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Evaluation of the Coupling and Coordination Relationships between Economic Growth and the Ecological Environment in Qinghai Province

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Abstract: ***Qinghai Province shoulders the important task of maintaining national ecological security. To promote the construction of an "ecological civilization pilot zone", it is necessary to coordinate the economic growth and ecological environment of the province. This paper uses panel data from 2008--2018 to construct an indicator system from the two dimensions of economic growth and ecological protection and uses the entropy method and coupling coordination model to measure and evaluate the development level of Qinghai Province's economy and ecological protection. The results show that (1) from 2008–2018, the changes in the coupling degree and coupling coordination degree of the two systems of economic growth and ecological protection in Qinghai Province basically showed a steady upward trend. (2) From 2008--2015, the degree of economic–eco-ecological coupling was in the antagonistic stage, and the degree of coupling coordination tended to change from moderate to mild. (3) From 2016 to 2018, the degree of coupling was in the running-in stage, the degree of coupling coordination was stable under mild imbalance, and there was a trend toward near-disharmony and coordinated development, indicating that the coordinated development level of the economy and ecology has moved toward coordinated development.***

Keywords: Entropy method; Coupling coordination model; Economic growth; Ecological protection; Qinghai Province.

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1. Introduction

As an important ecological barrier in China, Qinghai Province shoulders the important task of maintaining national ecological security. To build an "ecological civilization pilot zone", the coordinated development of economic growth and ecological protection is extremely important. Rachel Carson (1962) first proposed the issue of coordination between economic development and the environment [1]. Dasgupta & Heal [2] incorporated environmental factors into the economic growth theory model to study the relationship between the economy and ecology. Gao Hongxia et al. [3] used panel data from various provinces to conduct an empirical analysis of the environmental Kuznets curve of the relationship between economic growth and environmental pollution. In studies of the level of coordinated development of economic growth and the ecological environment, scholars have mostly measured and evaluated the degree of coordination at the river basin level and provincial level.

At the basin level, scholars have paid more attention to the degree of coupling coordination between economic growth and ecological protection in the Yellow River Basin. Zhang Rongtian et al. [4] took the Pan-Yangtze River administrative region as an example, used the entropy method to analyze the coupling coordination between economic development and the ecological environment and its evolution rules, and conducted a score ranking. Wang Wei [5] analyzed the ecological protection quality and economic development level of the Yangtze River Economic Belt on the basis of a comprehensive evaluation model and used the coupled coordination degree model to analyze its spatiotemporal evolution rules. Ren Baoping [6] is based on three factors: economic growth, industrial development and the ecological environment. The dimensions are used to evaluate and analyze the

degree of coupling coordination and its driving factors in the Yellow River Basin, and the GM prediction model is used to predict the degree of short-term coupling coordination. Zhang Xiaoyu et al. [7] constructed an indicator system from two dimensions: economic growth and the ecological environment. An analysis of the coupling and coordination of economic growth and environmental protection in nine provinces where the Yellow River flows revealed that, except for Qinghai Province, the degree of coupling and coordination in the other provinces has gradually increased. At the provincial level, Guofeng et al. [8] used the entropy method to conduct a coupling study of economic integration and sustainable development of the ecological environment in the three northeastern provinces and observed their temporal changes. Xie Qiang et al. [9] conducted research and analysis on the ecological environment and economic development of Gansu Province by constructing a coupling model and a coupling coordination model between the quality of the ecological environment and the economic development level. Xue Jing et al. [10] analyzed the coupling coordination degree of Gansu Province and its 14 municipalities in terms of time and space and reported that the comprehensive development level is increasing annually.

There are few studies on the coupling coordination between economic growth and the ecological environment in Qinghai Province. Zhao Yingyan et al. [11] used a modified ecological footprint model to study and analyze the ecological and economic coordination in Qinghai Province. The results revealed that the ecological environment was extremely unsafe and that economic and ecological coordination was very poor. Hu Xiwu et al. [12] used the coupling coordination model and VAR model to study and analyze the coordination between economic development and ecological protection in Qinghai Province and the influencing factors by industry. Jia Haifa et al. [13] used the entropy method and the coupling coordination model to evaluate and analyze the comprehensive development level of the ecological civilization in Qinghai Province from the three dimensions of economic development, social progress and ecological environment protection. This paper uses the entropy method and the coupling coordination model to establish two systems of economic growth and the ecological environment; establishes six subsystems, namely, economic level, economic structure, economic vitality and ecological foundation, environmental pressure and environmental governance; and conducts a comprehensive analysis and evaluation of the coordinated development level of economic growth and the ecological environment.

2. Overview of the Study Area

Qinghai is located between 31°36′ and 39°19′ north latitude and 89°35′ and 103°04′ east longitude. It borders Gansu in the north and east, Xinjiang in the northwest, Tibet in the south and southwest, and Sichuan in the southeast. It is located northeast of the Qinghai–Tibet Plateau and has an average altitude of more than 3,000 m and an average annual temperature of -5.1–9.0°C. It is named after the largest inland saltwater lake in the country, Qinghai Lake. Qinghai Province is divided into agricultural and pastoral areas with the Sun and Moon Mountains as the natural dividing line. Since four-fifths of the area is a plateau, the pastoral area is the main area. Qinghai Province has Sanjiangyuan National Park, Qilian Mountain National Park and Qinghai Lake National Nature Reserve and is a national highland for the construction of an ecological civilization.

3. Data Sources and Research Methods

3.1 Data Sources

The data used in this study are from the China Statistical Yearbook and the Qinghai Statistical Yearbook. The selected data range is from 2008--2018. The missing data in some years are calculated appropriately via arithmetic means and other methods. The data processing process was performed via Excel and Stata 16.0 software.

3.2 Entropy Weight Method

3.2.1 Data standardization

To eliminate the impact of the differences in the dimensions and magnitudes of the indicators, the indicators are first normalized to the minimum and maximum values. This paper refers to the approach of Zhang Xiaoyu et al. [7] and performs a 0.001 shift on the data.

$$\text{Positive indicator: } H_{ij}=\frac{X_{ij}-min(X_{ij})}{max(X_{ij})-min(X_{ij})}+0.001 \quad (1)$$

$$\text{Negative indicator: } H_{ij}=\frac{max(X_{ij})-X_{ij}}{max(X_{ij})-min(X_{ij})}+0.001 \quad (2)$$

where Xij is the jth indicator under the i-th system, H_{ij} is the value after normalization, and n is the number of indicators. Since there are 11 indicators, the value range of n is 1–19.

3.2.2 Use the entropy weight method to calculate the eigenvalue proportion P_{ij} of the j-th indicator in the i-th year

$$P_{ij}=\frac{H_{ij}}{\sum_{i=1}^{n} H_{ij}} \quad (0\le P_{ij}\le 1) \quad (3)$$

3.2.3 E_j of the index according to the entropy calculation formula.

$$E_j=-k\sum_{i=1}^{n} P_{ij} lnP_{ij} \quad (0\le E_j \le 1) \quad (4)$$

where k > 0, ln is the natural logarithm, the constant k is related to the sample number n, and k = 1/lnn.

3.2.4 Calculating the difference coefficient D_j of the j-th indicator on the basis of information entropy

$$D_j=1-E_j \quad (5)$$

3.2.5 Use the difference coefficient to calculate the weight W_j of the j-th indicator

$$W_j=\frac{D_j}{\sum_{i=1}^{n} D_j} \quad (6)$$

Among them? $\sum_{=1}$ □□, =1.

3.2.6 Weighted summation to calculate the comprehensive evaluation score

$$U_i=\sum_{i=1}^{n} Y_{ij} W_j \quad (7)$$

The higher the U value is, the higher the comprehensive score and the more favorable the evaluation result. Finally, the evaluation results are compared on the basis of all U values.

3.3 Coupling Coordination Model

$$C = 2 \times \left[\frac{U_1 U_2}{(U_1+U_2)2}\right]^{\frac{1}{2}} \quad (8)$$

$$T = \alpha U_1 + \beta U_2 \quad (9)$$

$$D = \sqrt{C \times T} \quad (10)$$

where C is the coupling degree of the two systems, reflecting the intensity of the interaction between the systems; T is the comprehensive coordination index of the two systems; and α and β are the weights of the two systems. Since both are equally important in the coordinated development of economy and ecology, α = β = 0.5 is taken, and D is the coupling coordination degree of the two systems. The higher the D value is, the higher the coupling coordination level, and vice versa.

4. Construction of the evaluation index system

4.1 Construction of the economic growth evaluation index system

This paper draws on existing research results [7-10] and, on the basis of the principles of indicator selection, reflects economic growth in three dimensions—economic level, economic structure, and economic vitality—and reflects the ecological environment in three dimensions—ecological foundation, environmental pressure, and environmental governance—as shown in Table 1.

(1) Economic level: GDP per capita, local fiscal general budget revenue, and total retail sales of consumer goods.
(2) Economic structure: the proportion of secondary industry, the proportion of tertiary industry, and the difference in per capita disposable income of urban and rural residents.

(3) Economic vitality: Growth rate of fixed asset investment, total import and export volume of foreign-invested enterprises, and total export volume.

4.2 Construction of the Ecological Environment Evaluation Index System

This paper draws on existing research results [11-13] and reflects the ecological environment in three dimensions, namely, the ecological foundation, environmental pressure, and environmental governance, on the basis of the principle of indicator selection, as shown in Table 1.

(1) Ecological basis: forest coverage, per capita water resources, and per capita cultivated land area.

(2) Environmental pressure: Sulfur dioxide emissions, smoke (dust) emissions, and total wastewater emissions.

(3) Environmental governance: Completed investment in industrial pollution control, daily urban sewage treatment capacity, and the harmless treatment rate of domestic waste.

Table 1: Index system and weights of economic growth and ecological environment protection in Qinghai Province

System Layer	Criteria Layer	Serial number	Indicator layer	Indicator Type	Weights
Economic Growth	economic level	1	per capita (yuan/person)	+	0.0507
		2	Local fiscal general budget revenue (100 million yuan)	+	0.0467
		3	Total retail sales of consumer goods (100 million yuan)	+	0.0499
		4	Industrial added value (100 million yuan)	+	0.0516
	economic structure	1	Proportion of secondary industry (%)	+	0.0441
		2	The proportion of the tertiary industry	+	0.0489
		3	Difference in per capita disposable income between urban and rural residents (yuan)	+	0.0507
	Economic vitality	1	Fixed asset investment growth rate (%)	+	0.0567
		2	Total import and export volume of foreign-invested enterprises (thousand US dollars)	+	0.0712
		3	Total export value (10,000 USD)	+	0.0528
ecosystem	Ecological foundation	1	Forest cover rate(%)	+	0.0384
		2	Per capita water resources (cubic meters/person)	+	0.0487
		3	Per capita cultivated land area (hectares/10,000 people)	-	0.0528
	Environmental pressure	1	Sulfur dioxide emissions (10,000 tons)	-	0.0775
		2	Smoke (dust) emissions (10,000 tons)	-	0.0561
		3	Total wastewater discharge (10,000 tons)	-	0.0449
	Environmental governance	1	Completed investment in industrial pollution control (10,000 yuan)	+	0.0610
		2	Daily urban sewage treatment capacity (10,000 cubic meters)	+	0.0521
		3	Harmless treatment rate of domestic waste (%)	+	0.0454

5. Results and Analysis

5.1 Comprehensive Measurement and Result Evaluation of Economic Growth and Ecological Protection in Qinghai Province

According to the various indicators of Qinghai Province from 2008--2018, the entropy method was used to calculate the weight coefficients of various indicators in the evaluation system of economic growth and ecological protection in Qinghai Province. The results are listed in Table 1. The comprehensive evaluation values of the three subsystems of economic growth and ecological protection were calculated via formulas (1) - (7), as shown in Tables 2 and 3. Table 2 and Figure 1 show that the comprehensive evaluation values of each subsystem of Qinghai Province's economic level, economic structure and economic vitality increased from 2008--2018, and the level of economic growth also showed an increasing trend, indicating that Qinghai Province's economy has been growing continuously from 2008--2018 and that its economic level, economic structure and economic vitality have improved to a certain extent.

Table 2: Comprehensive evaluation values of economic growth in different years

years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
economic level	0.0002	0.0085	0.0289	0.0587	0.0811	0.1044	0.1203	0.1352	0.1495	0.1710	0.1990
economic structure	0.0375	0.0450	0.0426	0.0576	0.0601	0.0551	0.0600	0.0809	0.0966	0.1085	0.1139
Economic vitality	0.0914	0.0911	0.0653	0.0823	0.0616	0.0730	0.0586	0.0617	0.0425	0.0099	0.0118
Economic growth level	0.1291	0.1446	0.1368	0.1985	0.2028	0.2325	0.2389	0.2778	0.2885	0.2894	0.3247

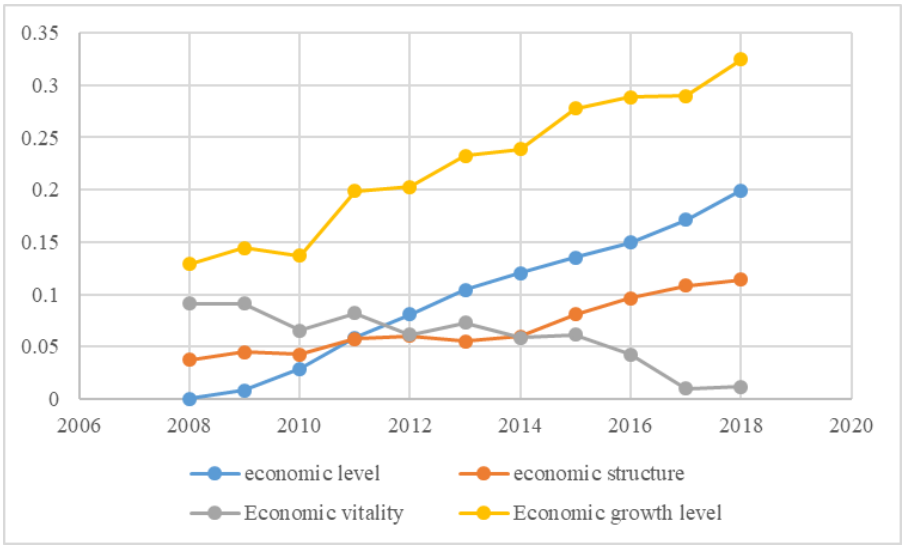

Figure 1: Trends in comprehensive evaluation values of each subsystem of economic growth in Qinghai Province from 2008--2018

Table 3 shows that the ecological foundation of Qinghai Province in 2008--2018 was evaluated at a high level in 2009, 2010 and 2018: the environmental pressure evaluation value has been decreasing since 2008, and it has not gradually increased until 2016, indicating that the environmental pressure is gradually decreasing; the environmental governance evaluation value has fluctuated each year, indicating that the governance of the environment is unstable. The ecological environment development level fluctuated in the early stage and rose slowly in the later stage, indicating that the ecological environment has gradually improved and developed in recent years.

Table 3: Comprehensive evaluation values of the ecological environment in different years

years	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Ecological foundation	0.0573	0.1265	0.1104	0.0555	0.0813	0.0457	0.0819	0.0506	0.0585	0.0854	0.1100
Environmental pressure	0.0908	0.0825	0.0717	0.0594	0.0541	0.0464	0.0245	0.0238	0.0821	0.0772	0.1225
Environmental governance	0.0159	0.0141	0.0064	0.0704	0.0657	0.0584	0.1019	0.0972	0.1587	0.0881	0.1006
Ecological environment development level	0.1640	0.2231	0.1885	0.1852	0.2011	0.1505	0.2083	0.1716	0.2993	0.2506	0.3331

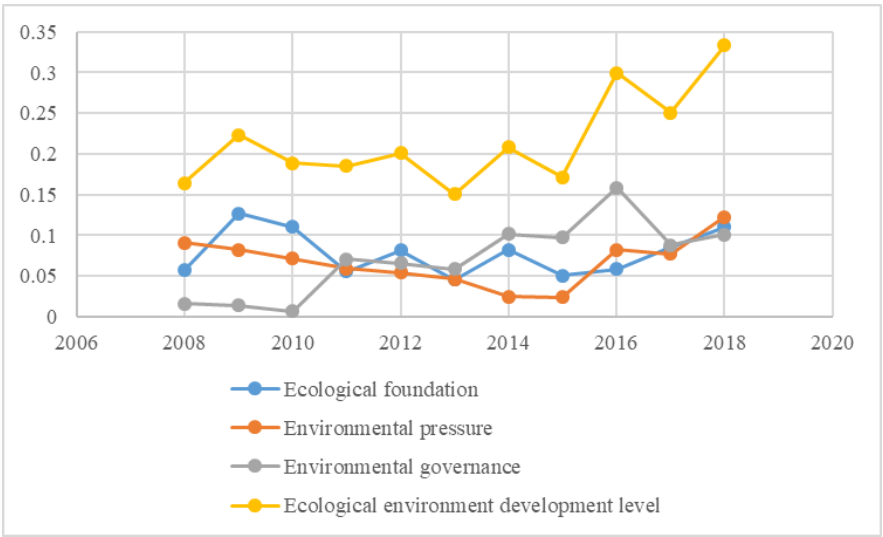

Figure 2: Trends in comprehensive evaluation values of ecological environment subsystems in Qinghai Province from 2008--2018

5.2 Coupling Coordination Analysis

This paper refers to the coupling degree and coupling coordination degree classification of Hu Xiwu et al. [12]

and divides the coupling degree into 4 levels and the coupling coordination degree into 10 levels, as shown in Table 4. On the basis of the comprehensive evaluation value of economic growth and ecological protection in Qinghai Province from 2008--2018, the coupling degree and coupling coordination degree of economic growth and ecological protection are calculated via formulas (8)–(10), as shown in Table 5, and its development trend is shown in Figure 3.

Table 4: Classification of the degree of coupling and degree of coupling coordination

C	Coupling level	D	Coordination level	D	Coordination level
[0.0-0.3]	Low level coupling stage	[0.0-0.1)	Extremely disordered	[0.5-0.6)	Barely coordinated
[0.3-0.5)	Antagonistic phase	[0.1-0.2)	Serious disorder	[0.6-0.7)	Primary Coordination
[0.5-0.8)	Running-in phase	[0.2-0.3)	Moderate Disorder	[0.7-0.8)	Intermediate Coordination
[0.8-1.0]	High level coupling stage	[0.3-0.4)	Mild disorder	[0.8-0.9)	Good coordination
		[0.4-0.5)	On the verge of disorder	0.9-1.0)	High-quality coordination

As shown in Table 5, the degree of coupling between economic growth and ecological protection in Qinghai Province remained between 0.3 and 0.5 from 2008--2015, which was in the antagonistic stage. It reached the running-in stage after 2016, indicating that the degree of coupling between the economy and ecology in Qinghai Province was relatively low and needs to be further improved. The coupling coordination degree gradually shifted from moderate imbalance to mild imbalance and then reached the verge of imbalance. The trend chart also steadily increases, which means that the coordination level of the economy and ecology in Qinghai Province is constantly improving and that the construction of an ecological civilization is playing a role.

Table 5: Types of coordination between economic growth and the ecological environment in Qinghai Province from 2008--2018

years	Coupling	Coordination Phase	Coupling coordination	Coordination Type
2008	0.3800	Antagonistic phase	0.2360	Moderate Disorder
2009	0.4188		0.2775	
2010	0.3982		0.2545	
2011	0.4378		0.2898	Mild disorder
2012	0.4494		0.3012	Moderate Disorder
2013	0.4275		0.2862	
2014	0.4717		0.3247	Mild disorder
2015	0.4606		0.3217	
2016	0.5421	Running-in phase	0.3992	
2017	0.5183		0.3741	On the verge of disorder
2018	0.5734		0.4343	

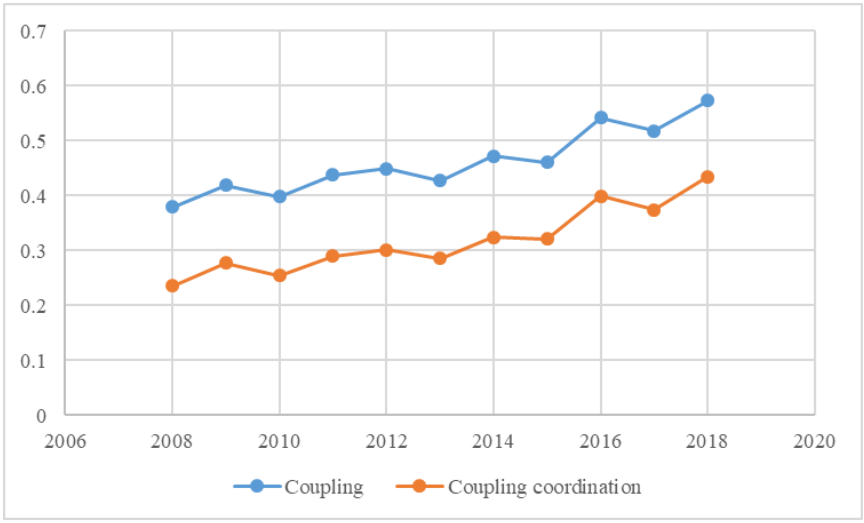

Figure 3: Trend of coordination between economic growth and ecological protection in Qinghai Province from 2008--2018

6. Conclusion and Discussion

6.1 Conclusion

From the two dimensions of economic growth and ecological protection, this paper established six subsystems, namely, economic level, economic structure, economic vitality and an ecological foundation, environmental pressure, and environmental governance. A total of 19 indicator factors were selected. The entropy method was

used to comprehensively evaluate the coordinated development level of economic growth and ecological protection in Qinghai Province from 2008--2018. The coupling degree and coupling coordination degree model were used to evaluate the comprehensive value and measure the coordination level. The conclusions are as follows:

(1) From 2008–2018, the economic growth and development level of Qinghai Province made great progress, and the economic level, economic structure and economic vitality steadily improved, which is conducive to the further development of Qinghai's economy in the future. The ecological environment is also constantly improving, especially the rapid development of the ecological foundation, and the environmental pressure and environmental governance level are also gradually improving and developing, which is of great help to Qinghai Province in further building an "ecological civilization highland". However, the comprehensive evaluation value of economic growth and the ecological environment is relatively low. Therefore, in future ecological civilization construction, we should continue to increase the governance of the ecological environment, improve people's living environment, and improve the level of Qinghai's economic development.

(2) From 2008–2018, the changes in the degree of coupling and degree of coupling coordination of the two systems of economic growth and ecological protection in Qinghai Province basically showed a steady upward trend. From 2008–2015, the degree of economic–ecological coupling was in the antagonistic stage, and the degree of coupling coordination tended to change from moderate coordination to mild coordination. From 2016–2018, the degree of coupling was in the running-in stage, the degree of coupling coordination was stable in mild imbalance, and there was a trend toward near-disharmony and coordinated development, indicating that the coordinated development level of the economy and ecology had moved toward coordinated development.

6.2 Discuss

Scholars have conducted many evaluations and measurements of the coordinated development level of economic growth and the ecological environment in various river basins and provinces. However, as a major province in terms of ecological civilization construction, Qinghai Province has few research results, and the existing research lacks a detailed division of subsystems. This paper uses the coupling coordination model to measure the coupling coordination level of economic development and ecological protection in Qinghai Province, which can provide a reference for the measurement of economic and ecological levels in other regions in the future. However, owing to the difficulty in obtaining data and the imperfection of the construction of a certain indicator system, further improvements can be made in the future to conduct in-depth research on the coordinated development level of economic growth and the ecological environment in Qinghai Province.

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Feasibility, Difficulties and Countermeasures of Mixed-age Education in Coastal Cities

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Abstract: ***One of the basic concepts of mixed-age education is that a kindergarten class is similar to a warm family. In such a family, there are children of different ages who live together like brothers and sisters, playing and learning together. Since each child is a member of this family, they also have their own living space and preferences. Against the specific regional background of China's coastal cities, it is of great practical significance to conduct in-depth exploration into the implementation of mixed-age education. It is necessary for us to systematically analyze the advantages and disadvantages of mixed-age education as well as its feasibility in coastal areas. From the perspective of advantages, coastal areas are often relatively developed economically, with relatively rich educational resources. Parents generally have a relatively high level of education and are more receptive to advanced educational concepts, which provides a good material foundation and conceptual support for the implementation of mixed-age education. The advantages of mixed-age education, such as cultivating children's social communication skills, enhancing empathy, and promoting the complementarity of knowledge among different age groups, are also expected to be brought into fuller play here. In China's coastal cities, we will analyze the advantages and disadvantages of mixed-age education, its feasibility in coastal areas, as well as the drawbacks in its application in coastal areas and the corresponding optimization methods. Combining the characteristics of the Minnan region, we will organically integrate them into the mixed-age education in kindergartens so that they can promote and grow with each other. We will analyze the factors of families, society and kindergartens, and strive to expand and deepen the reform of mixed-age education.***

Keywords: Preschool children; Mixed-age education; Eastern coastal cities; Class arrangement; Interaction among children of different ages.

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1. Introduction

1.1 Research Thought Process

Consult materials: Browse relevant knowledge in libraries and on CNKI, then integrate and conduct scientific analysis of the relevant materials.

1.2 Research Contents

The main research questions in this thesis are as follows:

What is mixed - age education?

What are the characteristics of mixed - age education?

Analysis of the necessity and feasibility of implementing mixed - age education in China's coastal cities.

1.3 Research Objects

The research objects of this study are the small classes of Xiamen North Station Kindergarten in Xiamen City, including teachers and children. I observed the class situations and interactions among children in the mixed - age classes to study the problems and advantages of mixed - age education.

1.4 Research Methods

Observation method: Record the daily activities in the kindergarten, the living habits and social interactions among children of different ages, and the measures taken by teachers to deal with the contradictions and problems among children of different ages for further research.

1.5 Recognition and Views of Mixed - age Education as a Normal University Student

Mixed - age education is an organizational form or a class arrangement that may occur in kindergarten classes. The so - called mixed - age education refers to arranging children with an age difference of more than 12 months in the same class, allowing children of different ages and different physical and mental development stages to conduct social interactions and knowledge learning in the same environment. Through the investigation of materials and literature related to mixed - age education and preschool education, such as CNKI and China After - school Education Newspaper, I learned that mixed - age education arranges children of different age stages in the same class, allowing them to learn knowledge and play games together. Compared with the same - age education chosen by most kindergartens, mixed - age education is a teaching method that is more conducive to the all - round development of children. Montessori believes that arranging young children in the same - age class will limit their development because they cannot experience the real social state. Therefore, it has many advantages that the same - age education cannot provide. As a preschool normal university student living in a coastal city, I want to stand on my own position to conduct a reasonable and scientific analysis of the implementation of mixed - age education in coastal cities. Teachers can macroscopically grasp the development layout of the class and can also meticulously observe different children of different ages and teach students in accordance with their aptitude. After understanding the individual differences of each child, they can conduct targeted education, which conforms to the concept of individualized education advocated at present. At the same time, the trade and economic development in coastal cities is relatively good. The economic base determines the superstructure. Therefore, the education level in coastal cities is also relatively high, and people have a higher degree of recognition and acceptance of higher - level education. From a broader perspective, mixed - age education makes up for the weaknesses of the same - age education and can also meet the needs of one - child families for social education of children of different age groups. I observed mixed - age education during my internship and became very interested in the knowledge related to mixed - age education. This also prompted me to study relevant knowledge hard, live up to the teacher's teachings, conduct further research on mixed - age education, and hope to make my own contribution.

2. Literature Review

Since 2020, some scholars at home and abroad have begun to pay attention to and strengthen the research on mixed - age education. For example, Gong Weixin and Shen Minghong conducted research on the significance and challenges of implementing Montessori mixed - age education in kindergartens in China in the "New Curriculum Research"; Zhang Jing (2022) conducted an in - depth analysis of people - centered mixed - age education and explored kindergarten mixed - age education and preschool education reform in the context of the "New Curriculum Reform Education Theory", which coincides with the inspiration of Li Xin's "Practical Exploration of American Preschool Mixed - age Education"; Xing Yu's "Research on the Strategies for Solving Peer Conflicts of Children in the Context of Mixed - age Education" carried out practical research on mixed - age education in Fujian Province with the focus on promoting the popularization of mixed - age education teaching through mechanism innovation.

These research achievements have played a good role in confirming the current situation of mixed - age education in China and improving the competitiveness of mixed - age education in China. However, there is still a need for further discussion on the existing basis: for example, the current research mainly focuses on the qualitative analysis of the competitiveness of mixed - age education in China from the perspective of education, and there is relatively little research on the families and teachers behind it. Multi - dimensional, multi - perspective, and multi - data research on mixed - age education in China is conducive to reasonably positioning the development level of mixed - age education in China, finding potential risks and the gap with developed countries, and formulating appropriate industrial development policies accordingly, promoting the optimization of the industry layout and structure of

mixed - age education in China, improving resource utilization efficiency, and maximizing the use of mixed - age education to promote the development of basic education in China.

3. Overview and Theoretical Basis of Mixed - age Education

3.1 Definition of Mixed - age Education

Mixed - age education arranges children with an age difference of more than 12 months in the same class, allowing children of different ages and development levels

3.2 Basic Concept of Mixed - age Education

The class in a kindergarten is like a warm - hearted small organization, with children of various ages living together like brothers and sisters, playing and learning together. Since each child is a part of this family, children also have their own living space and preferences.

3.3 Theoretical Basis of Mixed - age Education

In Piaget's cognitive development theory, Piaget believes that any cognitive process contains a certain cognitive development structure. They are schemas, assimilation, accommodation, and equilibrium respectively. Schemas initially come from congenital inheritance. When an individual begins to be exposed to the influencing factor of the environment, then the individual will continuously change and enrich the schemas in the process of adapting to the environment. With the increase of children's age and physical and mental development, the types and contents of schemas will inevitably become more abundant and diverse, and will change from simple to complex. Accommodation refers to the stage when the assimilative structure or schema changes due to the factors it assimilates. In other words, it is the process of adapting to the environment by changing the original schema or creating a new schema. From Piaget's cognitive theory, we can see that the role of the environment is crucial in the development stage of children. Children of different ages observe different things and are affected to different degrees, and their acceptance of knowledge in class is also different, which results in different degrees of mastery of the same lesson among children. However, because of the processes of schemas, assimilation, accommodation, and equilibrium, children can also form a teaching and learning relationship. This means that older children can assume the role of teachers. In the process of their mutual communication, younger children can acquire knowledge through repeated stimuli from different people and have a more profound memory of the knowledge.

In Bandura's social learning theory, Bandura believes that there are two different processes of behavior acquisition: one is the process of obtaining behavior response patterns, which is obtained through direct experience. Bandura calls this process of behavior acquisition "learning through the results of responses", that is, direct experience learning; the other is the process of learning behavior by observing the behavior of demonstrators. Bandura calls it "modeling learning", that is, indirect experience learning. Therefore, for things that teachers encourage, children are guided to do through the demonstration of older children.

4. Feasibility Analysis of Mixed - age Education in China's Coastal Cities

4.1 Internal Advantages of Mixed - age Education in China's Coastal Cities

Older children can help younger children and benefit from their activities. They have a happy experience in helping children. Research has found that peer teaching has a positive impact on children in the role of educators. They are more willing to help each other because they have helped others and received praise from adults. The setting of mixed - age classes with a large age span not only has the advantages of large and small scales but also solves the problem of children in some double - income families being unattended, eliminating the concerns of parents. It also allows students to have a place for collective activities after school. Mixed - age education expands the contact range of children and enables them to interact with children of different ages. The class is the prototype of society. In a class, there are children of different ages. They are like brothers and sisters. This family - like class arrangement can provide children with more role experiences and promote the development of role tolerance. With the development of society, there are more and more only children. It is a recognized problem that only children can adapt to society. This family - like class arrangement plays a very important role in overcoming the problem of poor social adaptability of only children. Through interaction and life with peers of different ages, children learn correct attitudes and communication skills with others, overcome egoism, cultivate good social behaviors, and lay

a good foundation for the formation of a positive and healthy personality.

4.2 Internal Disadvantages of Mixed - age Education in China's Coastal Cities

The design and implementation of educational plans are relatively complex. Teachers should master the different development stages of each child and be able to group children accurately and appropriately. Then we teach according to the characteristics of children: sometimes we group children according to their age or ability, and sometimes we put forward different requirements for the same content. This operation is very difficult, resulting in ordinary teachers being unable to conduct mixed - age education and easily wasting time. Some educational activities for the same age group only require one unit of time, while educational activities for mixed - age groups require several units of time to complete. Some children will never achieve anything without good organizational skills. Mixed - age education often makes older children competitive, affecting their development and self - confidence. On the contrary, teachers often pay more attention to children and have lower requirements for older children, which affects the development of older children to a certain extent.

4.3 External Opportunities of Mixed - age Education in China's Coastal Cities

The traditional form of collective education has obviously fallen behind. Mixed - age education requires more open and personalized education, allowing children to learn freely and think fully. The development direction conforms to the needs of the times. Mixed - age education for "only children" and "double - worker families" has great development potential. Mixed - age education is rare in China. In a diversified world, people of different ages have rich imagination and experimental space.

4.4 External Threats of Mixed - age Education in China's Coastal Cities

Compared with the pioneers of mixed - age education in Western Europe, China's economic development is unbalanced, and kindergartens have relatively low requirements for housing, teachers, and other conditions. Villages in towns are far apart, and villagers live scattered, making it impossible to enter kindergartens together. Under the influence of the national market economic policy, preschool education does not belong to the category of compulsory education. In addition, due to reasons such as laid - off workers, some kindergartens with poor conditions have insufficient enrollment or teachers. With the increase in the number of only children in China, the current situation of only children having no siblings has attracted the attention of many educational experts and parents. Therefore, under the guidance of some experts, positive research on mixed - age education has begun to emerge, but it is rarely put into practice.

5. Conclusions and Countermeasures

5.1 Comparison between Mixed - age Education and Traditional Same - age Education

The traditional concept of class arrangement is that children of different ages are like brothers and sisters. However, in an organization like brothers and sisters, the roles of children are fixed, that is, the elder brother or sister is always the elder brother or sister, and the younger brother or sister is always the younger brother or sister. If they are the elder brother or sister, they are always in a position to take care of others and are stronger; the younger brother or sister is always taken care of and is in a disadvantageous position. Mixed - age education believes that the roles of children in mixed - age classes are dynamic. From being cared for at the beginning to caring for others, from being "weak" to learning to be "strong" and then becoming "stronger". Their psychological and social roles develop and change with age and physical development. Education for mixed - age children provides favorable conditions for promoting the socialization process of children and makes the physical and mental development of children possible. To a certain extent, only children avoid the disadvantage of being fragile.

5.2 Problems that May Arise in the Implementation of Mixed - age Education in Coastal Cities

5.2.1 Lack of teachers

In China, the shortage of teachers is an important factor restricting the pace of mixed - age education. At present, as a new educational model, mixed - age education faces great challenges in some kindergartens with insufficient teaching staff. Most importantly, the requirements for teachers are higher, and the energy of preschool teachers is very limited. Teachers should have enough patience, be good at communicating with children, and be good at

observing and discovering.

5.2.2 Insufficient curriculum resources and complex curriculum design

For me, the most difficult part of the mixed curriculum is teaching. Because the mixed - age class does not have an independent curriculum system. The interviewed teachers told me that they are working hard to adjust the mixed class, but there is no curriculum system independent of the same - age class.

5.2.3 Insufficient positioning of mixed - age education

Although mixed - age education has not fully developed, some achievements have been made. The author found that in such a development state, there is a lack of local mixed - age education with Chinese characteristics. The mixed - age education advocated by Montessori is formulated and implemented according to the current situation of Chinese education. Due to differences in culture, representation, region, and culture between the East and the West, it cannot be directly transferred to preschool education, which will seriously hinder the development of Chinese education. According to the current situation of Chinese education, we should establish mixed educational content and carry out practical educational teaching. In the comprehensive implementation of mixed education, we should keep pace with the times, continuously innovate, and do a good job in mixed education suitable for China's national conditions.

5.2.4 Parents' lack of correct understanding of mixed - age education

Many parents of children hold a mistaken perception of education. They believe that kindergarten education ought to impart knowledge and skills to children, laying a solid foundation for primary school. Consequently, when confronted with mixed - age education, a new educational model, a multitude of problems may surface. Parents think that mixed - age education is an educational model of "older children guiding younger children", which can merely promote the development of younger children while being of no significance to older children and even impeding their progress.

5.3 Solutions to the Problems

5.3.1 Expand the Teaching Staff of Mixed - age Education in Kindergartens

Kindergarten teachers are scarce across China. Needless to say, mixed - age education teachers have even higher requirements compared to those for same - age education. This is an important reason why mixed - age education cannot be comprehensively developed in China. To address the issue of a shortage of mixed - age education teachers, the government needs to provide appropriate financial and policy support.

5.3.2 Enrich the Curriculum Resources of Mixed - age Teaching in Kindergartens and Improve the Comprehensive Quality of Teachers

The lack of curriculum resources and comprehensive qualities of teachers in mixed - age education directly impacts the teaching effectiveness of kindergarten mixed - age education. It is possible to enrich the curriculum resources of mixed - age education. Firstly, by vigorously promoting mixed - age education, the education administrative department can have the capacity and willingness to offer mixed - age courses or implement some mixed - age education programs in kindergartens and arrange appropriate evaluators to guide the implementation of mixed - age courses. By evaluating the measures and methods of the approval, implementation, and evaluation of mixed - age courses, pilot work of mixed - age courses can be carried out in different regions. Develop age - appropriate curricula and teaching materials and improve the comprehensive quality of teachers in mixed - age classes. The quality of mixed - age education largely depends on the low level of teachers. Teachers and kindergartens need to work together to better implement mixed - age education and improve the comprehensive quality of mixed - age education teachers.

5.3.3 Vigorously Promote the Localization of Mixed - age Education

To promote the localization process of mixed - age education, it is first necessary to fully understand mixed - age education and firmly grasp its essence, and then explore a mixed - age education model suitable for the specific conditions of our country. Only in this way can we correctly take the first step in promoting the localization of

mixed - age education. Change parents' mindsets and guide them to actively participate. Mixed - age education, as a new educational model, has emerged in people's vision. People should first understand it and then gradually accept it. Kindergartens should promote mixed - age education in various ways so that parents truly understand the benefits of the mixed - age education concept for children.

6. Future Prospects

Education is the wellspring of social progress. A clear spring leads to a clear torrent, while a deep spring leads to a long - term trickle. Only when education is advanced can society truly progress. On the other hand, in China's education, the cart is put before the horse, emphasizing morality over practice and preaching over setting examples. Therefore, well - trained young people severely lack the perception and feeling of the beauty of humanity, compassion, and love - their faces are gorgeous, but their hearts are withered. As a student of the Teacher Education College of Jimei University, I believe that the heavy burden of imparting knowledge and educating people on our shoulders is both a responsibility and a driving force. Preschool mixed - age education is an important factor in improving children's all - round qualities, including physical and mental development and knowledge absorption. Preschool mixed - age education aims to cultivate students and combine their potential with qualities to achieve the goals of preschool mixed - age education. Preschool mixed - age education cultivates outstanding successors for the next generation and enables students to achieve comprehensive personality development. In real life, what we need is the combination of wisdom and quality. Only such people can lead our country to prosperity. Therefore, preschool mixed - age education is of great significance. We should attach importance to preschool mixed - age education and cultivate outstanding talents for us from generation to generation

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Implementation Pathways for Vocational Education in Supporting the Cultivation of High-Quality Farmers

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Abstract: ***This paper aims to explore how vocational education can effectively promote the cultivation of high-quality farmers, thereby facilitating the modernization of agriculture and rural areas. First, it introduces the background of the study, highlighting the real issues of insufficient rural talent structure and the urgent needs of rural economic transformation, and elucidates the significant role of vocational education in addressing these challenges. Second, it discusses the concepts and characteristics of vocational education, as well as the connotations and requirements of high-quality farmers, emphasizing the close relationship between vocational education and the cultivation of high-quality farmers. Subsequently, it analyzes the problems and challenges faced by vocational education in farmer training, such as the disconnection between curricula and practical needs, the singularity of teaching methods, and insufficient industry alignment. Finally, it proposes implementation pathways for vocational education to support the training of high-quality farmers, including optimizing curriculum design, innovating teaching methods, and deepening industry integration.***

Keywords: Vocational Education; Cultivation of High-Quality Farmers; Rural Development; Implementation Pathways; Modernization of Agricultural Industry.

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1. Introduction

With the rapid advancement of agricultural modernization and the comprehensive development of rural economic and social systems, cultivating high-quality farmers has become an urgent need for promoting sustainable and healthy agricultural development. However, in the face of higher demands for improving farmers' quality in the new era, traditional agricultural production models have become outdated and insufficient. In this context, vocational education has garnered widespread attention as an effective means to enhance the comprehensive quality of laborers and adapt to the demands of modern agriculture. It is crucial to comprehensively understand the relationship between vocational education and the cultivation of high-quality farmers, as well as to explore the advantages and potential of vocational education in enhancing farmers' quality. In-depth research on the application of vocational education in cultivating high-quality farmers will not only help provide more scientific training models for farmers and improve their quality levels but also offer new ideas for promoting the comprehensive development of rural economic and social systems. Integrating vocational education into the farmer cultivation system can help narrow the urban-rural gap, promote agricultural industry upgrading, improve farmers' living standards, and achieve sustainable development.

2. Theoretical Foundations of Vocational Education and the Cultivation of High-Quality Farmers

2.1 Concepts and Characteristics of Vocational Education

Vocational education, as a specialized educational system, focuses on equipping students with the practical skills and knowledge required in specific occupational fields. Its concept has evolved over time; initially emphasizing

the impartation of technical skills, it has now expanded to encompass a broader range of sectors, including but not limited to technology, business, services, and agriculture.

The characteristics of vocational education are reflected in multiple aspects. First, it emphasizes practicality, focusing on integrating theoretical knowledge with practical operations to enable students to quickly adapt to the work environment. This practicality is evident not only in technical skills but also in problem-solving abilities and teamwork. Second, vocational education is flexible. Unlike traditional subject-based education, it places greater emphasis on individual and occupational differences, providing more personalized training programs based on students' interests and potential. Additionally, vocational education is industry-oriented, closely aligned with actual industry demands. It updates curriculum content through the involvement of industry professionals and incorporates internships and practical training to immerse students directly in professional environments, helping them better adapt to future work challenges. Lastly, vocational education emphasizes career development planning. In addition to imparting practical skills, it focuses on fostering students' awareness of their career development, guiding them to clarify their personal career goals, and providing appropriate support and training.

In summary, vocational education is not merely the impartation of technical skills; rather, it is a comprehensive educational system aimed at enhancing students' overall quality. Its flexibility, practicality, industry orientation, and focus on career development planning make it an essential component for adapting to the needs of social transformation and economic development.

2.2 The Connotation of High-Quality Farmers

High-quality farmers play a crucial role in rural revitalization. They are not only agricultural producers but also key drivers of rural industry, talent, culture, ecology, and organizational revitalization. An in-depth analysis of the connotation of high-quality farmers can be explored from the following five dimensions.

Firstly, high-quality farmers are innovators in rural industry revitalization. As innovators in this process, they bear the responsibility of leading agricultural development and are well-versed in modern agricultural concepts. They do not settle for traditional models but instead integrate technological innovation and modern management into agricultural production. Through continually upgraded professional agricultural skills, high-quality farmers can flexibly address various challenges in the production process, thereby promoting the modernization of the agricultural industry and providing new impetus for the sustainable growth of the rural economy. Their innovative spirit positions them as vanguards in rural industry revitalization.

Secondly, high-quality farmers are leaders in rural talent revitalization. During the process of revitalizing rural talent, they play a pivotal leadership role. With a positive and proactive professional attitude, they become leaders in rural development, demonstrating a commitment to contributing to rural revitalization. Through diversified management, high-quality farmers are not limited to traditional agriculture but actively engage in other industries, thereby promoting the diversification of rural industries. This aspect makes them leaders in rural talent revitalization, bringing new development opportunities to rural communities.

Thirdly, high-quality farmers are inheritors of rural cultural revitalization. As cultural inheritors, they possess a profound love for and protective awareness of traditional rural culture. By actively participating in various cultural activities, high-quality farmers serve not only as transmitters of culture but also as organizers who collaboratively promote cultural events. They ensure that cultural revitalization extends beyond individual actions, becoming a collective endeavor for the entire rural community. Through cultural inheritance, high-quality farmers infuse deeper values and social cohesion into rural areas, thereby revitalizing culture with new vitality.

Fourthly, high-quality farmers are guardians of rural ecological revitalization. In the context of rural ecological revitalization, high-quality farmers play a critical role as ecological guardians.

Possessing modern ecological and environmental protection concepts, they emphasize sustainable agricultural development and adopt various measures to protect the rural ecological environment. By implementing ecological agricultural practices and actively participating in ecological restoration efforts, high-quality farmers become steadfast guardians of rural ecology. Their actions not only benefit agriculture but also positively contribute to the sustainable development of the entire ecosystem, positioning them as a pillar of rural ecological revitalization.

Fifthly, high-quality farmers are collaborators in rural organizational revitalization. As organizational collaborators, high-quality farmers possess strong collaborative capabilities, enabling them to effectively organize and coordinate rural residents to participate in rural affairs collectively. By actively engaging in rural self-governance and organizational development, they provide robust support for the revitalization of rural organizations, making rural self-governance a shared responsibility. The collaborative efforts of high-quality farmers inject strong momentum into the stability and development of rural communities, enhancing their vitality and cohesiveness.

The connotations of these five aspects together paint a vivid portrait of high-quality farmers, reflecting not only their pursuit of agricultural modernization but also showcasing their optimistic attitude and profound understanding of rural revitalization.

3. Problems and Challenges Faced by Vocational Education in Cultivating High-Quality Farmers

3.1 Outdated Curriculum

Outdated curricula represent one of the core issues that vocational education urgently needs to address in cultivating high-quality farmers. Traditional agricultural courses remain confined to past agricultural production modes and technologies, failing to adapt to the rapid changes in modern agriculture. As a result, students often feel unprepared to meet the new requirements of contemporary agricultural technology, green agriculture, and market-oriented operations. The root of this problem lies in the lagging course content. Traditional agricultural courses emphasize basic knowledge but lack in-depth understanding of emerging technologies, modern management, and market trends. Students' focus often stays at the level of traditional agricultural skills, lacking the interdisciplinary knowledge necessary to tackle the complexities of contemporary agriculture.

Furthermore, the pace of curriculum reform in vocational education lags behind that of the agricultural industry. Vocational education institutions should establish close collaborative mechanisms with industries to regularly update curricula, aligning them with agricultural industry developments. Introducing industry experts and incorporating their latest research findings into course content through field visits can ensure that students can quickly adapt to and lead the direction of agricultural modernization upon graduation. Outdated curricula not only impact the cultivation of students' practical abilities but also constrain the role of rural vocational education in promoting the modernization of agriculture.

3.2 Monotonous Teaching Methods

Monotonous teaching methods pose another deep-seated issue hindering the cultivation of high-quality farmers. Traditional classroom teaching models primarily focus on the transmission of theoretical knowledge, failing to effectively stimulate students' practical interests and operational skills. In agriculture, theoretical discussions often fall short of meeting students' understanding and demands for practical agricultural work. In the context of advanced technology, rural vocational education needs to place greater emphasis on practical teaching. Over-reliance on traditional classroom models restricts students' deep understanding of the entire agricultural production process. Monotonous teaching methods not only diminish students' interest in learning but also limit their ability to apply knowledge in actual agricultural production.

3.3 Insufficient Industry Integration

Insufficient industry integration is a prominent issue in rural vocational education, restricting the comprehensive cultivation of high-quality farmers. Currently, the connection between vocational education institutions and the agricultural industry is relatively weak, leading to students lacking a profound understanding of actual agricultural operations and production during their time at school, making it difficult for them to quickly integrate and contribute to modern agriculture after graduation. Firstly, insufficient industry integration manifests as a disconnection between educational content and actual needs. Due to a lack of effective communication channels, the curriculum design of vocational education may not closely align with the actual demands of the agricultural industry, resulting in adaptability issues for graduates entering the job market. Secondly, the lack of teaching staff with actual industry experience also hinders industry integration. Vocational education requires more professionals from the industry frontline to ensure that teaching content is closely related to practical operations, providing students with more authentic professional experiences. Lastly, insufficient industry integration is also reflected in

a lack of internship and employment opportunities. Students often struggle to obtain internships related to the agricultural industry during their studies, affecting their understanding and adaptation to actual work environments. Therefore, addressing the issue of insufficient industry integration is crucial for enhancing the effectiveness of high-quality farmer cultivation.

3.4 Scarcity of Educational Resources in Rural Areas

The scarcity of vocational education resources in rural areas is a serious issue that limits the cultivation of high-quality farmers. Compared to urban areas, rural regions face significant imbalances in teaching staff, teaching equipment, and educational funding, which directly affects the opportunities and levels at which farmer students can receive high-quality vocational education. Firstly, the teaching staff in rural vocational education is relatively insufficient. Due to the relatively low attractiveness of rural areas, educational institutions struggle to attract high-caliber educational talent. This results in a relatively weak structure of teaching staff, lacking rich teaching experience and the ability to impart modern agricultural techniques. Secondly, teaching equipment in rural areas is often outdated and rudimentary. The lack of modern laboratories, farmland practice bases, and other educational resources makes it difficult for students to access the latest agricultural technologies and management methods. Additionally, funding support for rural vocational education is relatively tight. Due to economic constraints, rural educational institutions often face limitations in purchasing textbooks and updating equipment.

3.5 Insufficient Institutional Development

The insufficient institutional development of rural vocational education is a deep-rooted problem that hinders the cultivation of high-quality farmers. Currently, relevant policies, regulations, and management systems are relatively outdated, failing to effectively support and guide the healthy development of rural vocational education. This issue involves multiple aspects, including government policies, educational management, and internal school management.

Firstly, there is a lack of clear policy support for rural vocational education. The absence or inadequacy of relevant policies makes it difficult for rural vocational education to advance smoothly. Secondly, there are deficiencies in the institutional development of educational management. The management systems of rural vocational education institutions are relatively outdated, lacking flexibility and adaptability. Additionally, the internal management systems of schools also need further improvement. Aspects such as enrollment policies and teaching plans need to align more closely with actual conditions and market demands. Establishing a sound internal management system to enhance the operational efficiency and teaching quality of schools is a key element of institutional development in rural vocational education.

Finally, building a more open and inclusive training system is also an urgent issue that needs to be addressed in institutional development. Vocational education should pay more attention to deeply integrating with industries and society, breaking the constraints of traditional educational systems, and introducing more market mechanisms. This would encourage schools to adjust their training directions and curriculum designs more flexibly in response to market demands. Therefore, the inadequacies in the institutional development of rural vocational education directly affect the effectiveness of cultivating high-quality farmers.

3.6 Insufficient Social Recognition

Insufficient social recognition is a significant barrier to the development of rural vocational education, causing rural students to face a dual dilemma of understanding and support when choosing their career paths. Compared to traditional cultural education, rural vocational education has a relatively low level of societal acknowledgment, leading rural students and their families to favor conventional academic routes while neglecting the importance of vocational education.

Firstly, there are misconceptions among the public regarding rural vocational education. For a long time, rural vocational education has failed to occupy a significant share of social discourse, resulting in outdated public perceptions. Secondly, the lack of promotion for successful cases of rural vocational education is also a contributing factor to insufficient social recognition. Society tends to focus more on traditional cultural successes and well-known universities, overlooking the achievements of rural vocational education graduates in modern agriculture. Additionally, the insufficient alignment between vocational education and industry or societal needs further exacerbates the lag in social recognition of rural vocational education.

4. Implementation Pathways for Vocational Education to Support High-Quality Farmer Training

4.1 Curriculum Optimization and Update

In addressing the challenges of vocational education, optimizing and updating the curriculum is paramount. A curriculum design guided by job competency requirements is crucial, involving the establishment of a flexible mechanism to adjust course content in real time to meet agricultural market demands. Deep collaboration with the agricultural industry is an effective way to achieve this goal, ensuring that students learn the latest agricultural technologies and management knowledge.

Moreover, integrating interdisciplinary knowledge allows students to engage with various fields such as agricultural technology and information technology during their studies, enhancing their overall competence. On the other hand, introducing elective courses can cater to the personalized learning needs of students, thereby better unleashing their potential. By thoroughly adjusting and updating the curriculum, it is possible to meet the practical needs of cultivating high-quality farmers more effectively, enabling students to better tackle the challenges of agricultural industry modernization.

4.2 Innovative Teaching Methods

Innovative teaching methods are key to improving students' practical skills. Emphasizing practice-oriented teaching approaches—such as field practices, site visits, and simulated farm operations—can effectively stimulate students' interest in learning and enhance their practical abilities. Industry internships and collaborations are also essential; through deep integration with the agricultural sector, students can accumulate practical experience in real agricultural settings, better adapting to professional requirements.

Leveraging digital teaching tools, such as virtual reality and remote education, can enhance educational outcomes and increase students' understanding of emerging agricultural technologies. By combining practical experience with technological tools, rural vocational education can better cultivate students' innovative capabilities and practical skills, enabling them to meet the demands of modern agriculture. Introducing more practical and diverse teaching methods can further stimulate students' potential and provide comprehensive support for their career development.

4.3 Deepening Industry Integration

Industry integration is a crucial step in achieving the effectiveness of vocational education. Establishing platforms for cooperation between industry, academia, and research is a collaborative effort involving government, industry, and vocational education institutions. Such platforms can facilitate information sharing and technological innovation, ensuring that training content aligns more closely with actual industry needs.

By developing industry-academia collaboration projects, students can learn more practical skills in real agricultural production environments, enhancing their professional competitiveness. Strengthening communication and cooperation with the agricultural sector enables vocational education to better serve the needs of modern agriculture, cultivating agricultural professionals with strong practical skills. Collaborating with industry professionals to develop competency-based curricula will better match real industry demands and enhance the practicality of training. The government can implement policies encouraging agricultural enterprises to provide internships and employment opportunities, promoting deep cooperation between schools and businesses.

4.4 Integrating Rural Education Resources

To address the issue of scarce educational resources in rural areas, the government should increase financial investment in rural vocational education. This includes recruiting high-quality faculty to enhance the teaching standards in rural vocational institutions. Additionally, agricultural enterprises should be encouraged to support vocational education by providing resources such as scholarships and funding for laboratory construction, thus alleviating the lack of educational resources in rural areas.

By focusing on faculty development, improving educational facilities, and increasing financial support, the disparity between urban and rural educational resources can be gradually reduced, providing rural students with higher-quality vocational education and promoting the talent pool needed for agricultural modernization.

4.5 Building a Comprehensive Rural Vocational Education System

Establishing a comprehensive rural vocational education system is essential for advancing the entire framework. The formulation of market-oriented policies, reforms in educational management systems, and improvements in internal management structures will ensure that vocational education better adapts to the needs of the agricultural market and enhances the effectiveness of training.

When developing policies, the government should gain a deep understanding of market changes to ensure that policies are adjusted in sync with market demands. Furthermore, deepening reforms in the educational management system to increase the adaptability and flexibility of vocational education institutions is crucial for upgrading the entire system.

4.6 Enhancing Social Awareness

Enhancing social awareness is crucial for the development of rural vocational education. By strengthening the promotion of rural vocational education, showcasing successful case studies, and facilitating communication between industry and society, we can improve public recognition of rural vocational education and change public perceptions. Utilizing media, community events, and other outreach efforts to highlight the positive contributions of rural vocational education to rural development is essential.

Additionally, promoting successful case studies of rural vocational education graduates can set a precedent and inspire more students to take an interest in this field. Addressing the lack of social recognition for rural vocational education requires a collaborative effort from various stakeholders, including the government, educational institutions, and media, to enhance societal acceptance and encourage more aspiring agricultural professionals to choose this path, thereby providing stronger talent support for agricultural modernization.

Through the organic combination of these six implementation paths, vocational education can better support the training of high-quality farmers. The collaboration between government, educational institutions, and the agricultural industry is key to ensuring the success of these implementation strategies. Through continuous innovation and cooperative efforts, rural vocational education will better serve rural development and make greater contributions to cultivating high-quality farmers.

5. Conclusion

Vocational education faces numerous challenges on the path to cultivating high-quality farmers; however, it also holds boundless hope and potential. This study, through deep reflection and exploration of the issues, has identified methods and pathways for solutions, injecting new vitality and momentum into the modernization of agriculture and rural revitalization.

In the future, we look forward to the further enrichment and optimization of rural educational resources, ensuring that every farmer can access quality vocational education; aligning vocational education curricula more closely with real-world demands to provide students with practical and competitive knowledge and skills; updating and expanding the employment concepts of rural students, empowering them to explore and innovate; strengthening and enhancing the quality of vocational education faculty to provide superior educational services; and broadening and enriching employment channels for rural students, paving the way for a brighter future.

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Teaching Reform and Exploration of Python Programming Course Based on Knowledge Graph

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Abstract: ***This paper explores the application of knowledge graphs in the reform and exploration of Python programming education, using a case study from Nanfang College Guangzhou. The study investigates the impact of knowledge graphs on student learning outcomes in a Python programming course, comparing an experimental group (EG) that utilized an interactive knowledge graph-based learning tool with a control group (CG) that followed traditional teaching methods. A mixed-methods approach was adopted, combining quantitative assessments (pre- and post-course quiz, final exams, and practical coding assignments) with qualitative feedback from students through surveys. The results reveal that the EG outperformed the CG in all assessment categories, showing a significant increase in quiz scores, final exam performance, and practical coding assignments. Specifically, the EG demonstrated a 13% improvement in quiz scores, a 15% increase in final exam scores, and an 18% improvement in coding assignments compared to the CG. Statistical analysis confirmed the significance of these differences, with p-values below 0.05 for all measures. Qualitative feedback from the EG also highlighted the effectiveness of the knowledge graphs in enhancing understanding of abstract programming concepts, improving problem-solving skills, and boosting confidence in applying Python programming to real-world problems. These findings suggest that knowledge graphs can serve as a powerful teaching tool in programming education, offering students a visual and interactive method to comprehend complex relationships between programming concepts. The study highlights the potential for integrating KGs into computer science curricula to foster deeper learning, reduce cognitive load, and improve student outcomes. Further research is recommended to explore the long-term impact of knowledge graphs on programming education and their applicability across different programming languages and educational contexts.***

Keywords: Knowledge Graph; Python Programming; Teaching Reform and Exploration.

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1. Introduction

Knowledge Graphs (KGs) are structured representations of knowledge that use nodes and edges to depict relationships between entities [1]. In education, knowledge graphs enhance personalized learning by tailoring content to individual needs, improve understanding through interconnected topics, streamline information retrieval for students and educators[2], support curriculum development by highlighting relationships among concepts, and facilitate research by connecting relevant literature[3]. Overall, KGs can significantly enrich the learning experience and make education more effective[4].

The increasing demand for programming skills in various disciplines has led to widespread adoption of Python as an introductory language in universities and colleges. Despite its simplicity and versatility, many students struggle to grasp complex programming concepts. Traditional teaching methods, relying heavily on textual explanations and static examples, often fail to foster deep understanding[5]. This paper introduces the use of knowledge graphs as a teaching tool to address this issue, particularly in the context of teaching Python programming.

A knowledge graph is a structured representation of knowledge that illustrates the relationships between concepts. By mapping out these relationships, knowledge graphs can provide a more intuitive, visual approach to learning [6], making abstract concepts more accessible [7]. This study aims to explore the impact of KGs on student

performance in Python programming, comparing the effectiveness of this approach to traditional teaching methods through controlled group experiments.

Some of the mainstream knowledge graph tools nowadays include Neo4j [8], a powerful graph database that enables efficient knowledge graph construction and querying. Another is Google Knowledge Graph [9], which is widely used and integrated into Google's search service to provide users with more comprehensive and relevant information. Additionally, Stardog [10], an open-source triple store, offers features for building and managing knowledge graphs. Globe Explorer is also a great tool for Python programming learning. These tools play significant roles in various fields such as data analytics, artificial intelligence, and information retrieval [11,12,13,14,15,16].

2. Related Work

Knowledge graphs (KGs) are emerging as a transformative tool in education, enabling a more structured and interconnected approach to organizing knowledge. By visualizing the relationships between concepts, KGs offer a dynamic representation of information that mirrors how humans naturally understand the world. This visual organization allows learners to not only grasp individual facts but also appreciate the broader context and interconnections between these facts, thereby fostering deeper learning.

In the context of education, KGs can enhance the learning experience by supporting personalized and adaptive learning pathways. As educational systems increasingly incorporate digital tools, KGs are becoming instrumental in creating environments where content can be tailored to the specific needs and learning styles of students. For instance, in subjects that require an understanding of complex relationships, such as programming or mathematics, KGs can be used to visualize dependencies, making abstract concepts more tangible and accessible.

Currently, the role of KGs in education is expected to expand significantly. With advancements in artificial intelligence (AI) and machine learning (ML), KGs could become even more integral, enabling intelligent educational systems that adapt to the individual learning progress of students. This personalized approach could be particularly beneficial for subjects like programming, where understanding the relationships between key concepts is crucial for problem-solving and application.

Moreover, KGs have the potential to bridge interdisciplinary learning by providing a unified framework that connects knowledge across various domains. This could encourage more holistic learning and foster connections between otherwise siloed subjects. The integration of KGs with AI-powered systems is also likely to lead to innovations such as real-time feedback mechanisms, where students receive tailored suggestions and resources based on their current knowledge and progress.

The use of knowledge graphs in education has received considerable attention in recent years. Researchers have shown that KGs can enhance conceptual understanding by visually representing the relationships between different concepts. In programming education, KGs have been utilized to represent relationships between programming constructs such as loops, conditionals, functions, and classes.

Mathematically, KGs can be modeled as a Directed Acyclic Graph (DAG) where nodes represent concepts and edges represent relationships. This formalism allows students to explore and navigate the interconnectedness of programming topics. Additionally, KGs reduce cognitive load by providing a visual structure that supports better knowledge retention and recall [17].

In Python programming, KGs can help illustrate how various programming constructs interact, enabling students to visualize the flow of control in algorithms or the relationship between data structures and their manipulations. Previous studies have shown that using KGs in learning programming leads to improvements in problem-solving and conceptual clarity [18].

3. Methodology

3.1 Experimental Design

To assess the impact of knowledge graphs on Python programming education, we conducted a controlled experiment with 65 students enrolled in the Python programming course at Nanfang College, Guangzhou. The students were randomly assigned to two groups: The Experimental Group (EG) and the Control Group (CG).

Experimental Group (EG): Students in this group were provided with access to a Python knowledge graph, which was integrated into the course as an interactive tool. The graph allowed students to explore and interact with relationships between Python concepts, such as variables, loops, functions, and object-oriented programming principles.

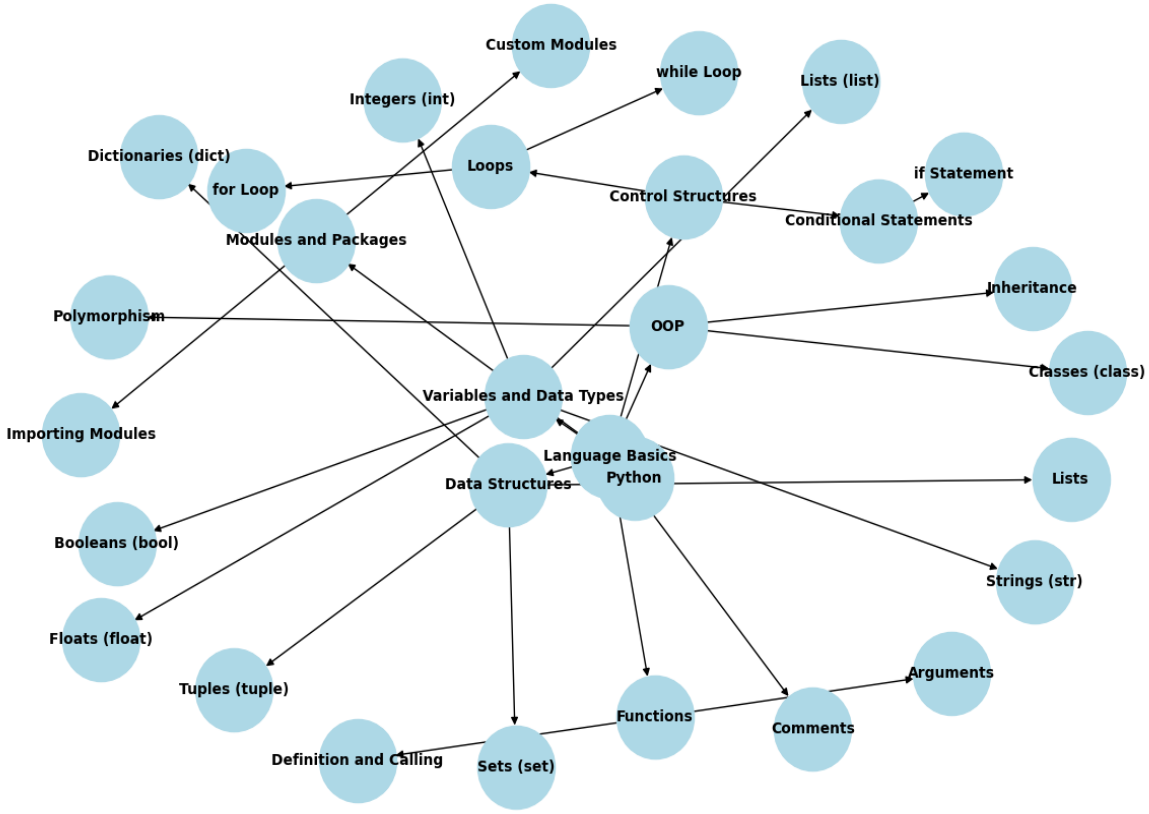

Figure 1: Knowledge Graphs of Python Programming

Control Group (CG): Students in this group followed the traditional curriculum, which relied on lecture-based instruction and textbook examples. The control group did not have access to the knowledge graph.

The knowledge graph was constructed based on the key concepts covered in the Python course. The graph represented programming constructs as nodes, with edges connecting related concepts. For example, an edge might connect a node representing “functions” to a node representing “variables”, indicating that functions typically contain variables. This graph was made accessible through a web-based interface, allowing students to interact with it dynamically.

3.2 Data Collection

The data collection process involved multiple stages:

- **Pre-course Assessment:** All students completed a pre-course quiz to assess their baseline knowledge of Python programming. The quiz covered basic programming concepts, such as variable declaration, control structures, and functions.
- **In-Course Engagement:** Throughout the course, students were encouraged to engage with the knowledge graph (for the EG) and participate in regular quizzes and coding exercises. The experimental group was instructed to refer to the knowledge graph for clarification and to explore programming relationships before and after lectures.

- **Post-course Assessment:** At the end of the course, all students completed a final exam, which included both theoretical questions and practical coding assignments. The exam tested their understanding of key Python concepts, problem-solving abilities, and the ability to apply concepts to real-world programming tasks.
- **Survey and Feedback:** A post-course survey was administered to both groups to gather qualitative data on student experiences. Students were asked about their perceived understanding of Python concepts, the usefulness of the knowledge graph (for EG), and their overall satisfaction with the course.

3.3 Performance Metrics

To quantify the performance of the two groups, we used the following metrics:

- **Quiz Scores (Q):** A set of quizzes designed to quiz students' understanding of key Python concepts. Each quiz was scored on a scale of 0 to 100.
- **Final Exam Scores (E):** A comprehensive exam that evaluated both theoretical knowledge and practical coding skills. The exam consisted of multiple-choice questions, problem-solving tasks, and coding assignments.
- **Practical Coding Assignments (C):** Regular coding assignments that required students to implement Python programs based on given specifications. The coding assignments were graded based on correctness, efficiency, and code clarity.

Each metric was weighted based on its importance in assessing overall student performance. The final performance score P for each student was calculated using the weighted sum of these metrics:

$$P = w_1 \cdot Q + w_2 \cdot E + w_3 \cdot C \tag{1}$$

Where w_1, w_2, w_3 are the weights assigned to each metric, based on their importance in assessing programming proficiency. For this study, we set $w_1 = 0.2$, $w_2 = 0.4$, and $w_3 = 0.4$, as practical coding skills were considered the most critical.

3.4 Statistical Analysis

To evaluate the significance of the observed differences between the groups, we performed a paired t-quiz. The null hypothesis H_0 stated that there was no significant difference in performance between the experimental and control groups, while the alternative hypothesis H_1 suggested that there was a significant difference. The t-statistic was computed as:

$$t = \frac{\overline{X_{\mathrm{EG}}} - \overline{X_{\mathrm{CG}}}}{\sqrt{\frac{s_{\mathrm{EG}}^2}{n_{\mathrm{EG}}} + \frac{s_{\mathrm{CG}}^2}{n_{\mathrm{CG}}}}} \tag{2}$$

Where:

- $\overline{X_{\mathrm{EG}}}$ and $\overline{X_{\mathrm{CG}}}$ are the mean scores for the experimental and control groups, respectively.
- s_{EG} and s_{CG} are the standard deviations for the experimental and control groups.
- n_{EG} and n_{CG} are the sample sizes for the experimental and control groups.

4. Results and Discussion

4.1 Student Performance: Quantitative Analysis

The performance data for the Experimental Group (EG) and Control Group (CG) were compared across three primary assessment categories: quiz scores, final exam scores, and practical coding assignments. The results clearly indicate that the integration of knowledge graphs (KGs) into the teaching methodology significantly improved the learning outcomes for the EG.

4.1.1 Quiz Scores (Q)

The quiz scores measured students' grasp of basic Python concepts, including variables, loops, and functions. As shown in Table 1, the EG outperformed the CG in both the pre-course and post-course assessments.

Table 1: Comparison of Quiz Scores Between Experimental and Control Groups

Group	Pre-Score (%)	Post-Score (%)	Difference (%)
Experimental Group (EG)	65	78	+13
Control Group (CG)	67	72	+5

In the pre-course quiz, both groups had similar scores, indicating comparable levels of understanding at the beginning of the course. However, the post-course quiz scores reveal a clear advantage for the EG, who had an average improvement of 13% compared to the 5% improvement observed in the CG. This suggests that the use of the Knowledge Graph facilitated a deeper understanding and retention of programming concepts.
A t-quiz conducted on the post-course quiz scores confirmed that the difference between the EG and CG was statistically significant (p-value = 0.001), rejecting the null hypothesis of no difference between the two groups.

4.1.2 Final Exam Scores (E)

The final exam consisted of both theoretical questions and practical coding problems. The results for final exam scores are shown in Table 2. The EG scored significantly higher than the CG, with an average score of 90% compared to 75% for the CG.

Table 2: Comparison of Final Exam Scores Between Experimental and Control Groups

Group	Average Score (%)	Difference (%)
Experimental Group (EG)	90	+15
Control Group (CG)	75	N/A

This improvement in the EG can be attributed to their better conceptual understanding, facilitated by the use of the knowledge graph. The EG's higher performance was most noticeable in coding assignments, where they demonstrated an improved ability to integrate multiple Python constructs, such as functions, loops, and conditional statements.

A t-test on final exam scores revealed a statistically significant difference between the EG and CG (p-value = 0.002), further supporting the effectiveness of the knowledge graph in enhancing student learning outcomes.

4.1.3 Practical Coding Assignments (C)

Practical coding assignments were graded based on correctness, efficiency, and code clarity. As shown in Table 3, the EG significantly outperformed the CG in practical coding tasks, scoring an average of 88%, compared to 70% for the CG.

Table 3: Comparison of Practical Coding Assignments Scores Between Experimental and Control Groups

Group	Average Score (%)	Difference (%)
Experimental Group (EG)	88	+18
Control Group (CG)	70	N/A

The EG's superior performance in coding assignments was particularly evident in tasks requiring students to write more complex algorithms, such as sorting and searching algorithms, and tasks requiring debugging. The EG students were able to efficiently identify and fix bugs in their code, showcasing their improved understanding of how different programming concepts are interconnected.

Statistical analysis using a t-test confirmed that the difference in coding assignment scores between the two groups was statistically significant, with a p-value of 0.001.

4.2 Qualitative Data: Survey and Feedback

In addition to the quantitative data, qualitative feedback was gathered from the students through a post-course survey. The survey asked students to rate their confidence in understanding Python programming, their overall satisfaction with the course, and the usefulness of the knowledge graph (for EG).

4.2.1 Student Confidence

The survey results indicated that the EG reported significantly higher levels of confidence in their Python programming skills compared to the CG. As shown in Figure 1, 83% of EG students felt confident or very confident in applying Python to solve real-world problems, compared to only 60% of CG students.

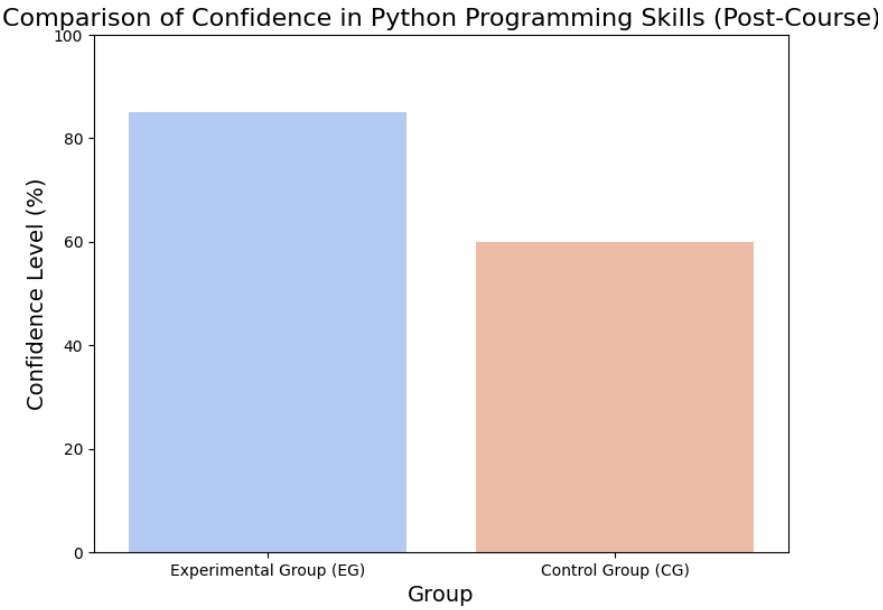

Figure 2: Student Confidence in Python Programming (Post-Course Survey)

The ability to visualize the relationships between different programming concepts in the knowledge graph seems to have helped EG students gain a clearer understanding of how to apply Python in practical scenarios, leading to higher self-confidence.

4.2.2 Student Feedback on Knowledge Graph

When asked about the usefulness of the knowledge graph, 90% of EG students rated it as either “very helpful” or “helpful”. Many students commented that the knowledge graph allowed them to better understand abstract concepts such as recursion, object-oriented programming, and the interactions between functions and variables. One student mentioned, “The knowledge graph helped me connect all the Python concepts together, and I no longer felt lost when learning something new.”

On the other hand, CG students expressed satisfaction with the traditional lecture-based method but also acknowledged that they struggled to see the connections between different programming constructs. One student noted, “I learned the individual concepts, but I found it hard to apply them together in real coding tasks.”

4.3 Implications of the Findings

The results from this study provide compelling evidence that integrating knowledge graphs into Python programming courses [19] can significantly enhance student learning outcomes. The EG students demonstrated superior performance across all assessment metrics, including quizzes, final exams, and practical coding assignments. The statistical analysis confirms that the observed differences between the EG and CG were not due to chance.

The qualitative feedback further supports these findings, with EG students reporting higher levels of confidence in their programming skills and appreciating the ability to visualize the relationships between programming concepts. The knowledge graph provided a structured and interactive way for students to explore and reinforce their learning [20], which may have helped reduce cognitive load and improved their ability to apply Python concepts in real-world scenarios.

4.4 Limitations and Future Work

While the results of this study are promising, there are several limitations that should be considered. First, the study was conducted at a single institution, and the findings may not be applicable to other institutions or educational contexts. Future research could involve a larger sample size and the replication of the study in different educational settings.
Moreover, the current implementation of the knowledge graph was limited to a specific set of Python concepts. Further research could explore how to extend the knowledge graph to cover a broader range of programming languages and topics, such as data structures, algorithms, and software engineering principles.

Lastly, it would be beneficial to conduct a longitudinal study to examine the long-term impact of knowledge graphs [21] on student retention and mastery of programming concepts. This could help determine whether the benefits observed in this study are sustained over time.

Potential future applications of knowledge graphs [22] in education:

• **Personalized Learning:** KGs can model a learner's existing knowledge and provide personalized recommendations to address gaps.
• **Curriculum Design:** Educators can leverage KGs to design interconnected curricula that reflect how topics relate to each other.
• **Assessment and Feedback:** By mapping student learning trajectories, KGs enable more personalized assessments and targeted feedback.
• **Collaborative Learning:** Shared knowledge graphs can facilitate collaborative exploration and problem-solving, enhancing peer learning.
• **Integration with AI/ML:** Integration with AI/ML: The combination of KGs and AI can lead to intelligent tutoring systems that adjust to the learner's needs.

5. Conclusion

This study demonstrates the positive impact of knowledge graphs on Python programming education. By visualizing the relationships between key programming concepts, students can more easily understand abstract topics and develop stronger problem-solving skills. The study also introduced the limitations and future work of knowledge graphs in the field of education. The results suggest that integrating KGs into programming curricula could be an effective strategy for improving student learning outcomes.

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Research on the Cultivation of Oral Communication Under the Background of Culture and Tourism Communication

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Abstract: ***In the context of the deep integration of culture and tourism, the role of oral communication professionals is no longer confined to being mere cultural disseminators but has expanded to become active promoters and key leaders in innovation within the tourism industry. Since the successful convening of the 18th National Congress of the Communist Party of China, it has repeatedly emphasized the extreme importance of cultural promotion and development for the overall national strategic layout at various propaganda, ideological, and cultural work conferences held nationwide. This series of important instructions clearly requires that all practitioners must attach great importance to the innovation of methods and approaches in their cultural and ideological propaganda work, actively utilizing modern new technologies and means to genuinely enhance the practical efficiency and broad influence of cultural dissemination. Currently, the integration of culture and tourism has become a new trend in the development of the tourism industry and an essential path for cultural inheritance and innovation. It not only injects new ideas and unique perspectives into the coordinated development of cultural promotion and the economy and society but also sets higher standards for the cultivation of oral communication professionals. Therefore, we must delve into more specific and detailed aspects to systematically and effectively cultivate high-quality oral communication professionals, particularly focusing on improving the oral skills of students majoring in broadcasting and hosting. To enhance communication skills, we must comprehensively strengthen the cultivation of cultural literacy and intercultural communication abilities. We should place great emphasis on practical training components in teaching, focusing on nurturing innovative capabilities under new media environments and a comprehensive attention to professional ethics and psychological qualities. In this process, we should be guided by market demand, closely align with the contemporary context, and meticulously design a more refined and scientific system for cultivating oral communication talents. This ensures that the talents we nurture can better adapt to the new requirements of cultural and tourism integration, contributing to the promotion of cultural prosperity and the upgrading of the tourism industry.***

Keywords: Cultural communication; Oral communication; Innovation; Practice.

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1. Current Situation of Cultural and Tourism Integration Communication

To thoroughly implement President Xi important thoughts on cultural development and actively promote the prosperity and flourishing of Chinas cultural sector and industry, cultural promotion work is continuously advancing in depth. In this process, the deep integration of tourism and the cultural industry has gradually emerged as a new trend in the current field of cultural promotion. Under the broad context of cultural-tourism integration, the importance of oral communication professionals becomes increasingly prominent. They are not only bridges and links for cultural exchange but also vanguards in tourism promotion, playing indispensable multiple roles in diverse scenarios of cultural-tourism integration. Therefore, guided by market demand, systematically cultivating oral communication professionals who can adapt to the new demands of cultural-tourism integration is not only of great significance for accelerating the vigorous development of the cultural tourism sector but will also effectively enhance the oral communication skills of students majoring in broadcasting and hosting.

As is well known, students majoring in broadcasting and hosting are artists of language expression who convey emotions through their voices and ideas through their words. They are also the backbone of oral communication talent in todays environment. Not only are they inheritors and disseminators of linguistic art, but they are also interpreters and promoters of cultural thought. Through their vivid and engaging language, they can bring to life

the rich history and unique customs of different regions, allowing travelers to deeply experience the distinctive charm of culture during their journeys. At the same time, they play the role of tourism promoters by telling captivating travel stories and sharing genuine and touching travel experiences, attracting more visitors to explore and thus strongly promoting the prosperity and development of the tourism industry.

However, under the current backdrop of cultural and tourism integration, the cultivation of oral communication talents still faces numerous challenges and difficulties. On one hand, traditional models for nurturing oral communication skills often focus on single-language training methods, such as script broadcasting and "reading from text," which can enhance students language expression abilities to some extent but inevitably confine them within the narrow scope of current broadcasting arts. In the vast expanse of future oral communication, if they remain confined to superficial expressions while neglecting deep content exploration and precise delivery, their ability to grasp key points will be significantly lacking. This is a common issue among students majoring in broadcasting and hosting: an excessive pursuit of "beautiful speech" at the expense of substantive content transmission. For cultural and tourism integration, conveying effective and meaningful content is precisely the core of expression. Therefore, for oral communication talents, it is essential not only to emphasize language skill training but also to strengthen the cultivation of cultural literacy and cognitive abilities, achieving an organic combination of form and content, thus creating a synergistic effect where 1+1 is greater than 2.

On the other hand, under the current context of cultural and tourism integration, the close integration of the tourism and cultural industries has made the audience for oral communication more diverse and international, potentially coming from all corners of the world. However, due to insufficient cultivation of intercultural communication skills, some oral communication professionals often struggle to effectively communicate with tourists from different cultural backgrounds in practice, which to some extent affects the actual effectiveness of oral communication and, in turn, weakens the widespread dissemination of cultural and tourism ideas. Moreover, as the integration of culture and tourism advances and develops, the comprehensive quality requirements for oral communication professionals are also increasing. The deep integration of technology and art demands that they not only have solid language fundamentals and rich cultural knowledge but also possess keen market insight, good innovative thinking, and proficient practical skills in using new media on the internet. Only then can they stand firm in the tide of cultural and tourism integration and contribute greater strength to the prosperity and development of the cultural and tourism industry.

2. Oral Communication Under the Combination of Culture and Tourism

Cultural and tourism integration means blending various cultural elements with vibrant tourism activities to create a more diverse and highly attractive travel experience. In this context, the words and actions of oral communication professionals play a crucial role. After all, they can convey cultural information in the most direct and vivid way, significantly enhancing tourists experiences and participation levels. Within the entire scope of oral communication, cultural promotion undoubtedly holds a primary position. When we focus on cultivating the qualities of oral communication professionals, it might be beneficial to conduct detailed and in-depth investigations into the numerous promotional activities currently underway for cultural and tourism integration. By leveraging solid data, we can provide strong support for talent development, using these data points to underpin the training programs for oral communication professionals. This approach will make the training plans more scientifically sound and comprehensive.

As a teacher in the broadcasting and hosting major, when the college is formulating various core professional courses and elective courses, it should clearly incorporate the current context of cultural and tourism integration into the training program. Moreover, during the teaching process, there should be a strong emphasis on thoroughly understanding and accurately grasping Chinese traditional culture and its ideas, as well as local cultures. When universities develop talent cultivation plans, first, regarding the cultivation of cultural literacy, we can approach this from the perspective of course design. In addition to conventional language skills courses, the proportion of cultural courses should be further increased. For example, elective courses such as "Local Culture and Tourism" and "Introduction to Local Culture" could be offered, providing detailed introductions to historical changes, folk customs, artistic characteristics, and other aspects of knowledge about different regions. These courses should also delve into how these cultural elements are specifically applied in tourism promotion activities. At the same time, students should be actively encouraged to conduct practical investigations into the effectiveness of cultural and tourism integration in their hometowns, allowing them to truly experience the impact of promotion through personal experiences. Additionally, students can be organized to visit the area where the school is located and nearby cities for field trips, enabling them to tour local cultural sites and engage in deep interactions with local

residentsIn order to gain a comprehensive understanding of the local cultural characteristics, it is essential for oral communication professionals to strengthen their learning of local history and traditional customs. This ensures that the content conveyed is both accurate and error-free, achieving "emotion and effectiveness." Consequently, this approach can successfully capture the interest of tourists, fulfilling the intended goals of external communication and language dissemination.

For the integration of culture and tourism, a deep understanding and effective dissemination of local culture is crucial. Secondly, in the process of cultivating oral communication talents, courses such as "Cross-Cultural Communication Case Analysis" can be introduced. Although this course is also offered in our bilingual broadcasting program, it may seem somewhat unfamiliar to students majoring in oral communication and broadcasting arts. Under the broader context of cultural and tourism integration, oral communication should not be confined to a single professional direction; every student from different fields has the potential to become an ambassador for oral communication and can further deepen their learning of this course. By analyzing real cross-cultural exchange cases, students can master communication skills and coping strategies under various cultural backgrounds. This teaches them how to communicate effectively across different cultural contexts. Additionally, organizing activities where students simulate various travel scenarios both inside and outside the classroom, using scenario-based teaching methods, promotes a series of educational reforms. Through practical exercises, students can enhance their intercultural communication abilities and improve their capacity to handle cultural conflicts and misunderstandings. Given the starting point of the tourism marketIn the end, it is in a constant state of change, and new tourism products and services are constantly emerging. Oral communication talents must be able to keenly capture the dynamic changes in the market, deeply understand the needs and preferences of tourists, so as to provide targeted suggestions and solutions for tourism promotion.

3. Cultural and Tourism Communication Talent Training

As the integration of culture and tourism advances, the fusion development of tourism and cultural industries has become a new trend. In this context, the importance of oral communication professionals is increasingly highlighted. They are not only messengers of cultural exchange but also pioneers in promoting tourism. Therefore, cultivating oral communication talents that meet the needs of cultural and tourism integration is of great significance for advancing the development of cultural and tourism endeavors. Practical teaching is an indispensable part of nurturing such talents. While strengthening practical teaching and school-enterprise cooperation, schools can collaborate with tourism enterprises through curriculum reform or practical training projects, jointly launching initiatives like "on-site tour guide internships" or "guiding tours based on courses." Outside of class, combining school-enterprise cooperation, inviting corporate mentors into classrooms to provide professional training and skill instruction; students can also, under the guidance of professional guides or corporate mentors, personally lead tourists through scenic spots, taking on the role of tour guides or interpreters for on-site practice and explanations. Additionally, students can be encouraged to plan and produce oral communication videos, starting from scratch, attempting to independently create communication cases, conduct analysis, and share their experiences.

Practice and practical training play a significant role in enhancing students abilities. They not only effectively hone their oral communication skills but also test their mastery of oral expression and public presentation through hands-on activities. Additionally, these experiences allow students to gain a deeper understanding of specific issues that require special attention during travel, as well as the individual needs and preferences of different types of tourists. This deepened understanding helps improve service quality in future work, better meeting the needs of travelers while accurately grasping the real effects of oral communication in the context of cultural and tourism integration. Furthermore, during winter and summer breaks, schools can actively organize students to participate in various social practice activities, such as tourism promotion events and cultural festivals, allowing them to fully develop their oral communication skills by taking on roles like "ambassadors of communication" and promoters. Moreover, schools can establish close partnerships with tourism companies and cultural institutions to jointly launch extracurricular talent development programs. Through this school-enterprise collaboration model, more practical opportunities and broader employment channels can be provided for students.

Cultural and tourism integration, as the name suggests, is a development model that closely combines the two fields of culture and tourism. This model not only allows tourists to relax and enjoy a wonderful travel experience during their journey but also, more importantly, enables them to subtly feel the rich cultural heritage of different places, thereby enhancing the cultural depth of their travels. From an economic perspective, the integration of culture and tourism has powerfully promoted local economic growth, making the cultural and tourism industry a

new driver of regional economic development. For example, by the end of 2023, Harbins "Ice City" image, Luoyangs "Henan" characteristics, and Tianshuis "Spicy Hot Pot" cuisine all quickly gained popularity. This wave of enthusiasm has not only significantly boosted the development of the tourism and cultural industries but also created numerous job opportunities, driving the prosperity of related industrial chains. More importantly, the integration of culture and tourism provides more people with the opportunity to understand and experience the unique cultures, customs, and natural landscapes of different regions, refreshing the publics perception of Chinese culture and inspiring a love for Chinese culture, thus enhancing national pride and cultural confidence. In this process, oral communication professionals play an irreplaceable role, becoming an important force in promoting the protection and inheritance of excellent traditional Chinese culture, which aligns with President Xi Jinpings call for culturalIt is of great significance to give important instructions on publicity work, build a strong socialist cultural country, tell the story of Chinas beautiful rivers and mountains, explain the essence of Chinese civilization, and write a new chapter of Chinese stories.

As technology continues to advance and develop, the production and dissemination of new media and short videos have become increasingly significant in the field of tourism promotion. Therefore, oral communication professionals must keep up with the times, continuously update and enhance their skills, especially acquiring relevant expertise in new media operations. To this end, we can add specialized courses such as "New Media Marketing for Tourism" and "New Media Video Production and Dissemination" to our existing talent cultivation curriculum system. These courses will systematically teach students how to effectively utilize emerging media platforms like Weibo and TikTok for short video and live streaming tourism promotions. The content includes, but is not limited to, how to efficiently acquire traffic, how to produce high-quality content, and how to create eye-catching presentation formats to attract more tourists and public attention. Additionally, various short video creativity competitions and other professional events can be organized to promote practice through competition, encouraging students to fully leverage their strengths and creativity, and actively participate in various practical activities. Students are encouraged to independently plan and conduct diverse online tourism promotion activities, such as "Cloud Tour of a Place" and "Traveling with Poetry," which are creative live streaming events. Through these rich and varied practical activities, students practical skills will be further enhancedAbility and innovation ability, to lay a solid foundation for their future career development.

In addition to emphasizing the arrangement of general education in cultural literacy and the organic combination of on-campus and off-campus practical teaching, we should also pay special attention to fostering innovative thinking and market sensitivity among oral communication professionals during their training. In the context of the integration of culture and tourism, the tourism market is ever-changing, with new products and services constantly emerging. Market orientation becomes particularly crucial in practice and dissemination. With continuous technological advancements and the amplification of online network effects, phenomena such as the sudden popularity of tourist attractions, the rapid spread of internet memes, and young peoples preference for the Internet of Things all require current oral communication professionals to have keen market insight and a fresh internet perspective, enabling them to promptly identify and seize market opportunities. We can specifically set up courses like "Tourism Market Analysis and Planning" and related activities, teaching students how to conduct scientific market research, deeply analyze tourist needs, and plan innovative tourism promotion activities. At the same time, we encourage students to actively participate in the planning and implementation of tourism projects, allowing them to continuously hone and enhance their innovation capabilities and market sensitivity through practice. Additionally, they need to possess an innovative mindset, closely integrating local characteristics and cultural resources, accurately grasping promotional timing, and being preciseCapture the hotspots of promotion, develop tourism projects and products with strong appeal, contribute to the innovative development of the tourism industry, and at the same time, speak for your "hometown." In general, the integration of culture and tourism offers vast development space and endless possibilities for oral communication professionals. By continuously reforming and innovating talent cultivation models, we can nurture more outstanding oral communication talents who meet the needs of cultural and tourism integration, injecting new vitality and powerful momentum into the thriving cultural and tourism sector.

Finally, we need to pay special attention to the professional ethics and psychological qualities of oral communication professionals. As practitioners in the tourism industry and oral communication sector, their language expression and output require them to have good professional ethics and service awareness. They must treat every tourist, every member of the public, and every stranger with sincerity, calmly handling various unexpected situations that may arise during public presentations and explanations. At the same time, facing complex and changing emergencies and diverse tourist needs, they also need strong psychological resilience and flexible adaptability, as well as the ability to efficiently handle issues and soothe different tourists emotions.

Therefore, we can organize targeted training activities for students professional competence and psychological quality improvement, initiating challenging activities or simulation exercises in college students professional competence courses or interest activities, helping students gradually establish correct professional concepts and communication philosophies, and enhancing their ability to cope with various pressures and challenges.

In summary, the cultivation of oral communication talents under the background of cultural and tourism integration requires a multi-dimensional and in-depth approach. By optimizing course settings, enhancing practical teaching, fostering innovative thinking and market sensitivity, as well as improving professional ethics and psychological qualities, we can cultivate more high-quality oral communication talents who meet the needs of cultural and tourism integration. This will contribute greater strength to the sustained and healthy development of the cultural and tourism industry.

4. Conclusions

In the current era of deepening integration between culture and tourism, oral communication professionals undoubtedly play a crucial role. They not only need to have a solid foundation in language skills, capable of expressing themselves fluently and accurately, but also must possess keen insight and profound understanding of the tourism and cultural sectors. Telling Chinas stories well is not only an inescapable responsibility and mission for every descendant of Huaxia, but also provides a broad platform for oral communication professionals to express and showcase their talents. How to deeply embed the rich traditional culture and long historical heritage into ones heart, conduct in-depth research and study, and combine this with the language skills learned in their field to present unique perspectives and charm, is a systematic project that requires long-term effort, continuous accumulation, and deep-rooted commitment. Therefore, the cultivation of oral communication professionals should not remain superficial; it needs to be more specific, meticulous, and profound, focusing on enhancing overall quality and strengthening professional skills, to nurture more outstanding oral communication professionals who can meet the demands of the integrated culture and tourism era.

President Xi Jinpings proposal on cultural thought provides a powerful ideological weapon and a scientific guide for action for cultural workers to do a good job in propaganda, ideology, and culture work in the new era and on the new journey, and to shoulder new cultural missions. This thought not only points the way for artistic creation but also injects new vitality into cultural inheritance and innovation. As future builders of the country and the main force in the frontlines of propaganda, ideology, and culture, contemporary college students bear the heavy responsibility of inheriting and promoting fine traditional Chinese culture. In the talent cultivation programs of media colleges, the teaching and practice of broadcasting and hosting majors need to focus more on cultivating talents with oral communication skills to meet the demands of cultural development in the new era. As full-time teachers of broadcasting and hosting majors, how to guide students to fully leverage their professional strengths and advantages in course teaching and extracurricular practice, assist in cultural dissemination, contribute to the integration of culture and tourism, and cultivate oral communication talents that meet the new eras new ideas, is not only the professional mission of university teachers but also an important way to help students expand their professional competence and broaden employment channels. Applying what they learn, under the backdrop of the integration of culture and tourism, talent cultivation oriented towards output has become one of the important ways for universities to deliver applied talents to society in the new period. Through this training model, it can not only..It can not only improve students comprehensive quality and practical operation ability, but also provide strong talent support for the prosperity and development of cultural industry.

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The Bidirectional Value Return of Education and Technology: The Review and Integration Path of Intelligent Education

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Abstract: ***With the development of artificial intelligence, technology applications have gradually penetrated into educational scenarios. The application of artificial intelligence in the field of education, education is advertised by the pronouns of "efficiency", "precision" and "individuality". However, technology is a double-edged sword. The educational application of technology should be carried out under the premise of fully respecting the value of education, and should not be constrained by the "efficiency", "precision" and "individuality". Based on the analysis of the alienation phenomenon in the application of artificial intelligence, this article conducts a reflection on the return to the origin of education from the perspectives of ontology, axiology, life theory and technology theory. Finally, it is proposed that education in the era of artificial intelligence should adhere to the people-oriented nature of education, respect the experience of life growth, focus on students' experiential learning, form a diversified evaluation orientation of generative learning, realize the Bidirectional value return of artificial intelligence and education, and promote the healthy growth of individual life.***

Keywords: Artificial intelligence, Life value, Experiential learning, Life growth, Value return.

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1. Introduction

With the continuous advancement of educational informatization, the educational innovation led by core technologies such as big data analysis, deep learning, emotional computing and semantic recognition has been very popular and highly praised by education practitioners and education enterprises. Keywords such as efficiency, precision, intelligence and personalization have gradually become the goals that education should pursue. Precision teaching based on big data analysis technology collects, processes and analyzes the data generated in the learning process through internal algorithm models, thereby forming decisions. Personalized teaching can comprehensively record, analyze and visualize students' learning behaviors, learning foundations, learning preferences and learners' other characteristics, establish learning models for different learners, and provide personalized learning paths [1], thus generating learning content suitable for learners. Generative AI answers can replace some of the teacher's work such as homework grading, answering questions and preparing lessons intelligently. The popularization of these educational applications has promoted students' learning to a certain extent, liberated teachers' teaching, and greatly improved the effectiveness of teaching practice.

However, the original intention and value of education are prominently manifested in "educating people" and promoting the growth of students' lives. Jaspers once said that education is the education of the human soul, "one soul awakening another soul." The meaning of education is to awaken learners' life consciousness, stimulate life awareness, and cultivate learners' ability to understand and transform the world. Behind this beautiful encounter between education and technology, the blind worship of technological tools allows the scientific nature of education to be fully utilized, but ignores the nurturing nature of education. The imbalance between technology and education will lead to excessive commonality enforcement, weak innovation ability cultivation, and excessive emptiness in education. Therefore, current education urgently needs to return to the essence of education, rethink

the relationship between technology and education, combine the rational dimension of education with the limits of technology, and explore the path of integrated development of education and technology.

2. Analysis of the Phenomenon: Alienation of Educational Application

With the continuous development of technology, AI technology, data mining, knowledge graphs, emotional computing and other technologies are constantly being applied to education, providing a powerful engine for the innovative development of education. The concepts of learning, teaching, curriculum, teachers, students, schools, evaluation, quality and educational development will all face reconstruction [2]. In the process of deep integration of education and technology, various educational concepts are constantly being deconstructed and reconstructed. The "overstepping" or "misalignment" of technology will inevitably lead to the phenomenon of education being alienated by technology.

2.1 Precision Teaching Curbs People's Free Development

Precision teaching was proposed by American psychologist Lindsley in 1960 based on Skinner's behavioral learning theory. It is a method based on specific teaching objectives, which collects, cleans, integrates and converts teaching and learning behavior data, accurately evaluates students' learning status, and finally generates targeted, scientific and precise teaching strategies. In the whole process, the teaching process is complex, the measurable factors of the learning subject are various, and the measurement of learning behavior content is refined. Early precision teaching was difficult to popularize due to technical conditions such as difficulty in recording and cumbersome operation. With the development of information technology, precision teaching's educational algorithm models continuously optimize, which results in the measurability, interpretability and accuracy of students' cognitive, emotional and behavioral data being enhanced. Teachers can adjust teaching content and teaching strategies based on system feedback, and finally achieve teaching goals after continuous revision. It is undeniable that precision teaching can solve the one-dimensional and inefficient evaluation problems in the small data era to a certain extent [3], and improve teaching efficiency, especially in reading and mathematics teaching, showing great superiority [4]. However, the core of precision teaching is the degree of refinement, labeling and measurability of knowledge points, and the goal is to use technology to control students' learning and meet the established teaching goals. Therefore, this teaching strategy strengthens the importance of "standards" rather than weakening them, and uses educational goals and educational standards to constrain "educational freedom". This is like military training, where each soldier practices according to the same action standard, and finally trains a uniform army. What modern society needs is people with innovation and adaptability to changes. Precision teaching based on the principles of standardization, process and efficiency seems to be stretched in terms of cultivating the abilities of people with the characteristics of the new era. "Standardization" is more likely to make the people trained more like machines rather than more like people, which is obviously contrary to the original intention of education.

2.2 "Personalized Teaching" Weakens the Cultivation of People's Innovative Thinking

What makes a person a person is that he is unique and special. Therefore, personalized teaching and teaching students in accordance with their aptitude have always been the ideals pursued by education. However, due to the limitations of educational conditions at that time, "teaching students in accordance with their aptitude" was difficult to implement on a large scale. Nowadays, with the change of teaching paradigm, the concept of personalized teaching has become the mainstream thought in education. It is consistent with the educational thought of "teaching students in accordance with their aptitude". It refers to a teaching model that takes students as the main body, attaches importance to students' subjectivity, respects students' individual differences, and meets students' different needs [5].

Personalized teaching first appeared in the personalized teaching system proposed by Keller [6]. It is based on technologies such as big data and knowledge graphs, and aims to create a system that "understands" learners. This can reduce students' learning burden, stimulate learners' learning interest, and improve learners' satisfaction to a certain extent. However, technology is something that cannot think like humans. Its "understanding" depends on "algorithms". Using "algorithms" to analyze learners' preferences is to think about educational practice completely from the perspective of learners, lacking the most basic value judgment. Moreover, human emotions, consciousness, behavior and actual teaching scenarios are a complex educational ecosystem. Personal emotional judgments and behavioral choices are highly unique and uncertain. This "feeding" teaching method abandons the complexity and life characteristics of education itself, weakens students' autonomous learning ability, is not

conducive to the cultivation of new era literacy, and ultimately regresses to the educational training paradigm of the industrial era.

2.3 AI-assisted Learning Hinders Students' Deep Learning

As technology continues to promote the innovative development of education, the structure of educational practice has also changed. Educational practice activities that are highly programmed and reproducible, such as homework grading, answering questions, and intelligent lesson preparation, are being replaced by technology. The technological advantages of fast response speed, low fault tolerance, and high efficiency occupy a dominant position in education. If the value of education is merely the function of imparting knowledge, then technological substitution is undoubtedly a good choice. However, education is an organic unity of knowledge imparting and value guidance. Value guidance, as the shaping of human souls, occupies a dominant position in education, while the essence of technology lies in the establishment of technical standards, the operation of technical procedures, and the creation of a technical environment [7], and does not have human attributes.

In the process of human-computer collaboration, AI solutions can only generate answers based on pre-programmed rules and algorithms, and cannot understand and solve problems through language and emotional communication like humans. This generative solution lacks communication and emotional resonance, is not inspiring, and may even hinder people's imagination. Imagination is a specific mode of internal state and cognitive process possessed by humans, and is a necessary condition for human existence [8]. In addition, AI solutions can often only provide shallow knowledge and experience, and cannot guide learners to think and learn in depth. This may cause learners to remain in a shallow learning state. Deep learning is to trigger students' thinking through teacher-student interaction, stimulate students' learning initiative and participation, and teachers and students jointly reconstruct and create the meaning of knowledge, rather than a simple dialogue. This process is inspiring, communicative and emotional. In the process of deep interaction, teachers and students exchange knowledge, spirit and wisdom, awaken learners' consciousness, stimulate life power, and demonstrate and promote the meaning of life. This is the value of education.

3. Philosophical Reflection: Bidirectional Value Return of Education and Technology

In the field of education, the updating and replacement of teaching tools also means changes in the teaching structure and the deep meaning of teaching [9]. Driven by technological tools, the balance of educational value gradually tilts towards educational efficiency, teaching strategies and academic achievement. Students' mental and psychological qualities are estimated by data, while the human soul and life value are excluded from the "algorithm", resulting in the neglect of the individual's spiritual world and personal dignity, and the "torn apart" of individuals with life meaning by technology [7]. As an extension of the human cognitive world, technology should play an objective role, not dominate education. In the process of technology constantly accelerating the reform of education, we have to return to the origin of education, carefully think about the origin of education, and rationally view technology to promote the bidirectional value return of education and technology.

3.1 Ontology: Adhering to the Principle of "Being Human"

Educational ontology is a study of the origin, essence, existence and development of education. In different periods, influenced by social and economic systems and culture, educational ontology has evolved from "thinking ontology" to "generative ontology". Under "thinking ontology", the meaning of human existence in education is to master knowledge and understand the external world, while "generative ontology" is guided by Marx's dialectical materialism and emphasizes that education is a life process in which teachers and students create the meaning of life [10]. Based on the materialist historical view of the origin of education, some scholars have proposed that education is the self-directed transmission of the super-biological experience that humans have acquired, thereby promoting the formation of individual people, promoting the development and perfection of the entire human race, and realizing the reproduction and re-creation of human beings [11]. From the above explanation of the essence of education, it can be seen that the subject of education is human beings.

As an educational object, human beings have complex attributes. Marx pointed out that human beings are the sum of all social relations. It includes human natural attributes and social attributes. Natural attributes refer to human beings' internal attributes, which are innate. The internal structure of the human body is quite complex. Physiological psychology research has found that the human brain is a complex structure, and the nervous system is an extremely complex functional system composed of neurons [12]. From the perspective of cognitive

psychology, cognition is a complex system composed of perception, memory, reasoning and other activities. They do not regard cognition as a single activity, but as a complex system composed of a group of related activities [12]. Social attributes refer to the sum of the relationships between people based on educational practice. They are acquired, changing and developing, and are not eternal and unchanging.

The characteristics of human beings are the richness, subtlety, diversity and multifacetedness of their nature [13]. Human diversity leads to the complexity of education, which has the characteristics of openness, diversity, nonlinearity, emergence and chaos [14]. However, the algorithmic thinking of current technology is linear, logical and preset, and cannot handle educational practice activities with divergent characteristics such as emotional attitudes, values and free will. In the process of interaction with learners, technology lacks emotional resonance and is not inspiring. Therefore, in the process of educational practice, we need to be people-oriented, pay more attention to people's psychological growth and value formation, and look at the applicability of technology rationally, do not blindly exaggerate the application effect of technology, use technology applications reasonably, and avoid dependence on technology and learning inertia.

3.2 Axiology: The Challenge of Talent Mission to Technology in the New Era

Value is the real relationship between the needs of the subject and the attributes of the object. In the field of education, different perspectives, different subjects, and different times will produce different educational values. From a social perspective, the social demand for talents is the value of education. With the advent of the era of artificial intelligence, the social industrial structure has undergone tremendous changes. Labor-intensive industries are constantly transforming. Rapid knowledge updates and the replacement of replicable labor by technology have become the main characteristics of this era. Independent thinking ability, innovation ability, and moral literacy, which are difficult to acquire through technology, have become the value of education. The reports of the 18th and 19th National Congresses of the Communist Party of China both pointed out that "cultivating morality and educating people" is the fundamental task of education. This undoubtedly gives the value-leading function of education a basic, central, and leading position in the various tasks of education development in the new era [15].

Educational practice should focus more on the cultivation of innovative ability, rather than just the imparting of knowledge. Innovative ability is not a single ability, but a comprehensive ability of many factors such as knowledge, skills, emotions, and thinking. It is a huge engine that drives social development. People acquire survival skills and innovative ability through education. The higher the level of education, the stronger their ability to adapt to and transform society. After entering society, people constantly update their knowledge and abilities in the process of labor, continuously transform society, and continuously promote social development. In the "dual intelligence" world where human intelligence and artificial intelligence coexist [16], rational thinking such as experience induction and logical reasoning can be easily recognized by artificial intelligence and easily replaced [17]. Innovative ability, a combination of rationality and sensibility that is different from machines, is even more precious.

In traditional education, emotions and experiences are transmitted through the interaction between teachers and students, and finally the process of value shaping is completed. The intervention of technology has broken the traditional teaching structure based on teachers and students, and formed a "three-dimensional interactive" teaching relationship between teachers, technology and students. The intervention of technology with procedural, dependent and emotionless attributes has weakened the teacher's function of imparting knowledge and solving doubts. The visibility and measurability brought by technology have gradually lost the humanistic dimension of education. Under the requirements of the era of moral education, technology-only education is not feasible. The application of technology needs to be based on value education, uphold the position of instrumentalism, use technology as a medium, and build a bridge of communication between teachers and students. It should be known that the demand for talents in the new era society is not only the demand for skills and knowledge, but also ideology and value orientation are the most important goals in talent training.

3.3 Life Theory: Shaping Life is the Starting Point and Destination of Technology

The object of education is human beings. General Secretary Xi Jinping pointed out that "what kind of people to cultivate, how to cultivate people, and for whom to cultivate people" are the fundamental issues of education. Tracing back to the source, the origin of education is life. The definition of life in Western philosophy is a complex of body and consciousness. Human beings and animals are both life, but they are essentially different. Human beings have "human" attributes, which are a collection of generative, creative, social and other attributes. That is,

human beings are unspecified, uncertain and incomplete [18]. Human beings will not always be in a certain state, but will constantly improve themselves and break through themselves in the process of social interaction with the surrounding environment, and at the same time generate new selves, and so on, and finally achieve self-realization.

In fact, human self-realization is the self-transcendence of life. In addition to its natural attributes, life also focuses on its "value" attributes, which are mainly manifested in the transcendent nature of human beings and their pursuit of truth, goodness, and beauty, and ultimately tend to the realization of freedom [18]. As another form of life existence, value life has a strong connection with society and culture. It is through education that cultural and social attributes are added to life, making individual life socialized, personalized, and professional. Facing life, respecting life, shaping life, and promoting life's "life consciousness" are the foundations of education.

Technology is an external force of education. It aims to serve education and takes the growth of human life as its starting point and destination, rather than the production of goods centered on technology. "The object of education of the ancients was the true nature of life, the content of education was the study of life, and the path of education was from the inside out [19]." Maslow's hierarchy of needs theory divides personal growth into intrinsic motivation and extrinsic motivation. Intrinsic motivation is the motivation of people to understand and explore the world. It comes from the motivation of the origin of life. Intrinsic motivation is the external motivation of people. It is not sustainable and needs to be stimulated and strengthened by external events continuously. The growth of individual life is a complex process generated from within, which requires multiple transformations of behavior, thinking, and thoughts [20].

Technology is an external thing. In the process of human learning, it is an external motivation of human beings. If it is separated from the self-consciousness of life growth and excessively strengthens the role of external motivation through control and discipline, it will not benefit the growth of individual life. In the process of human-machine collaboration, people should be the main body and technology should be auxiliary. We should always care about life, awaken people's life consciousness, stimulate people's inner "life consciousness", "realize and enhance people's life value, and demonstrate and promote the meaning of people's life" [7].

3.4 Technology Theory: Eliminating the Corrosion of the Concept of Technology First

Since its emergence, technology has been an extension of human understanding of the world, and its purpose is to improve efficiency. In the era of artificial intelligence, educational applications are created to improve the efficiency of knowledge transfer. Its acceptance depends on whether it narrows the gap between educational output and educational preset goals, and whether it helps education complete more tasks in a shorter time [21]. In addition, the manifestation of educational applications is "computationalization", which is essentially based on quantification of positivism. Its internal core has a set of quantitative standards. Its process is to collect, process, and analyze data such as students' behavior, language, and learning results in educational practice to obtain students' learning status and make educational decisions. In the practice of artificial intelligence educational applications, "standardization" abandons the diversity and complexity of people and promotes the unification and homogenization of people. Moreover, "the value positioning of prediction may lead people to data determinism, which is prone to the 'labeling' effect [22]." Although we always emphasize that all data-based teaching evaluations are objective, we must remember that data is impersonal and meaningless in itself. Its meaning still comes from the people who analyze it.

Education is a special field. Human thinking, emotion and behavior are a complex system. The complexity of human beings will inevitably lead to the complexity of education. The complexity of education should not be labeled as efficiency. "We need to pursue tasteful and spiritual practices in a slow process and guide students to experience learning [23]." Excessive worship of technology will reduce education to mechanized knowledge indoctrination and skill training. It will also become a shackle that constrains students' thinking and innovation, making education monotonous and homogenized, and resulting in education without its soul. Therefore, in the future process of integrating artificial intelligence and education, it is necessary to find a balance between the rationality of technical tools and the humanistic dimension of education to promote the high integration of technology and education.

4. Possibilities and Boundaries: Integration of Education and Technology

Artificial intelligence is based on algorithms and represents objective things according to preset standards. It is a rational behavior activity. Although machine learning attempts to simulate and realize human thinking and learning,

its non-human attributes are still its main characteristics. In educational activities, education is both educating and scientific. Being educating means that education can evoke relevant images in the minds of learners, promote human thinking activities, and give people a beautiful life growth experience, thereby gaining a certain value of life. Being scientific means that education has its own educational laws and is a rational behavior that conforms to the laws of natural development. The application of artificial intelligence cannot cross the boundaries of educational science. If artificial intelligence occupies a dominant position and education is only data-based and standardized, it will stifle human freedom and cause education to deviate from the normal track. Therefore, we must clarify the "can" and "no" of artificial intelligence, actively integrate and seek change.

4.1 Adhering to the People-Oriented Nature of Education

Technology is a "double-edged sword". Whether the technology is used appropriately or not determines whether it promotes or inhibits education. In the process of the mutual development and integration of technology and education, education often suffers from "travails". The appearance of these "travails" is often the result of the conflict and mutual adjustment between different technology applications and educational concepts. In essence, it is the mutual game of "subject status" between educational subjects. Therefore, in the process of technology intervention in education, we must always adhere to the people-oriented principle and respond to the "ever-changing" technology with the unchanged essence of education.

On the one hand, technology should be based on respecting life and enhancing life vitality. The value of life is the basic value of education, and the spiritual energy of life is the basic component of educational transformation. The intrinsic and transcendent nature of life is destined to be incalculable by technology. Talking about technology without considering the life characteristics of education will make education take the path of data-only and efficiency-only values. If life is forcibly symbolized and materialized, individual students will become the object of education and the product of technology, losing their unique personality and vitality. Education will take the path of industrialized production, which violates the objective laws of education. Therefore, we should make it clear that technology is only an auxiliary means of education, not the core of education. In the process of education, we must adhere to the people-oriented nature of education, respect the life characteristics of individual students, and pay attention to their growth and development. Through personalized teaching methods, guide students to explore their potential and interests, cultivate students' innovative ability, and make them people with "vitality".

On the other hand, education should actively accept the advantages of technology with an inclusive attitude. The integration of information technology such as artificial intelligence and knowledge graphs with education has become an inevitable trend. In this irreversible trend, education should actively accept the integration of technology based on the principles of innovation, inclusiveness and fairness. In the process of human-machine collaboration, we should properly handle the relationship with technology and do a good job in positioning our role in the field of education. As an extension of human understanding of the world, technology has been used to make up for human defects and transform nature since its production. As a natural person, the cognitive load of the brain leads to limited ability to receive and store information, and technology can completely overcome this defect. Linear, reproducible and repetitive work can be replaced by artificial intelligence. However, the unique human field based on nonlinearity, thinking and emotionality of innovation cannot be replaced by artificial intelligence. This aspect is the role positioning in the "human-machine" relationship that we need to consider.

It can be seen from this that in the process of human-machine collaboration, we should grasp the value of education, make use of the technological advantages of artificial intelligence and the natural human advantages of teachers, seek the balance between technology and education, promote the complementary advantages of the two, and pursue educational efficiency under the healthy growth of individual life.

4.2 Focusing on Students' Experiential Learning

The significance of education is to enable students to experience and personally go through the process of life growth. In modern cognitive science, the embodied cognition view represented by Merleau-Ponty believes that the concepts of "perception" and "body" occupy an extremely important position. "Perception" is the core foundation of human cognition, and "body" is the greatest prerequisite for the realization of "perception". It is a subjective existence with perceptual consciousness [24]. People produce perception and cognition through the interaction between the body and the world [25]. Embodied cognition emphasizes the importance of the body in the cognitive process, which can be understood from three aspects: "embodiment", "contextuality" and "experience": "embodiment" of cognition means that the body actively participates in cognitive activities during

the cognitive process, not passively; "experience" of cognition refers to the feelings and experiences of the body during the cognitive process, that is, the body experience shapes the content, method and result of the subject's cognition [26]; "contextuality" of cognition emphasizes that the learning situation in which the body is located has an important influence on cognitive activities, which can trigger the participation of multiple sensory channels such as hearing, vision and smell, thereby strengthening the subject's cognitive state. Based on this, the core of experiential learning is that the construction of knowledge is achieved through individual personal experience, emotional involvement and in-depth interaction with specific situations. This learning method emphasizes students' learning initiative and participation.

In the process of experiential learning, rich teaching situations can play a huge role in promoting teaching. Rousseau paid great attention to the educational environment in the process of educating Emile [27]. The intervention of technology has brought unlimited possibilities for the construction of rich and interactive learning environments and learning experiences. It can arouse students' learning interest and enhance their learning experience by creating a rich learning environment. For example, virtual reality technology has the characteristics of immersion, interactivity and imagination, which provides unlimited possibilities for enhancing students' learning experience. It can be used to represent abstract knowledge in concrete forms or simulate real scenes that are usually inaccessible, providing students with opportunities to give full play to their life experience and conduct situational learning. Tools such as knowledge graphs and semantic networks can help learners understand the semantic relationship between various viewpoints and deepen their understanding of knowledge. Generative artificial intelligence, with the help of natural language processing technology and through a large amount of data training, can respond to students' confusion in the learning process in a timely manner and provide personalized learning resources. In the teaching process, teachers can stimulate students' interest, enhance their learning experience and improve their learning involvement by setting reasonable, challenging and spiral learning tasks and using appropriate technical means. Through human-computer collaboration, we insist on taking people as the main body and technical tools as the auxiliary, integrate the rationality of technical tools with the rationality of educational values, and transform "feeding-style" learning into experiential and personal learning, enhance students' emotional experience in the learning process, and ultimately promote the healthy growth of students' individual lives.

4.3 Practicing a Diversified Evaluation Approach for Generative Learning

As big data has become popular, some scholars advocate that everything can be measured, emphasizing the authority, objectivity and importance of big data analysis. However, we can easily find that some so-called mature data analysis is actually based on quantitative analysis of learning results, such as taking students' academic performance, online click-through rate, viewing time, number of discussions and other online learning behaviors as the basis for evaluation, and finally forming a learning analysis report after simple processing. This single-dimensional evaluation system cannot truly reflect the students' growth level.

Education is a complex and dynamic system that has both scientific and educational characteristics. The scientific rationality of education can be quantified by data, while the educational nature of education emphasizes more on the humanistic dimension of education and cannot be quantified by data. Therefore, evaluation cannot be simply a single quantitative evaluation, but requires a combination of quantitative and qualitative methods, combining the objective data of positivism with the subjective ideas of interpretivism, to achieve a transformation from result-oriented evaluation to process-oriented evaluation, and to comprehensively evaluate the students' growth process.In terms of quantitative evaluation, we should emphasize the accuracy and reliability of data, and conduct "value-added evaluation" on students' academic performance, professional ability, physical fitness and language ability through scientific statistical analysis or data analysis models. Quantitative evaluation also needs to respect individual differences of students, that is, it should fully take into account the unique starting point and differentiated growth trajectory of individual students, and cannot adopt a " one-size- fits-all " evaluation standard. It is necessary to conduct personalized evaluation according to the specific situation of students. In terms of qualitative evaluation, we should pay attention to the insight and understanding of students' subjective experience, pay attention to students' inner world and growth needs, and deeply analyze the growth of students' emotions, attitudes, values and other non-quantitative aspects through in-depth observation, interviews, text analysis and other evaluation methods. The teaching process is a dynamic and generative knowledge generation process. The student subject constantly evolves and develops in the interaction with teachers and classmates, and jointly constructs knowledge. Therefore, teaching evaluation should take generative learning as the basis and construct a multi-subject and diversified evaluation model in which teachers, classmates and students themselves participate.

In addition, education is a beautiful process of awakening life consciousness and realizing the value of life. It focuses on the process of enjoying life growth rather than the final result. Evaluation based on learning results has deviated from the original intention of education. We should refocus on students' generative learning evaluation and attach importance to students' learning and growth process. Teaching evaluation is a means of discovering learning problems and a way to promote learning. Teaching evaluation aims at increasing students' knowledge and abilities, not proof or accountability [28]. We should avoid putting the cart before the horse and using evaluation as a tool to assess whether students are good or bad, and fall into the trap of data-only theory.

5. Conclusion

2022 is considered by scholars in the industry to be the first year of the development of artificial intelligence. The application of technologies such as AI and big data analysis technology in the field of education is booming. The human-machine collaborative education model will inevitably be the norm in the future. We should actively welcome the arrival of artificial intelligence rather than passively accept it. Active acceptance can enable education to occupy a major position in the entire process of educational development, and enable in-depth understanding and active pursuit. This article examines the relationship between education and technology from the perspectives of ontology, axiology, life theory, and technology theory. It advocates that when dealing with the relationship between education and artificial intelligence, education should not exaggerate the technical advantages of artificial intelligence and fall into the process-based and standardized industrial production cycle of "efficiency", "precision" and "personality". Instead, it should adhere to the essence of education, respect the laws of educational development in a way that remains unchanged in the face of ever-changing situations, actively explore the path of integrated development of artificial intelligence and education, so that technology and people can form two effective forces, realize the bidirectional value return of education and technology, and jointly promote the healthy and happy growth of individual life.

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