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Thoughts and ideas on Curriculum Construction in Private Colleges Based on TOPSIS Analysis

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Abstract: This study aims to explore the relationship between course types in private higher education institutions and those in social education settings through the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). It seeks to provide practical recommendations for course development in private institutions. The paper begins by highlighting the significance and challenges faced by private higher education institutions in the realm of higher education. It then elaborates on the principles and applications of the TOPSIS algorithm, using it as a foundation to analyze the current state of course types in private institutions. By comparing these with social education course types, the study reveals potential gaps in the current curriculum design, offering theoretical support for enhancing the educational quality of private institutions. Finally, a series of recommendations for course development in private higher education institutions are proposed to promote sustainable growth and improve social integration.

1 Introduction

With the continuous development of higher education, private colleges play a crucial role in meeting student demands, enriching educational options, and promoting educational diversity. However, private colleges still face challenges in curriculum development and require a better understanding and analysis. This study aims to delve into the curriculum types of private colleges, utilizing the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) as a tool to support the improvement of educational quality and social integration in private colleges. The purpose of this study is to reveal the current state of curriculum types in private colleges and their relationship with those in socially run schools through TOPSIS analysis, thereby providing feasible suggestions for curriculum development in private colleges. This research holds significant policy and practical implications, promising to drive forward the development of the higher education sector.

2 Introduction to Relevant Background

2.1 The Role of Private Colleges in Higher Education

Private colleges, as an essential component of the higher education system, have played a pivotal role in meeting the ever-increasing demand for education in recent years. Compared to public institutions, private colleges offer greater flexibility in catering to the diverse needs of different student groups. This flexibility encompasses more diversified curriculum offerings, more accessible admission policies, and more agile teaching methods. Private colleges have played an active role in filling gaps in educational resources, promoting social diversity, and providing more options. However, private colleges also face challenges, one of which is curriculum development[1]. While different private colleges may have unique curriculum setups, ensuring these curriculum types align with student and societal demands, as well as enhancing educational quality, remains an issue requiring in-depth research.

2.2 Application Areas of TOPSIS

The Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is a mathematical method used to compare the similarity between different data points, and it has a wide range of applications across multiple fields. In this study, TOPSIS will be utilized to analyze the curriculum types of private colleges. The strength of this algorithm lies in its ability to quantify the similarity and difference between different data points, thereby providing robust support for decision-making. In other fields, TOPSIS has been successfully applied in areas such as face recognition, natural language processing, bioinformatics[2]. This demonstrates its potential in analyzing and comparing data, especially when dealing with large datasets and complex information.

2.3 Relationship Between Previous Research and This Study

In previous studies, some scholars have focused on the role and challenges faced by private colleges. Their research primarily concentrated on the historical development, educational quality, and admission policies of private colleges, but in-depth analyses of curriculum types were relatively scarce. This study aims to fill this research gap by applying the TOPSIS algorithm to the analysis of curriculum types, revealing potential issues and suggesting improvements. This complements previous research and contributes to a comprehensive understanding of the role of private colleges in higher education [3]. By delving into the curriculum types of private colleges and leveraging the TOPSIS algorithm, this study is expected to provide additional data support and practical recommendations for the development of private colleges, thereby enhancing their educational quality, meeting evolving student demands, and fostering better integration between private education and societal needs.

3 Methodology

3.1 Principle of TOPSIS

To conduct an in-depth analysis of the curriculum types in private colleges, TOPSIS algorithm is employed. This algorithm is a mathematical tool used to compare the similarity and dissimilarity between different data points. Its principle lies in calculating the distance between each data point to determine their degree of correlation. In this study, the algorithm will be applied to compare different curriculum types, providing insights into the construction of private colleges.

3.2 Data Collection and Processing

This study intends to obtain curriculum data from various private colleges, including course names, syllabi, credit requirements, and other relevant information. These data will be used as inputs for subsequent analysis. To ensure the accuracy and comparability of the data, consistent data collection standards will be adopted to avoid data noise and errors.

3.3 Analysis Framework for Curriculum Types in Private Colleges

During the analysis of curriculum types, the data will undergo cleaning and preprocessing to ensure its quality and consistency. The TOPSIS algorithm will then be applied to calculate the similarity and dissimilarity between different courses, identifying patterns and potential correlations between various curriculum types. Additionally, factors such as course difficulty, credit requirements, and course objectives will be considered to gain a deeper understanding of the characteristics of different curriculum types. Through these analyses, the current features of curriculum types in private colleges will be identified, and future development suggestions will be proposed based on their strengths and weaknesses

3.4 Comparison with Curriculum Types in Socially-run Schools

The curriculum types of socially-run schools represent societal demands and trends in the field of education. Comparing the curriculum types of private colleges with those of socially-run schools can determine whether the curriculum types in private colleges align with societal demands and if there are any discrepancies[4]. By analyzing these gaps through algorithms, areas for improvement can be identified, and constructive suggestions can be made. This will enable private colleges to better meet student needs, improve educational quality, and promote the integration of private college curricula with those of socially-run schools, thereby facilitating the sustainable development of higher education.

4 Analysis of Curriculum Types in Private Colleges

4.1 Overview of Current Curriculum Types

Similar to other types of institutions, private colleges also include basic courses such as English, advanced mathematics, and computer theory to ensure students possess fundamental knowledge. Building upon this foundation, discipline-based foundational courses encompass economics, finance, accounting, management, and other subjects closely related to various majors, providing support for students' further professional studies. In terms of practice and innovation, private colleges focus more on employment-oriented training, emphasizing the cultivation of practical operation and problem-solving abilities, as well as helping students explore their interests and strengths to guide their targeted development.

4.2 Application Process of TOPSIS

4.2.1 Determining Evaluation Indicators

•**Basic Knowledge Coverage**: Ensures students master necessary general knowledge, such as English, advanced mathematics, and computer theory.

•**Professional Support**: The degree to which discipline-based foundational courses are closely related to professional studies, **such** as economics, finance, accounting, and management.

•**Practical Innovation Ability**: Whether courses emphasize practical operation, problem-solving skills, and helping students explore their interests and strengths.

•**Employment** Orientation: Whether courses are employment-oriented and can effectively enhance students' employment competitiveness.

4.2.2 Constructing the Decision Matrix

Assuming there are three curriculum development strategies (A, B, C), they are scored on the above four indicators (on a scale of 1-10) to construct the following decision matrix:

Strategy/Indicator	Basic Knowledge Coverage	Professional Support	Practical Innovation Ability	Employment Orientation
A	8	7	6	9
B	9	8	7	8
C	7	9	8	7

4.2.3 Determining the Ideal and Negative Ideal Solutions

The ideal solution is the maximum value among all indicators, while the negative ideal solution is the minimum value.

Ideal Solution:{9,9,8,9}

Negative Ideal Solution:{7,7,6,7}

4.2.4. Calculating Distances

Calculate the distances from each strategy to the ideal and negative ideal solutions using the Euclidean distance formula:

Distance from Strategy A to the Ideal Solution:

$$D_A^+ = \sqrt{(8-9)^2 + (7-9)^2 + (6-8)^2 + (9-9)^2} = \sqrt{9} = 3$$

Distance from Strategy A to the Negative Ideal Solution:

$$D_A^- = \sqrt{(8-7)^2 + (7-7)^2 + (6-6)^2 + (9-7)^2} = \sqrt{5}$$

Distance from Strategy B to the Ideal Solution:

$$D_B^+ = \sqrt{(9-9)^2 + (8-9)^2 + (7-8)^2 + (8-9)^2} = \sqrt{3}$$

Distance from Strategy B to the Negative Ideal Solution:

$$D_B^- = \sqrt{(9-7)^2 + (8-7)^2 + (7-6)^2 + (8-7)^2} = \sqrt{7}$$

Distance from Strategy C to the Ideal Solution:

$$D_C^+ = \sqrt{(7-9)^2 + (9-9)^2 + (8-8)^2 + (7-9)^2} = 2\sqrt{2}$$

Distance from Strategy C to the Negative Ideal Solution:

$$D_C^- = \sqrt{(7-7)^2 + (9-7)^2 + (8-6)^2 + (7-7)^2} = 2\sqrt{2}$$

4.2.5 Calculating the Relative Closeness

Relative Closeness: $C_i = \frac{D_i^-}{(D_i^+ + D_i^-)}$

Relative Closeness of Strategy A: $D_A = \frac{\sqrt{5}}{(3+\sqrt{5})} \approx 0.43$

Relative Closeness of Strategy B: $D_B = \frac{\sqrt{7}}{(\sqrt{3}+\sqrt{7})} \approx 0.65$

Relative Closeness of Strategy C: $D_C = \frac{2\sqrt{2}}{(2\sqrt{2}+2\sqrt{2})} = 0.5$

4.2.6. Conclusion

According to the calculation results of the TOPSIS algorithm, Strategy B has the highest relative closeness (0.65), making it the optimal strategy among the three. This implies that private colleges should place greater emphasis on the balanced development of basic knowledge coverage, professional support, practical innovation ability, and employment orientation in their curriculum development, particularly in maintaining high levels of basic knowledge coverage and professional support while strengthening the cultivation of practical innovation ability and employment orientation.

4.3 Comparison with Curriculum Types in Socially run Schools

4.3.1 Balance between Basic Knowledge and Professional Support

Both private colleges and socially run schools emphasize providing students with necessary basic knowledge, such as English, advanced mathematics, and computer theory, to ensure students possess a broad range of general knowledge. In terms of professional support, private colleges offer courses such as economics, finance, accounting, and management closely related to various majors to support students' further professional studies. Socially run schools may also have similar curriculum settings, but the specific content and depth may vary.

4.3.2 Emphasis on Practical Innovation and Employment Orientation

Private colleges place greater emphasis on practical innovation and employment orientation in their curriculum development, as reflected in the design of more employment-oriented courses and the emphasis on the cultivation of practical operation and problem-solving abilities. Socially run schools may also focus on practical innovation and employment orientation, but there may be differences due to school positioning, resource conditions, etc. Some socially run schools may be more flexible and able to adapt to market demands more quickly, offering more targeted courses and training.

4.3.3 Diversity and Flexibility of Curriculum Types

Private colleges may offer more diverse and flexible curriculum types, capable of being adjusted and optimized according to market demands and student interests. Socially-run schools also typically exhibit considerable flexibility, able to respond quickly to market changes and provide a variety of courses and training programs. However, the specific diversity and flexibility of curriculum types may vary by school.

4.3.4 Differences in Evaluation and Improvement Mechanisms

Through the analysis of the TOPSIS algorithm, we can see that private colleges may need to consider multiple factors in their curriculum development, including basic knowledge coverage, professional support, practical innovation ability, and employment orientation. Socially run schools may also have similar evaluation and improvement mechanisms for their curricula, but the specific

methods and standards may vary by school. Some socially run schools may place greater emphasis on student feedback and market demands to continuously optimize their curriculum settings.

4.3.5 Conclusion

From the data, private colleges place greater emphasis on the balance between basic knowledge and professional support, as well as the emphasis on practical innovation and employment orientation. In contrast, socially run schools may be more flexible and diverse, capable of quickly responding to market changes and student demands.

5 Construction Analysis

5.1 Challenges in Curriculum Development for Private Colleges

As a pivotal component of higher education institutions, private colleges face various pressures from policies, economics, and future development of both public colleges and socially-run schools, leading to multiple challenges:

Resource Constraints: Compared to public colleges, private colleges often face more severe funding and resource limitations. Their limited funding sources and lack of substantial government subsidies result in constrained investments in curriculum development.

Teacher Quality and Quantity: Due to lower salary and social welfare benefits compared to public and socially run schools, private colleges struggle to attract top-tier talents.

Student Diversity: Students come from diverse backgrounds and academic fields, with varying learning needs and goals. Curricula must adapt to this diversity by offering personalized learning opportunities[5].

Changing Social Demands: Private colleges need to closely monitor market dynamics to ensure their curricula remain valuable. However, the unpredictability of social demands increases the challenge of curriculum development. To adapt to these challenges, private colleges must collaborate with industries to continuously update and improve their course content. These challenges make curriculum development for private colleges complex and demanding.

5.2 Suggestions for Construction

The current stage of social development presents both opportunities and challenges for curriculum development in private colleges. To leverage these challenges for institutional growth, reform, sustainable development, and social integration, this study proposes the following suggestions:

5.2.1. Optimize Resource Allocation and Enhance Capital Efficiency

Given the resource constraints faced by private colleges, it is recommended to optimize resource allocation to ensure funds are used effectively. This can be achieved by attracting external investments, collaborating on the construction of laboratories or training bases, and strengthening cooperation with enterprises to jointly develop curriculum resources and achieve resource sharing.

5.2.2. Improve Teacher Quality and Expand the Teaching Team

Intensify efforts to attract talent by appropriately raising salaries and welfare benefits to attract more high-quality teachers. Establish a comprehensive teacher training system, encouraging teachers to participate in professional training, academic exchanges, and other activities to

continuously enhance their teaching and research capabilities[6].

5.2.3. Enhance Curriculum Diversity and Flexibility to Meet Diverse Student Needs

Offer a diverse range of courses to provide personalized learning opportunities. Beyond introducing new teaching models like online courses, micro-lectures, and MOOCs to break time and space constraints, establish a flexible course selection system and enrich elective course content, encouraging students to choose courses based on their personal circumstances and meet their diverse learning needs.

5.2.4. Closely Monitor Changes in Social Demands and Strengthen Practical Innovation Abilities

Closely monitor changes in social demands, promptly adjust course content and teaching methods to ensure curricula remain valuable. Through project-based learning, internships, and practical training in collaboration with enterprises, strengthen students' practical innovation abilities and encourage their participation in research projects, innovation and entrepreneurship competitions, and other activities to enhance their problem-solving skills.

5.3 Importance of Sustainable Development and Social Integration

By constructing a curriculum system that emphasizes foundational knowledge, professional support, practical innovation, and employment orientation, private colleges cultivate a large number of talents with comprehensive qualities and innovative abilities. These talents not only excel in their respective fields but also quickly adapt to market changes, driving technological innovation and industrial upgrading, injecting continuous vitality into society's sustainable development. Meanwhile, the diversity and flexibility of private colleges' curricula contribute to cultural exchange and integration. Different course types provide a platform for students to engage with diverse cultures and ideas, enhancing their sense of social belonging and inclusivity. This cross-cultural exchange and understanding are crucial for building a harmonious society and promoting integration among different groups.

6 Conclusion

Through an analysis based on the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) algorithm, this study delves into the curriculum types of private colleges, revealing potential issues, potential, and challenges in current curriculum settings. It explores opportunities and room for improvement in curriculum development for private colleges. By comparing with socially-run school curricula, this study provides guidance for private colleges to better meet student and societal needs. To achieve sustainable development in higher education, it calls for concerted efforts from policymakers, education administrators, and private college leaders to take practical measures to improve curriculum development, enhance education quality, and promote social integration among private colleges.

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