view. It is unrealistic to evaluate the meaning of teaching from the perspective of instrumental meaning, since it only values the efforts of selected goals while other dimensions are neglected and in turn this leads to the meaningless identifying of teaching [24]. It is precisely because of the blindness and ambiguity of this type of thinking, just emphasizing the adequacy and effectiveness of methods, irrespective of whether the goal is appropriate or not [25]. The introduction of online technology in teaching has always been considered to be adding or embedding some needed technology or tool in teaching. When online technology becomes an indispensable part of ESD teaching, it is easy to overlook the connotation of sustainable development, ignore the significance of online technology's application in teaching and create an inversion of the relationship of "purpose–means". Technology is synonymous with efficiency and practicality. The paradox is that the connotation of sustainable development is a matter of relaxation and sustainability while the embeddedness of online technology is instrumental and efficient. Therefore, is instrumental value orientation worth thinking about?

5. The Connotation and Bearing of ESD's Humanistic Value

5.1. ESD Purposive Rationality and Humanistic Value Orientation

Teaching works as a "contrived", "people-oriented" and "everyone involved" meaning-world, and is a practical process to promote the cognition, selection and achievement of meaning [26]. Basically, ESD promotes people's overall development rather than just progress in education. Only when individuals have realized the importance of the environment, biodiversity, ethnic diversity, justice and the capacity for sustainable development can the connotation of ESD be interpreted perfectly. However, the development and application of online technology have always caused people's absence.

The formulation of the IIS Decade in 2005 raised the value of ESD to a higher level. The international community had also achieved consensus on ESD's humanistic value orientation, not just its instrumental value. The promotion of humanistic value orientation does not deny new technological applications under instrumental rationality. Instead, it believes that only when instrumental and teleological rationality are combined in opposition and unity can it "reach the reality" based on "pursuit of reason"; "achieve the goodness" complies with "following of truth". Therefore, the integration of ESD online technology needs not only efficiency, effectiveness and the benefit of instrumental rationality, but also the

reasonableness and virtue of teleological rationality. Rethinking the current exaggeration of instrumental rationality in the integration of ESD online technology and practice, there is an urgent need for the regulation and guidance of teleological rationality. The guiding principle of teleological rationality in ESD activities does not depend on any utilitarian means, but a rational reflection to achieve the purpose, that is, an in-depth reflection on the truth, virtue and goodness in humanistic value.

5.2. Immersive Experience and ESD Value Orientation

As it has been noted before in the definition of value, the core carriers of ESD value should be explored deeply. These carriers are people-oriented and comply with the concept of sustainable development, so as to realize real needs of learners and achieve the embodiment and orientation of ESD value.

Respect is one of the ESD value orientations. That is, respect others, respect present and future generations and respect the planet and everything it provides to us (resources, fauna and flora) [27]. Respect for interpersonal and cultural differences, fairness and equity means that teachers should review their lifestyles and attitudes, connect learning content with practical actions, link their teaching content with behaviors inside and outside the campus and encourage students to question their lifestyles and take actions according to their own attitudes toward sustainable development [28]. In practice, respect is manifested in recognition and allowance to try, especially with a critical review of these behaviors and attitudes that we take for granted today. Hence, we can find better learning and working lifestyles that could be conducive to sustainable development.

Responsibility consciousness is another ESD value orientation. John Holmberg of Chalmers University of Technology in Sweden clearly put forward the importance of responsibility and educational means in the Chalmers action plan of the university: "Sustainable development is an issue that can very easily become the concern of everyone but the responsibility of no-one. The risk of spreading responsibility, however, is that the power in the processes can be easily lost if there is no driving force that maintains momentum and direction. Ideas and responsibility need to be built into the operating framework" [29].

In Africa, the education system of many countries is very transformative. In some places, rites of passage and folk rituals are created to cultivate a sense of responsibility of every society member so that they can establish a wide range of connections between themselves, society and a larger scope [9]. Responsibility is a kind of consciousness that means one is willing to put the belief of sustainable development into action. At the same time, responsibility is a kind of mission, and people take responsibility not because they should, but because it is their mission [30].

The cultivation of respect and responsibility needs careful interaction between educators and learners, and also needs an implementation approach to prevent the "unsustainable" dilemma that only stays in theoretical thinking. Respect and responsibility mean the feeling of humanism. Humanistic philosophy emphasizes openness, interaction and experience. Citizens are not informed about to what extent tasks of sustainable development need to be completed, instead they should have the awareness and ability to explore, discover, discriminate and connect with different tasks of sustainable development. In fact, the formation of sustainable development needs contact with every "object" to arouse feelings and concerns about resources, the environment, culture and situations. However, the introduction of online technology prevents these authentic experiences.

Technological domination is introduced through the gradual transfer of power from the individual to the technology or bureaucracy level, from living to dead labor, from personal to remote control, from a machine (or group of machines) to the entire mechanized system [31]. American technology philosopher Albert Borgmann once proposed the concepts of focus thing and device paradigm. He took the stove and device as examples, where the stove represents the focus of the pre-technological era, and it provides not only warmth, but a focus, a feeling and common participation. According to Borgmann, all concerns toward objects will involve the experience of the wider world and engagement with

society [32]. Additionally, the device is just the embodiment of technology, it is separate from focus and experience, and even makes people unaware of the source of warmth, and just indulge in it. Apparently, this kind of technology paradigm obscures people's real experience and separates people from different potential links with society and the world. In the broader perspective of these social activities, we can see how the natural dimensions of culture and world present [32]. According to Andrew Feenberg, "in this escalation, not only the human dignity is lost, but also the awareness of human being's unique role as a place of experience and where the world meets existence is realized" [33].

Mr. Stephen of Malmö, Sweden, applies the eco-friendly concept to build an ecological puppet theater and Picasso Garden for students to visit and study, cultivating students' sense of responsibility in practice. The design of the theater and garden calls for children's deep understanding of nature and all lives in a most direct way [34]. Through personal involvement, children cultivate their heartfelt love for the environment and sense of self-responsibility. The UK also places special emphasis on students' self-involvement in daily study and life, encouraging students to construct their own experience and link experience with responsibility through activities and participation. For example, they contact local government and people who do business locally, to be aware of the significance of sustainable development at home and abroad, and cultivate their sense of responsibility [35]. In conclusion, ESD's humanistic value orientation is carried by immersive experience and formed in the driving force of global consciousness and spontaneous action. Only by focusing on the experience of the object rather than indulging in the paradigm of technology can learners combine the knowledge and skills related to sustainable development with the fate of human future development.

5.3. The Bearing of Humanistic Value Orientation also Needs Relevant Professionalism

Many studies are currently exploring professionalism in the curriculum of ESD, so as to make learners have a sustainable way of thinking [36–38]. However, it is not possible to describe a mandatory set of competencies for sustainability, because of the different definitions of the terms sustainability and competence in educational settings [39]. After investigating different countries' intended learning outcomes in the ESD curriculum, Johnston [40] considered that these professionalisms mainly reflected knowledge about ecosystems, basic understandings of social scientific analyses about human cultures, systemic thinking, inter- and intrapersonal skills as well as the development of change agent skills, strategies and self-concepts. In research about professionalisms, Cebrián and Junyent summarized them more comprehensively and specifically. They developed a theoretical framework of the professional competencies in ESD and elaborated eight key components [41]: (a) Future/alternative scenario visioning: Understanding the different scenarios, possible futures, promoting work with different visions and scenarios for alternative and future changes. (b) Contextualizing: Taking the different dimensions of problems or actions into account, as well as the spatial dimension (local–global) and the temporal dimension (past, present and future). (c) Work and live with complexity: The ability to identify and connect the ecological, economic and social dimensions of problems. Generating conditions for systems thinking in the school environment. (d) Think critically: Creating the conditions for critical thinking to question assumptions and to recognize and respect different trends and views in different situations. (e) Decision making, participation and acting for change: Moving from awareness to action; sharing responsibilities and engaging in joint action. (f) Clarify values: Value clarification and strengthening behavior towards sustainability thinking, mutual respect and understanding of other values. (g) Establish a dialogue between disciplines: Developing teaching and learning approaches based on innovation and interdisciplinarity. (h) Manage emotions and concerns: Promoting reflection on one's own emotions and to reach a deeper understanding of problems and situations.

In addition, transformative education needs a social emancipatory view. There are three teaching approaches that are central to fostering emancipatory transformative learning: First, the critical reflection (determining the way that could change the reality of society

and students themselves), the second one is a liberating approach (promoting cognition, introduction of questions and discussion) and the last one is horizontal, an equal student–teacher relationship [42]. The professionalism of ESD needs to allow people to develop various capabilities so that they can shape themselves to be active, accountable and suitable for future social needs, complying with sustainable development principles. At the same time, professionalism also needs a participatory and experiential education approach to carry the connotation of ESD value.

6. Bounded Rational Game between Instrumental Value and Humanistic Value

ESD is of great importance to the development of human beings and society. In fact, there are two kinds of value tendencies: Instrumental value (online technology-oriented) and humanistic value (carried by immersive experience). These two value orientations are intertwined in the process of education. As an educational entity, the choice of two value orientations is often encountered. While faced with choices, it will often need to reach the equilibrium of the game, and the equilibrium result will in turn dominate the process of ESD.

6.1. Bounded Rationality and Payoffs Analysis of Game Entities

In the value game around the ESD theme, this study states that each entity participating in the game has the following tendencies: On the one hand, if every entity has the humanistic value tendency, it can make itself take the appropriate approach of immersive experience, make the learners have a basic literacy of sustainable development, benefit human society and greatly enhance the payoffs. On the other hand, some entities tend to be utilitarian. For example, every educational entity adopts online technology to complete educational tasks assigned by the superior organization quickly, conveniently and practically, and uses instrumental rationality instead of teleological rationality, which can also make it obtain higher benefits. However, if one entity tends to have instrumental value and another entity tends to obtain humanistic value, although the humanistic value orientation can gain widespread support from society, its payoffs will be reduced because of larger costs, while the utilitarian-oriented entity only considers the instrumental attribute of online technology and ignores the teleological rationality, and its payoffs will be small in the actual context.

However, for the players in the game, every educational entity, although they have the ability to analyze the payoffs and judge the strategy effect after the fact, due to the wide spread of online technology and limited understanding of ESD humanistic value, every entity is unlikely to choose the "totally rational" strategy immediately without the help of sufficient information communication and clear judgement. Generally speaking, every educational entity is good at discovering and using new online technology, but they have different understanding of sustainable development. Therefore, they often show "bounded rationality" subjectively towards various value choices that are objectively very beneficial. Therefore, around the theme of ESD, the "bounded rational" games are constituted among educational entities. Yet, those subjects frequently fail to choose the unique Nash equilibrium actions, although they are able to make fewer errors over time with learning [43]. Additionally, these errors can be modeled by using latent utility components that are not reflected in pecuniary payoffs [44]. The equilibrium of that model should be able to be achieved through the imitation and adjustment process of game players and keep it steady under the threat of error deviation and other small interferences.

According to evolutionary game theory, the replication dynamic evolutionary game model is a dynamic differential equation describing the frequency of a particular strategy adopted in a population [45]. This equilibrium strategy formed by bounded rational game players after mutual simulation and strategy adjustment is also called an "evolutionary stable strategy". It is believed that every two educational entities in the world constitute a pair of games, and the game between them is constantly simulated, evolving and diffused.

6.2. Value Choice's Multiple Evolutionary Game Model

We first build a static game model between the two entities around the ESD theme (Table 1). Based on the previous analysis of the value choice of the entities participating in the game, we can assume that the utility value is a > b > c > d. It is not hard to find that according to the marking method of the game model, the game has two Nash equilibria: (Immersive experience, immersive experience) and (online technology, online technology), which is a typical "coordination game" matrix. In the two equilibria, it is obvious that the former is Pareto optimality compared to the latter. However, which equilibrium an entity would choose is not fixed. If an entity is confident enough to adopt the value choice of "online technology" or speculate that the other one may adopt the strategy, then (online technology, online technology) is the best equilibrium of risk relative to (immersive experience, immersive experience). We now assume that all educational entities around the world are randomly paired and played repeatedly under the framework of an evolutionary game. Under the restriction of "bounded rationality", all entities may not choose a Nash equilibrium strategy at the beginning. It is likely that some choose "immersive experience" and some choose "online technology". We can regard players who choose different strategies as different types of players. With the change in strategies, types will also change.

Table 1. Static game model of ESD value choice.

		An Educational Entity	
		Immersive Experience	Online Technology
An Educational Entity	**Immersive Experience**	<u>a</u>, <u>a</u>	c, d
	Online Technology	d, c	<u>b</u>, <u>b</u>

Assuming that the proportion of the "immersive experience" type in all entities is P, then the proportion of "online technology" type is $1 - P$. In the game of random pairing, each type of entity may encounter the same type of entity or different types of entity, so we can first find out the expected benefits of each type of entity in the ESD topic according to the method similar to a mixed strategy (π_h represents payoffs of "immersive experience", π_t represents payoffs of "online technology", π_m represents the total expected payoffs).

$$\pi_h = P \times a + (1 - P) \times c \tag{1}$$

$$\pi_t = P \times d + (1 - P) \times b \tag{2}$$

$$\pi_m = P \times \pi_h + (1 - P) \times \pi_t \tag{3}$$

In fact, the connotation of a bounded rational game is to observe the dynamic changes of players' strategy choice types, to see what equilibrium the repeated game will eventually tend to after "evolution". Generally speaking, the variation in P depends on how quickly the entities learn to imitate, and the dynamic rate of change in the entity type ratio generally depends on two aspects. One is the number of the same type of imitation, the other is the judgement of whether the same type can succeed (this can be judged by "$\pi_h - \pi_m$").

Therefore, we could use the dynamic change speed of the proportion of "immersive experience" type entities to construct a dynamic differential equation:

$$\frac{dP}{dt} = P \times (\pi_h - \pi_m) \tag{4}$$

Putting (1), (3) into (4), it can be concluded that

$$\frac{dP}{dt} = P \times (1 - P) \times [(a - d + b - c) \times P - (b - c)] \tag{5}$$

Letting $\frac{dP}{dt} = 0$, we can obtain three stable states, $P^* = 0$, $P^* = 1$, $P^* = \frac{b-c}{a-d+b-c}$ (it is easy to see that the value is greater than 0 and less than 1).

Looking from the previous introduction, any stable equilibrium point must be able to keep it steady under the threat of error deviation and other small interferences. That is, when an interference makes $P > P^*$, $\frac{dP}{dt}$ must be less than 0; when $P < P^*$, $\frac{dP}{dt}$ must be greater than 0. Letting $\frac{dP}{dt} = G(P)$, this also means that the derivative $G'(P^*)$ of $G(P)$ at the stable point must be less than 0 (the slope of the stable point should be negative). Under the assumption of the above variable value, only $G'(\frac{b-c}{a-d+b-c}) > 0$ in three stable states, and according to the stability theorem of differential equations, $P^* = \frac{b-c}{a-d+b-c}$ is not the stable evolution strategy for this game while $P^* = 0$ or $P^* = 1$ is. We use a multiple game phase diagram (Figure 1) to show the above dynamic change process.
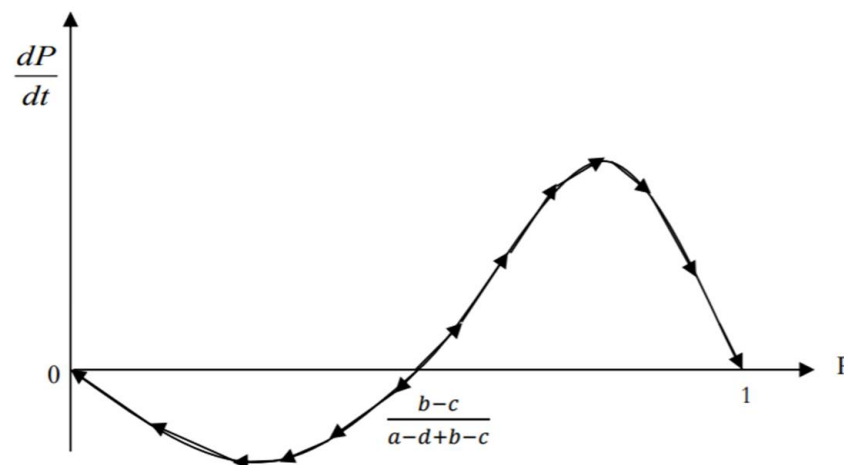

Figure 1. The phase diagram of ESD value choice's bounded rational evolutionary game.

6.3. Discussion

The dynamic change trend in Figure 1 gives us such inspiration that: When the proportion of the initial type P is between $[0, \frac{b-c}{a-d+b-c}]$, the dynamic change would approach 0, that is, all the educational entities would choose "online technology" at the end; while the initial proportion P is between $[\frac{b-c}{a-d+b-c}, 1]$, the dynamic change would approach 1, which means that all the educational entities would choose the strategy of "immersive experience" value orientation eventually.

Further analysis shows that values of a and b can be fixed in practice. After some simple mathematical conversions, we can find that if we want to diminish the value of $\frac{b-c}{a-d+b-c}$, we can increase the value of c or by reducing the value of d, in other words, when one entity chooses "immersive experience" and another entity chooses "online technology", we should try to increase the value of "immersive experience" and reduce the value of "online technology". In this way, as the value of $\frac{b-c}{a-d+b-c}$ is small, the initial selection of the entity more easily falls into the range of $[\frac{b-c}{a-d+b-c}, 1]$. For example, assuming that the probability of the initial selection of "immersive experience" is equal to "online technology", letting $\frac{b-c}{a-d+b-c} < \frac{1}{2}$, there is a greater chance for educational entities to dynamically evolve to a Pareto optimal equilibrium. If superior educational organizations fail to pay attention to the actual payoffs of all entities undertaking ESD under different strategic choices in the management process, then various strategic decisions that aim to promote the connotation of ESD may be difficult.

Previous studies have focused more on the importance of online technology [16], the propensity to instrumental value [17], the impact on higher-order thinking ability [20] and the veiling of the original intention of humanism [21]. In terms of the value orientation of ESD, it mostly focused on some basic connotations of humanized beginnings [27,30,36–38] and approaches that promote emancipatory transformative learning [42]. However, these studies have only stayed in a single perspective to think about issues and failed to examine

the participants' payoffs and the evolutionary trends of strategy choices from the perspective of relationships. This study is based on the basic research stance and hypothesis, making deductive analysis through models by identifying stable equilibrium points and their trends in the gaming phase diagram to provide supporting evidence for ESD policy making and behavioral choices.

Due to the cultural differences, ways of thinking, educational conditions of countries around the world, as well as the differences in development issues faced by different countries, there are significant differences in terms of educational goals, learning content and education organization methods of sustainable development education. Copying and squashing are not in line with the requirements for the implementation of sustainable development strategies, nor are they sustainable education strategies, because multiculturalism and biodiversity are the content of implementing sustainable development strategies. The result of this study shows that simply pointing out the drawbacks of ESD online technology investment and the importance of humanistic value can reveal some problems but is not enough to solve them. Rather, it is only by placing it in the context of a relational impact horizon that problems in practice and potential avenues for development can be better identified.

7. Conclusions: The Return of ESD Humanistic Value

We conducted a game model analysis on the value choices of educational entities in the context of ESD by defining the connotation of ESD and analyzing the manifestations and payoffs of its different value orientations. Based on the bounded rationality of the participants, this study constructs random pairing and repeated games of all educational entities in the evolutionary game framework of the binary static game, thereby obtaining the game phase diagram of the dynamic change of value selection.

Adaptation is the best and a country's ESD could consider jumping from the development model that traditional education adopts, putting too much emphasis on the theoretical system construction. Instead, it should start from those concrete education issues which urgently need to be solved with the theory of sustainable development, combined with the understanding of the above proposed meaning, and make the necessary choices.

7.1. Theoretical and Practical Implications

In reality, utilitarianism cannot eliminate people's utilitarian desire in their practical course as well as the contradiction for the supply of limited resources in nature. The instrumental value tendency of educational entities means that their adopted approaches (such as online technology) can directly meet sustainable development needs and utility for individual and groups of learners. Over time, the arrogation of instrumental rationality and the excessive pursuit of utilitarianism go beyond the legitimacy of the use of online technology itself. The humanistic meaning of "focus thing" mentioned by Borgmann would also be replaced by the technical thought of a "device paradigm". Technical logic obscures people's emotions, since people's reliance on technology has reached an unprecedented level, so that they automatically give up their human intuition and experience. Additionally, the real purpose of ESD would also lack implementation. All these problems make the understanding towards ESD value or even the whole practice of ESD have a kind of utilitarian imperfection.

The theoretical implication of this study is that, on the one hand, it expands the applicable context and theoretical scope of technological philosophy by combining it with the idea of ESD. Additionally, ICT itself does not have an ethical tendency, but the possibility of unveiling or veiling, with the subjective item being the key to determine this tendency. The idea of sustainable development requires sustainability and complexity, as well as diverse educational activities to explain it, with online technology being the effective way to achieve this goal. At the same time, ESD's connotations of presence, engagement and experience form a paradox with its pace to achieve this goal. Therefore, the application of philosophical ideas of technology in this study further suggests that new forms of

online technology may bring new structures of practice, but the original "focus thing" and experiential forms of practice are still worthy of our concern. On the other hand, this study expands the static model of the game of participating entities. Applying the dynamic model of the evolutionary game to ESD by constructing a differential equation [46], it discovers causes of problems in the value choice game. This extension of the theoretical model is more applicable to the actual changing and complex situation of ESD, enriching the connotation of this study and stepping out of the limitations caused by single-perspective thinking.

The research findings also provide practical implications. As mentioned in the Introduction, in the context of the current pandemic, ICT and online technologies have become a necessity in the educational context. At the same time, the relationship between online technology and ESD has become simultaneously strained. The study argues that ESD can only put SD knowledge and competencies into practice and closely integrate them with the destiny of future human development if it focuses on the experience of real situations rather than indulging in the paradigm of technology. Based on the above theoretical and practical contributions, this study makes the following recommendations.

7.2. Recommendations

7.2.1. The Strengthening of ESD Value Selection's Benefit Guidance

From the perspective of relationships, the realistic value of ESD is the satisfaction of a learner's educational needs for sustainable development, but the learner's needs only cannot produce realistic value. There are also constraints such as the learner's knowledge, ability, interest and willingness [19]. For example, the transience of an individual's daily life, the limitation of activities' scope and the gradual evolution of ecosystems are greatly different in time and space. In the case of lacking scientific knowledge and personal experience, it is self-evident that it is difficult for learners to understand the environmental value and establish the belief of ecosystem value through sustainable development education activities. At this time, if online technology is widely involved, no doubt every learner can obtain the cognition of sustainable development at the level of education. This is also in line with the usefulness understanding mode in the value relationship, which makes the connection between the educated and economy as well as the nature objective and concrete. At this moment, for every participating entity in the game, the choice of instrumental value is a better strategy than the choice of humanistic value.

Therefore, any ESD policy should reinforce the guidance of ESD value selection. On the one hand, we should set up some good models for humanistic value selection and make immersive experiences become a demonstration through active advocacy, since "all kinds of experience and thinking between man and nature are the basic content of education in human history" [47]. On the other hand, policies need to give more spiritual and material rewards to those representative humanistic value strategies, making that choice provide intended benefits that every educational entity can see, so as to lead the evolution of the value game's return to a humanistic orientation.

7.2.2. The Integration of ESD Online Technology Should Be Aligned with Its Essential Attribute

The humanistic value choice of ESD is a kind of purpose. The teleological rationality lies in the deep reflection on the purpose of ESD and the all-round control of the harmonious meaning of sustainable development. No entity participating in the game is in a state of "complete rationality" before the beginning, but "limited rationality", so the result of dynamic replication may not be optimal (for example, the initial selection ratio falls between $[0, \frac{b-c}{a-d+b-c}]$). This just explains why we have widely publicized the connotation of sustainable development, and SD's humanistic value orientation has profound significance for individuals and society, but the final game entity may not follow this choice. Therefore, it is a very arduous task for sustainable development education to focus on the long-term effect of educational practice with the orientation of humanistic value. The completion of this task requires the joint efforts of every educational organization and individual, and continuous external forces are especially needed for the guidance of theory and practice.

The essence of ESD is sustainable, but the application and development of online technology is practical and efficient. Online technology itself does not directly cause alienation, nor is it directly contrary to generation. The logic of technology does not possess "human attributes" such as "foresight, intuition, creativity, rationality or irrationality". Rather than saying online technology has framed the way people behave in ESD and the corresponding pedagogical models, people are actually satisfied with the perfection and convenience of technology and rely on it to an unprecedented degree. With the condition of intelligent computing, the labor of educators will also be transformed into a sport [48]. When technological consumerism prevails, online technology influences human thinking patterns. Hence, instead of adopting higher-order modes of thinking that can be possessed under immersive experiential choices such as creativity, reflection and critique, educators and learners will instead indulge in the thrill of facilitated technology. Online technology platforms redefine the concept of learning, simplify the forms of learning and weaken the connotations of learning to better accommodate the educational technology revolution theory [49,50]. Thus, online technology always influences higher-order thinking through people and is framed within a "human–technology" structure. Moreover, AI is currently far inferior to human intelligence at the linguistic, thinking and cultural levels, i.e., at the higher-order cognitive levels [51]. Therefore, it is important to take full advantage of the moderating function of online technology between humans and the real world, rather than seeing it as the leading role. Only by transcending the shackles of simplified and reductive stylized thinking can online technology be integrated into the specific teaching purpose, teaching situation and teaching process from the perspective of complexity and generation. ESD participants are able to develop higher-order thinking skills such as reflection, critique, creativity, decomposition and integration in authentic immersive experiences, making the use of online technologies more theoretically and practically relevant.

From this point of view, ESD should pay more attention to the humanization of educational objectives, the contextualization of educational content, the experience of the educational process and the rationalization of educational technology, so as to truly draw everyone's attention to ESD's essential attributes—respect, responsibility, professional competency and the value bearing of the "immersive experience". It is far from enough to let these entities participate in the game to understand these connotations by themselves, and numerous theories of humanistic and utility value also need to be transformed into effective policies and plain educational texts and, hence, to truly realize the return of humanistic value orientation.

8. Research Limitations and Future Research Directions

There are some limitations in this study. First, the matching degree between the game theory model and the real world needs to be tested empirically. As a normative study, this study uses dynamic evolutionary game models to deduce equilibria that match real-world situations based on the assumption of participants' bounded rationality as much as possible. However, the real world is more complex and changeable. Research in future needs to operationalize variables and further validate the game model by collecting empirical data. In addition, this study divides the behavioral choices of participants in ESD into two, which is often not the case in reality. Therefore, future research should consider including other choice strategies between the two choices to enhance the accuracy of the mathematical game model.

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