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Research on the Comprehensive Evaluation of the Curriculum System for the Higher Vocational Pharmacy Operation and Management Major Based on the OBE Theory

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Abstract: This research is based on the OBE theory and aims to construct a scientific and reasonable comprehensive evaluation system for the curriculum system of the higher vocational pharmacy operation and management major. Through various research methods, it deeply analyzes the current situation and problems of the curriculum system, clarifies the evaluation indicators and standards, aiming to provide strong support for optimizing the curriculum system of the higher vocational pharmacy operation and management major, so as to improve the quality of talent training and meet the development needs of the pharmaceutical industry.

Keywords: OBE theory; Higher vocational pharmacy operation and management major; Curriculum system evaluation

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1. Introduction

With the rapid development of the pharmaceutical industry, the demand for professionals in pharmacy operations and management is increasing, and the requirements are also constantly rising. Higher vocational education, as an important way to cultivate applied talents, the rationality and scientificity of its curriculum system for the pharmacy operation and management major is of great significance. The outcome-based education (OBE) theory emphasizes taking students' learning outcomes as the core, and designing and implementing educational and teaching activities around the abilities and qualities that students should achieve upon graduation [1–2]. Applying the OBE theory to the evaluation of the curriculum system of the higher vocational pharmacy operation and management major helps to improve the pertinence and effectiveness of talent training and better meet the needs of the industry.

2. Theoretical Basis

2.1. Overview of the OBE theory

The OBE theory was proposed by American educator William G. Spady in the 1980s. Its core idea is that all activities in the education system should revolve around the learning outcomes ultimately achieved by students. In higher vocational education, the OBE theory requires that the design of the curriculum system, the selection of teaching methods, and the construction of the evaluation system should all be guided by the abilities and qualities that students can demonstrate in practical work after graduation.

Its core idea is that all activities in the education system should revolve around the learning outcomes ultimately achieved by students. This means that from the setting of educational goals, the planning of curriculum content, the selection of teaching methods, to the implementation of teaching evaluation, everything should start from and end with the abilities and qualities that students can achieve after graduation [3]. Under the OBE theory framework, educators first need to clarify what knowledge, skills, and values students should possess after completing their studies, and then reverse-design the entire educational process based on these expected outcomes.

2.2. Necessity of applying the OBE theory to the higher vocational pharmacy operation and management major

In higher vocational education, the application of the OBE theory is of great significance. As an important part of higher education, higher vocational education undertakes the important task of cultivating high-quality applied talents for society. Guided by the abilities and qualities that students can demonstrate in practical work after graduation, the OBE theory requires that the design of the curriculum system be closely combined with industry's actual needs. For example, for students majoring in pharmacy operation and management, the curriculum system should cover content such as drug market analysis, drug marketing skills, and drug quality management regulations to ensure that students can quickly adapt to the jobs in drug operation enterprises after graduation.

The higher vocational pharmacy operation and management major aims to cultivate applied talents with professional skills in drug procurement, sales, storage, quality management, as well as good professional ethics and teamwork spirit. Applying the OBE theory can better connect with industry needs, clarify the ability goals that students should possess, make the curriculum system more scientific and reasonable, and make the teaching process pay more attention to the cultivation of students' practical and innovative abilities, thereby improving the quality of talent training and enhancing students' employment competitiveness [4–5].

3. Construction of the curriculum system evaluation model for the higher vocational pharmacy management major

3.1. Evaluation framework design

Based on the OBE theory, a "three-dimensional and nine-element" evaluation framework is constructed to comprehensively evaluate the curriculum system of the higher vocational pharmacy management major from the goal dimension, curriculum dimension, and evaluation dimension (**Table 1**).

Table 1. "Three-dimensional and nine-element" evaluation framework

First-level indicators	Second-level indicators	Scoring standards	Score range
Goal dimension	(1) Degree of fit with industry requirements (2) Degree of compliance with national standards (3) Degree of match with school positioning	Comparison with the "Vocational education specialty catalog" Analysis of pharmaceutical industry research reports Integration of school characteristics	Enterprise research reports Professional filing materials Talent training programs
Curriculum dimension	(1) Modular curriculum structure (2) Practical teaching system (3) Resource guarantee conditions	Curriculum offering based on post abilities Work-study integrated training model Digital teaching resource library	Curriculum system architecture diagram Implementation of in and out-of-school training Teaching platform data
Evaluation dimension	(1) Multiple evaluation subjects (2) Process-oriented evaluation content (3) Outcome-oriented indicators	Proportion of enterprise participation in evaluation Formative assessment methods Degree of achievement of post abilities	Assessment record sheets Third-Party evaluation reports Graduate tracking data

3.2. Evaluation index system

Table 2 shows the index system determined through three rounds of expert consultations using the Delphi method.

Table 2. The index system determined through three rounds of expert consultations using the Delphi method

First-level indicators	Second-level indicators	Scoring standards	Score range
Goal rationality (Weight 30%)	Depth of industry demand analysis (8%)	Conduct more than 2 industry research surveys per year (5 points), and the surveys cover more than 80% of cooperative enterprises (3 points)	0-8 points
	Degree of compliance with national standards (10%)	Fully comply with the "Higher Vocational Pharmacy Management Major Teaching Standards" (6 points), with characteristic and innovative content (4 points)	0-10 points
	Measurability of training goals (12%)	Set more than 6 quantifiable ability indicators (8 points), and establish a goal-achievement calculation model (4 points)	0-12 points
Curriculum scientificity (Weight 40%)	Modular curriculum structure (15%)	Designed based on post abilities (9 points) Set up new-format and new-standard modules (6 points)	0-15 points
	Practical teaching system (18%)	Practical class hours account for ≥ 45% (10 points) Have a virtual simulation training system (8 points)	0-18 points
	Resource update mechanism (7%)	Revise more than 50% of textbooks every three years (3 points) Have a dynamic case library (4 points)	0-7 points
Evaluation effectiveness (Weight 20%)	Multiple evaluation methods (8%)	Implement the "1 + X" certificate assessment (3 points) Jointly cultivate students by schools and enterprises, and participate in the formulation of evaluation content and methods (5 points)	0-8 points
	Proportion of process-oriented evaluation (6%)	Formative evaluation accounts for ≥ 40% (4 points) Use learning outcome portfolios (2 points)	0-6 points
	Feedback application effect (6%)	Evaluation results are used for curriculum improvement (4 points) Establish a continuous improvement loop (2 points)	0-6 points

Table 2 (Continued)

First-level indicators	Second-level indicators	Scoring standards	Score range
Improvement sustainability (Weight 10%)	Dynamic adjustment mechanism (5%)	Adjust 10% of the curriculum content every year (3 points) Establish a channel to quickly respond to industry changes (2 points)	0-5 points
	Quality assurance system (5%)	Teachers win awards in vocational ability competitions (2 points) Students win awards in vocational ability competitions (3 points)	0-5 points

3.3. Application instructions

Composition of the review group: When evaluating, a review group composed of education experts (40%), industry representatives (30%), teachers (20%), and students (10%) needs to be formed. The participation of different subjects can evaluate the curriculum system from multiple perspectives to ensure the comprehensiveness and objectivity of the evaluation results.

Evaluation method: The "evidence chain" evaluation method is adopted, which requires providing relevant evidence such as talent training programs (goal dimension), curriculum teaching documents (curriculum dimension), assessment records, and improvement reports (evaluation dimension). Through the analysis and evaluation of this evidence, it is possible to more accurately understand the implementation situation and effects of the curriculum system.

Dynamic weight adjustment mechanism: Implement a dynamic weight adjustment mechanism, and update 10%-15% of the index content every year according to changes in pharmaceutical industry policies. This ensures that the evaluation index system can timely reflect the development and changes of the industry and improve the accuracy and effectiveness of the evaluation.

4. Construction of the curriculum system for the higher vocational pharmacy operation and management major based on the OBE theory

In the process of constructing the curriculum system for the higher vocational pharmacy operation and management major based on the OBE theory, through extensive market research, in-depth enterprise interviews, analysis of industry development trends, and policy interpretation, etc., the industry's demand for talents was comprehensively and deeply analyzed. Then, multiple core positions were determined, and each position has its unique ability requirements, suitable courses, modular projects, and teaching methods.

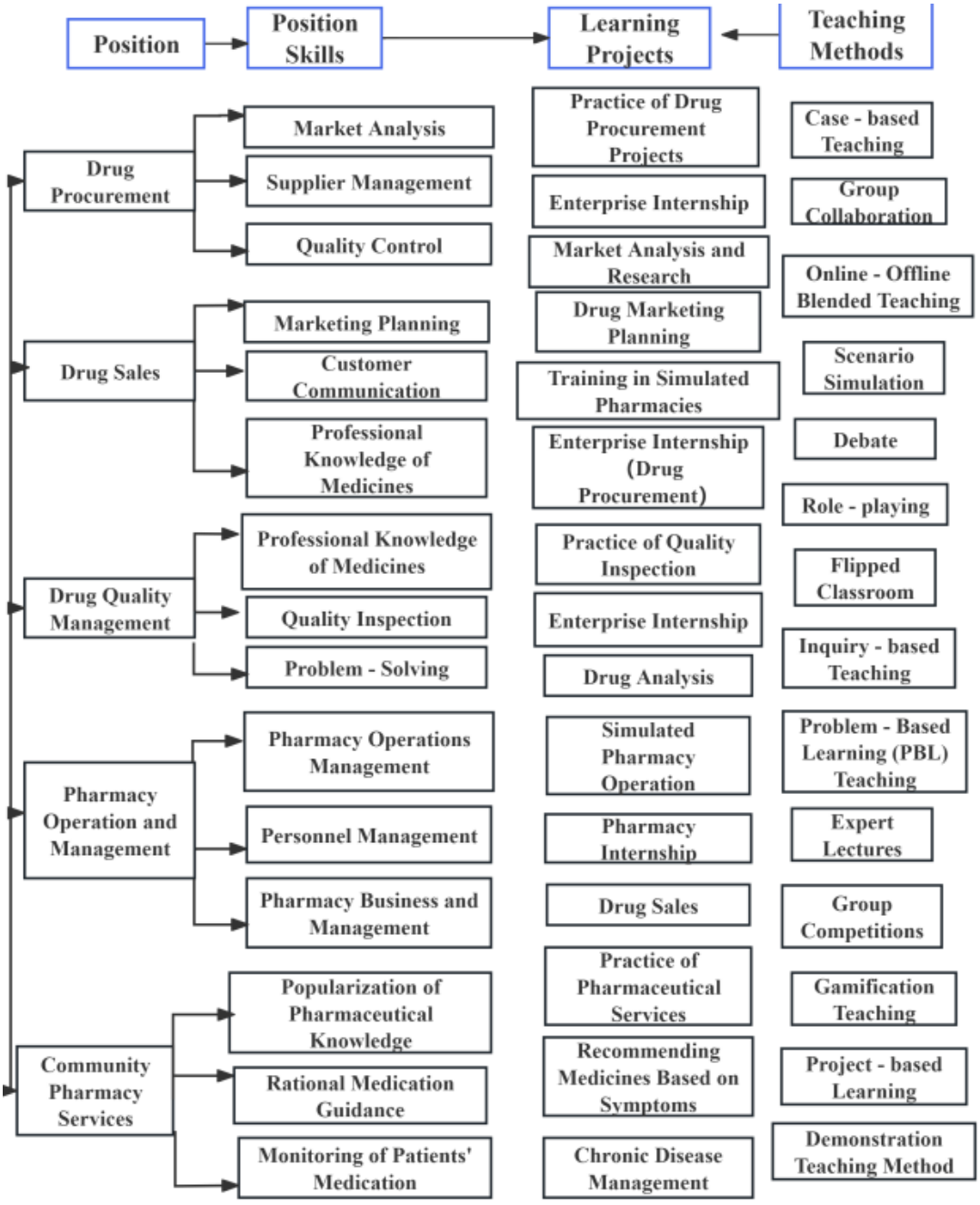

Figure 1. Flow chart of positions-skills-projects-teaching methods

5. Empirical research: Verification of the curriculum evaluation model based on dynamic weights

5.1. Data collection and processing methods

5.1.1. Experimental design

In order to scientifically and rigorously verify the effectiveness of the curriculum evaluation model based on dynamic weights, this research adopts a "double-blind controlled experiment." The specific settings are as follows.

Experimental group: Three higher vocational colleges were carefully selected as the experimental group. From September 2023 to December 2024 (covering two complete semesters), the curriculum evaluation system constructed in this research was applied. These three colleges are representative in terms of professional settings, teaching staff, and student scale, and can better reflect the application effect of the model under different conditions.

Control group: Three higher vocational colleges were also selected as the control group. During the same period, the traditional curriculum evaluation method was used. The control group was selected to have similar basic conditions as the experimental group to ensure the comparability of the experimental results.

5.1.2. Data characteristics

The data sources of this research are extensive and have been strictly screened and processed to ensure the reliability and effectiveness of the data. The specific data characteristics are as follows.

Sample data: Through a carefully designed teacher questionnaire, 287 valid questionnaires were collected. The questionnaire content covers teachers' evaluations and feedback on various aspects of curriculum teaching. 109 evaluation data were obtained from enterprises. These evaluations come from enterprises that have cooperative relationships with higher vocational colleges and mainly involve the performance of graduates in enterprises and their views on the school's curriculum settings. 423 students were tracked and investigated to comprehensively understand students' experiences, gains during the curriculum learning process, and their employment situations after graduation.

Industry data: The position requirement information of the five school-enterprise cooperative pharmaceutical enterprises in the past three years was deeply mined. These data detail the knowledge, skills, and quality requirements of different positions in the pharmaceutical industry, providing an important basis for analyzing the matching degree between the curriculum and industry needs.

Curriculum data: The files of 8 core courses of the pharmacy operation and management major were sorted out. The curriculum files contain detailed information such as curriculum standards, teaching plans, and assessment methods, which is helpful for comprehensively understanding the setting and implementation of the courses. All original data have been desensitized to protect data privacy while ensuring data availability.

5.2. Model validity verification

5.2.1. Content validity verification

Form a small expert group: Invite 3–5 senior teachers majoring in pharmacy operation and management, and 2–3 business backbones from cooperative enterprises. Introduce in detail the various indicators in the curriculum evaluation model to them. For example, for the "depth of industry demand analysis" in "goal rationality", explain that it is measured based on the number of industry research surveys per year and the proportion of covered enterprises. Ask the experts to judge whether these indicators can comprehensively and accurately reflect the curriculum quality. Let the experts provide feedback in the form of scoring and written comments, and then comprehensively organize and adjust, and improve the model according to the opinions of the majority of experts.

Refer to the excellent curriculum standards within the school: Find out the evaluation standards of the excellent courses of the pharmacy operation and management major selected by the school in the past. Compare the existing curriculum evaluation model with them to see if the indicators are similar. If the excellent curriculum standards emphasize the proportion of practical teaching, and the weight of this part in the existing

model is low, consider appropriately increasing the weight to make the model more in line with the evaluation logic of high-quality courses recognized by the school.

5.2.2. Structural validity verification

Simple factor analysis attempt: Use the data statistical function of Excel to preliminarily sort out the collected data, such as student grades and teacher evaluations. Group the data with high correlations. For example, the "Pharmaceutical Comprehensive Knowledge and Skills Course Grade" and the "Pharmacy Operation and Management" data are closely related and can be grouped into the "Pharmaceutical Service" group. Similarly, sort out other groups and see if the grouping results can correspond to the first-level indicators such as "curriculum scientificity" and "evaluation effectiveness" in the model. If most of them can correspond, it indicates that the model structure has a certain degree of rationality.

Internal consistency test: Calculate the consistency of the scores of the same type of indicators. For example, under the "curriculum scientificity" indicator, there are secondary indicators such as "modular curriculum structure" and "practical teaching system". Use a simple calculation method (such as calculating the standard deviation of the scores of these indicators; A small standard deviation indicates high consistency) to see if the evaluations of these secondary indicators by students or teachers are similar. If they are similar, it indicates that the model structure in this part is relatively stable, and each indicator can jointly reflect the "curriculum scientificity" dimension.

5.2.3. Criterion-related validity verification

Compare employment data: Collect the employment information of graduates from colleges using the new model (experimental group) and the traditional model (control group). Mainly focus on the employment rate and the employment match rate. The data can be obtained through the school's employment guidance center, and then the data of the two groups are compared. If the employment match rate of graduates in the experimental group is significantly higher than that in the control group, for example, 10% higher, it can be preliminary explained that the new curriculum evaluation model has a positive effect on improving the employment match degree of students and is related to the actual employment results.

Student feedback survey: Design a simple questionnaire and ask graduates about the help of the courses in school in their work. Questions such as "Did the practical teaching links in the courses help you a lot in your actual work after employment?" Let graduates answer with "very helpful", "helpful", "average", "less helpful", and "not helpful at all." Compare the feedback of graduates in the experimental group and the control group. If more people in the experimental group think it is helpful, it indicates that the courses under the new model are more in line with actual needs, verifying the criterion-related validity of the model and students' actual gains.

6. Conclusion and prospect

Prospect of model application: Elaborate on the potential expansion directions of this model in the future construction of the curriculum system for the higher vocational pharmacy operation and management major. For example, with the accelerated digital transformation of the pharmaceutical industry, the model can further incorporate the evaluation of digital skills training, such as adding evaluation indicators for students' abilities to master drug e-commerce operations and the operation of intelligent warehousing management systems, helping the major keep up with the pace of industry development. It can also explore the possibility of promoting the

model to other related majors or different levels of education, such as expanding it to secondary vocational or undergraduate pharmaceutical majors to improve the versatility of educational evaluation [6].

Analysis of limitations: Honestly point out the shortcomings of the model. For example, in the data collection process, due to the limited number of sample colleges, the results may not fully cover all types of higher vocational colleges. Although the dynamic weight adjustment mechanism takes into account changes in industry policies, its response to sudden market situations (such as short-term drastic changes in the industry caused by the epidemic) may not be timely enough. In addition, in terms of evaluation indicators, it may not be possible to comprehensively and accurately measure some difficult-to-quantify [7–8].

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