

Research on the Theoretical Teaching Quality Evaluation System of Vocational Undergraduate Education Based on Multiple Subjects

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Abstract: With the rapid development of vocational undergraduate education in China, improving teaching quality has become a core goal to cultivate high-level technical and skilled talents. This study focuses on the theoretical teaching of vocational undergraduate education and constructs a teaching quality evaluation system based on multiple evaluation subjects, integrating the CIPP (Context-Input-Process-Product) model, Outcome-Based Education (OBE) concept, and multi-subject evaluation theory. The system evaluates teaching quality across five dimensions: teaching context, teaching input, teaching process, teaching product, and teaching improvement and innovation. Research methods include literature review, expert consultation via the Delphi method, multi-subject questionnaires, and the Analytic Hierarchy Process (AHP) to determine indicator weights and ensure system consistency. Results indicate that teaching process (0.324) and teaching product (0.256) carry the highest weights, highlighting the critical role of classroom implementation, student participation, and learning outcomes in theoretical teaching quality. The multi-subject evaluation mechanism—comprising student evaluation, expert assessment, and teacher self-evaluation—forms a feedback loop that promotes continuous improvement and curriculum optimization. This study provides a scientific and operable framework for monitoring and improving theoretical teaching in vocational undergraduate education, supporting teachers' self-diagnosis and teaching reform. Future research can expand sample scope, integrate classroom observation with learning effectiveness analysis, and extend the evaluation system to practical, innovation, and entrepreneurship teaching, contributing to a comprehensive and dynamic teaching quality evaluation mechanism in vocational undergraduate education.

Keywords: Vocational Undergraduate Education, Teaching Quality Evaluation, CIPP Model, Multi-Subject Evaluation, Analytic Hierarchy Process (AHP).

1. Introduction

With the acceleration of the construction of China's modern vocational education system, vocational undergraduate education has become an important part of promoting the cultivation of high-level technical and skilled talents. The implementation of policies such as the "Decision on Accelerating the Development of Modern Vocational Education" and the "Twenty Guidelines for Vocational Education" has pushed the construction of vocational undergraduate education into a new stage of quality and efficiency improvement. As the core indicator to measure the level of vocational undergraduate education, teaching quality urgently requires the establishment of a scientific and systematic teaching evaluation system to provide a basis and guarantee for the improvement of educational quality [1].

Different from general undergraduate education, vocational undergraduate education possesses both "higher education attributes" and "vocational attributes", with teaching objectives focusing more on the cultivation of students' vocational competence and comprehensive quality [2, 3]. This makes teaching quality evaluation not only pay attention to the effect of knowledge transmission, but also reflect the alignment between theoretical teaching, practical ability and post requirements. However, existing studies mostly focus on classroom teaching links, and systematic evaluation research on the theoretical teaching quality of vocational undergraduate education is still insufficient [4-6], lacking an operable and promotable indicator system.

Based on this, this paper takes the theoretical teaching of

vocational undergraduate education as the research object, constructs a teaching quality evaluation system based on multiple evaluation subjects, and introduces the CIPP model (Context-Input-Process-Product) as the theoretical framework to systematically analyze the constituent elements of theoretical teaching quality from four dimensions: teaching context, input, process and product. The study comprehensively uses literature research, expert consultation and analytic hierarchy process (AHP) to form a systematic evaluation model with indicator weights, aiming to provide a scientific basis for the monitoring of teaching quality and the improvement of teachers' teaching in vocational undergraduate education, and enrich the theoretical research and practical paths of teaching evaluation in vocational undergraduate education.

2. Theoretical Basis

Guided by the improvement of teaching quality in vocational undergraduate education, this study comprehensively applies the CIPP evaluation model, Outcome-Based Education (OBE) concept and multiple-subject evaluation theory [7].

The CIPP model, proposed by Stufflebeam, systematically evaluates educational activities from four dimensions: Context, Input, Process and Product, emphasizing a continuous feedback mechanism "for the purpose of improvement". The introduction of this model helps to realize the whole-process evaluation of theoretical teaching in vocational undergraduate education from goal setting to result output.

The OBE concept takes learning outcomes as the core, focuses on the formation of students' abilities, qualities and attitudes, and emphasizes the teaching design logic of "starting with the end in mind". This study integrates it into the theoretical teaching quality evaluation system of vocational undergraduate education, making the indicator system better reflect the consistency of "knowledge transmission - ability generation - vocational orientation".

The multiple-subject evaluation theory emphasizes the participation of students, teachers, supervision experts and other parties, which can form a comprehensive judgment of teaching quality from different perspectives, and strengthen the objectivity and development orientation of evaluation results. Based on this, the evaluation system constructed in this study not only pays attention to the quality of "teaching", but also focuses on the experience of "learning" and the improvement function of "evaluation".

3. Research Methods

The study comprehensively adopts literature research, expert consultation (Delphi method), questionnaire survey and analytic hierarchy process (AHP) [8]. Firstly, the key dimensions of teaching quality evaluation in vocational undergraduate education are clarified through literature review; secondly, 15 educational experts are invited to conduct two rounds of consultation to revise and improve the indicator system; thirdly, a multi-subject questionnaire is designed to collect data and analyze the differences in the cognition of teaching quality among students, teachers and experts; finally, the AHP method is used to establish a hierarchical structure model, calculate indicator weights and conduct consistency test ($CR < 0.1$), forming a scientific and reasonable theoretical teaching quality evaluation model.

This methodological framework ensures the logical integrity of the system and the verifiability of data, providing a reliable basis for the subsequent teaching diagnosis and improvement as well as performance evaluation of vocational undergraduate colleges and universities.

4. Construction of the Theoretical Teaching Quality Evaluation System for Vocational Undergraduate Education

4.1. Construction Ideas and Principles

The construction of the theoretical teaching quality evaluation system for vocational undergraduate education is guided by the talent training objectives of vocational undergraduate education, and follows the principles of scientificity, orientation, operability and development.

Scientificity is reflected in that the indicator design follows educational evaluation theories and vocational education laws, with a rigorous system structure and clear logic;

Orientation is reflected in taking the achievement of teaching objectives and learning outcomes as the core, guiding teachers to improve teaching design and optimize classroom quality;

Operability is reflected in that each indicator has clear observation points and measurability, facilitating the implementation of evaluation by multiple subjects;

Development is reflected in emphasizing the feedback function of teaching evaluation, promoting the continuous growth of teachers and students.

Overall, the system takes the CIPP model (Context-Input-Process-Product) as the framework, expanding the teaching quality evaluation from a single link to a whole-process and all-element systematic system. Combined with the characteristics of vocational undergraduate education, 5 first-level indicators, 17 second-level indicators and several third-level observation points are finally determined, forming a three-level progressive and interrelated structure.

4.2. Design of First-Level Indicators

Teaching Context: It focuses on the alignment between curriculum setting, vocational standards and training objectives, examines the scientificity of curriculum positioning, the rationality of teaching objectives and the matching degree between content and industry needs, reflecting the "vocational orientation" and "higher education attributes" of vocational undergraduate education.

Teaching Input: It emphasizes the guarantee role of teachers' literacy and resource allocation, covering teachers' professional level, teaching attitude, curriculum resource construction, textbook and information tool use, etc., which is the material and ability foundation of theoretical teaching quality.

Teaching Process: As the core dimension of teaching quality, it evaluates the systematicness of teaching design, classroom organization and interaction, innovation of teaching methods, student participation and learning experience, etc., reflecting the teaching concept of "student-centered".

Teaching Product: It focuses on the achievement of teaching objectives and learning outcomes, evaluating both the improvement of students' knowledge and abilities, as well as learning satisfaction and vocational identity, reflecting the supporting role of theoretical teaching in the generation of vocational competence.

Teaching Improvement and Innovation: It pays attention to teachers' reflection and reform ability, including participation in teaching diagnosis and improvement, effectiveness of curriculum reform, curriculum ideological and political education and integration of production and education, etc., reflecting the sustainable improvement orientation of vocational undergraduate education quality.

4.3. Construction of Second-Level and Third-Level Indicators

Several second-level and third-level indicators are further refined under the five first-level indicators. For example, under the dimension of "teaching process", second-level indicators such as "classroom design and organization", "teaching methods and means", "teaching interaction and feedback" are set; the third-level observation points below include "clear logic of teaching content", "effective classroom questioning and discussion", "combination of cases and multimedia", "high student learning investment", etc.

This three-level progressive structure not only maintains the systematicness of evaluation, but also enhances operability, enabling different subjects such as students, teachers and experts to conduct quantitative and qualitative evaluation from multiple perspectives, ensuring the comprehensiveness and credibility of results.

4.4. Design of Multiple-Subject Evaluation

According to the "multiple collaboration" characteristics of vocational undergraduate education, the system sets three

types of subjects: student evaluation, expert evaluation and teacher self-evaluation.

Student evaluation focuses on teaching process and learning experience; expert evaluation pays attention to teaching objectives, curriculum content and professional standards; teacher self-evaluation emphasizes teaching reflection and improvement awareness. The three coordinate to form a feedback loop of teaching quality, realizing the transformation from "external evaluation" to "internal improvement", and promoting teachers' self-growth and continuous curriculum optimization.

4.5. Preliminary Verification and Application

After the establishment of the system, its scientificity and applicability are verified through questionnaires and expert reviews. The Delphi method is used for two rounds of expert consultation to determine the importance of indicators, and the AHP method is used to calculate weights. The results show that "teaching process" and "teaching product" have the highest weights, indicating that classroom implementation and learning effectiveness are the key factors affecting theoretical teaching quality; although "teaching improvement and innovation" has a lower weight, it plays a long-term role in promoting the improvement of teaching quality.

In summary, this system takes the CIPP model as the logical main line and multiple subjects as the support, forming an evaluation framework with reasonable structure, clear logic and clear functional orientation, providing a scientific path and operational basis for the quality monitoring and teaching improvement of vocational undergraduate education.

5. Determination and Analysis of Indicator Weights

5.1. Research Ideas and Methods

After the construction of the theoretical teaching quality evaluation system for vocational undergraduate education, to ensure the scientific and reasonable distribution of the importance of each indicator, this study adopts a combination of Delphi Method and Analytic Hierarchy Process (AHP) to determine indicator weights and verify the scientificity of the system. The research ideas are as follows:

Revise the rationality and completeness of the indicator system through two rounds of expert consultation. On the basis of the convergence of expert group opinions, use AHP for quantitative analysis to calculate the relative weights of indicators at all levels. Conduct consistency test on the final weights to ensure the logical consistency and operability of the evaluation system.

The advantage of this method lies in combining the scientificity of expert experience judgment with the objectivity of mathematical calculation, which is suitable for solving complex multi-dimensional, multi-level and multi-subject problems in teaching quality evaluation.

5.2. Determination of Indicator Importance by Delphi Method

Expert Selection and Questionnaire Design: This study invites 15 experts with vocational undergraduate education background to participate in the consultation, including school teaching managers, supervision experts, front-line teachers and educational evaluation researchers. The first round of questionnaire adopts an open form to solicit experts' opinions on the completeness, logical structure and

operability of the indicator system. The second round of questionnaire is based on the revised indicators, using a 5-point Likert scale to score the importance of each indicator (1—extremely unimportant, 5—extremely important).

Statistical Analysis and Convergence Judgment: The mean (M), standard deviation (SD) and coefficient of variation (CV) of each indicator are calculated to judge the consistency of expert opinions. The results show that the CV values of all first-level indicators are less than 0.25, indicating that expert opinions tend to be consistent, and the indicator system has high recognition and rationality. Among them, the "teaching process" and "teaching product" dimensions have the highest mean values, indicating that experts generally believe these two links have the greatest impact on theoretical teaching quality.

Result Analysis: After revision by the Delphi method, the final theoretical teaching quality evaluation system for vocational undergraduate education includes five first-level indicators (teaching context, teaching input, teaching process, teaching product, teaching improvement and innovation), 17 second-level indicators and several third-level observation points, laying a solid foundation for subsequent weight calculation.

5.3. Determination of Weights by Analytic Hierarchy Process

Construction of Judgment Matrix: Based on the indicator system revised by the Delphi method, a two-level judgment matrix including first-level and second-level indicators is constructed. Through the expert group's judgment on the relative importance of paired indicators, the Saaty 1–9 scale method is used to establish the matrix.

Weight Calculation and Consistency Test: The AHP method is used to calculate the eigenvectors of indicators at all levels and normalize them to obtain the relative weights of each indicator. At the same time, the consistency ratio (CR) is calculated to test the consistency of the judgment matrix. When $CR < 0.1$, the weight distribution result is considered reasonable. After calculation, the CR values of all hierarchical judgment matrices in this study are less than 0.1, indicating good consistency and credible weight results.

Results of First-Level Indicator Weights: The calculation results show that the weights of the five first-level indicators are as follows:

Teaching Process: 0.324
Teaching Product: 0.256
Teaching Input: 0.198
Teaching Context: 0.135
Teaching Improvement and Innovation: 0.087

It can be seen that "teaching process" has the highest weight, indicating that teaching design, classroom implementation and student participation are the key links affecting theoretical teaching quality; followed by "teaching product", reflecting the core position of learning outcomes in vocational undergraduate education; although "teaching improvement and innovation" has a relatively low weight, it reflects the important orientation of vocational undergraduate education emphasizing teachers' continuous growth and curriculum reform.

Distribution Characteristics of Second-Level Indicator Weights: Under each first-level indicator, the second-level indicators with higher weights mainly include: "scientificity and applicability of teaching content", "classroom organization and interaction effect", "achievement of teaching

objectives", "teachers' professional literacy and teaching attitude", etc. These indicators are highly consistent with the characteristics of vocational undergraduate education of "integrating theory with practice and serving the cultivation of post capabilities".

6. Conclusion and Prospect

Starting from the "higher education attributes" and "vocational attributes" of vocational undergraduate education, this study constructs a theoretical teaching quality evaluation system based on multiple evaluation subjects. Taking the CIPP model as the framework, the study covers five dimensions: teaching context, teaching input, teaching process, teaching product and teaching improvement, and determines the weights of each indicator through the Delphi method and analytic hierarchy process. The results show that "teaching process" and "teaching product" are the key factors affecting the theoretical teaching quality of vocational undergraduate education, and the evaluation mechanism involving multiple subjects helps to realize the true reflection and continuous improvement of teaching quality.

This study not only provides theoretical support for vocational undergraduate colleges and universities to establish a scientific and systematic teaching quality monitoring and diagnosis and improvement mechanism, but also provides an operable tool for teachers to carry out self-diagnosis and teaching improvement. At the same time, the study reflects the transformation of quality culture from "result-oriented" to "process improvement", providing new ideas for the improvement of the teaching evaluation system of vocational undergraduate education.

Future research can further expand the sample scope, combine classroom observation data with learning effectiveness analysis to conduct dynamic verification and iterative optimization of the system. In addition, on this basis, we can explore the comprehensive evaluation mechanism of practical teaching, innovation and entrepreneurship teaching and other links, forming a teaching quality evaluation system covering the whole process of vocational undergraduate education, and providing continuous motivation for the high-quality development of vocational education.

Acknowledgements

We would like to acknowledge the support of the "14th Five-Year Plan" Project of Vocational Education Scientific Research in Hebei Province entitled "Research on the Construction of Teaching Quality Evaluation Index System for Vocational Undergraduate Colleges and Universities" (No.: JZY23344) for this research.

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