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Research on classroom teaching evaluation system of higher vocational colleges based on OBE concept

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SUMMARY: *With the continuous development of vocational education, the concept of Outcome-Based Education (OBE) has gained increasing attention in teaching reforms at higher vocational colleges. This study focuses on the research of classroom teaching evaluation systems based on OBE principles in vocational institutions. First, it provides an in-depth analysis of existing issues in traditional classroom teaching evaluation systems at vocational colleges. Second, it introduces the essence of OBE and its significance in educational assessment frameworks. Subsequently, it outlines principles for constructing teaching evaluation systems according to OBE principles. Finally, it elaborates on a "One Cycle, Dual Stages, Three Dimensions, Four Subjects" classroom teaching evaluation system developed through OBE principles. This student-centered framework emphasizes the learning process, comprehensively reflects students' learning outcomes and integrated competencies, thereby enhancing the effectiveness of teaching evaluations in assessing whether vocational college graduates meet the talent demands of modern societal development.*

KEYWORDS: *OBE concept; classroom teaching evaluation; vocational colleges; teaching reform*

1 Introduction

At present, the social economy is showing a rapid development trend, and the industrial structure is also continuously upgrading and transforming [1]. In this context, higher vocational education has become a key battlefield for cultivating applied talents, undertaking the important mission of delivering a large number of high-quality technical and skilled talents to society. The evaluation of vocational classroom teaching, as the core point of teaching effectiveness evaluation and teaching method guidance, is not only a key measure to ensure the quality of education, but also an important support for promoting the close integration of vocational education with market demand and assisting students' all-round development [2, 3].

Looking back at the past, the teaching evaluation model of vocational classrooms has shown significant limitations and lagging trends. The traditional evaluation methods used in the past have overly focused on students' mechanical memory of theoretical knowledge and simple mastery of basic skills [4]. When evaluating students' learning effectiveness, it mainly relies on outcome indicators such as final exam scores and skill operation assessments, which serve as the main basis for measuring students' learning outcomes. With the development of the times, contemporary society places greater emphasis on students' comprehensive qualities, including innovation ability, teamwork ability, problem-solving ability, and lifelong learning ability, in

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order to meet the demands of professional talents [5, 6]. At the same time, there is a clear contradiction between the traditional evaluation model and the modern student-centered and all-round development educational philosophy. Contemporary educational philosophy emphasizes respecting the subject status of students, paying attention to their experiences and changes in the learning process, and vigorously advocating the cultivation of students' comprehensive literacy and unique advantages. However, compared with traditional evaluation models, its focus is too limited to the final results, lacking dynamic tracking and observation of students' learning processes and immediate feedback responses [7].

This study is based on the concept of Outcome Based Education (OBE) and aims to construct a classroom teaching evaluation model suitable for the characteristics of vocational colleges, emphasizing the reverse design and planning of teaching content and evaluation methods based on actual social needs. At the same time, we attach great importance to dynamically tracking students' learning process and providing timely and effective feedback to ensure accurate assessment. Through this system, it is expected to promote the improvement of the quality of higher vocational education, deepen educational and teaching reforms, provide solid and powerful support for the self-development and continuous progress of higher vocational colleges, help higher vocational education achieve high-quality development in the new era, and better serve social and economic development.

2 Related Research

In previous teaching evaluation practices, traditional evaluation methods mostly relied on results as the core basis, but seriously overlooked the importance of dynamic tracking and timely feedback in the teaching process [8]. Due to the lack of comprehensive and dynamic attention and feedback mechanisms on the teaching process, it is difficult to accurately and comprehensively present students' actual learning status and comprehensive literacy level [9, 10]. This one-sided evaluation method is no longer suitable for the diverse needs of modern vocational education for talent cultivation, and there is an urgent need to deeply analyze its existing problems and carry out reforms.

(1) Single evaluation subject

Vocational colleges mainly rely on their own internal evaluation system to carry out teaching evaluation work, which usually covers the evaluation of teachers' teaching performance and students' learning outcomes [11]. However, in this evaluation process, external stakeholders, especially enterprises, clearly lack substantive participation and effective input of opinions. Vocational colleges shoulder the important mission of cultivating professional and technical talents for frontline enterprise positions, and the students they cultivate ultimately enter enterprises and play a role in practical work positions. Therefore, it is necessary for vocational colleges to leverage the resources and feedback of enterprises to verify whether the practical skills possessed by students truly meet the actual needs of enterprise work [12]. However, in terms of the current evaluation situation, the existing evaluation framework has not fully incorporated the views and suggestions of this key stakeholder, and has not effectively integrated the actual needs and evaluation standards of enterprises into the teaching evaluation system. This may result in a mismatch between the skills and job requirements of the trained students after entering the enterprise, affecting their career development and the efficiency of the enterprise's employment.

(2) Single evaluation dimension

Among the teaching evaluation activities carried out by many vocational colleges, final closed book exams have become a common evaluation method, aimed at testing students'

memory of various knowledge points [13]. However, this evaluation method has obvious limitations and often overlooks the specific application of theoretical concepts in practical work scenarios, failing to give due attention. When evaluating ability goals, the current approach mainly focuses on determining whether students have completed the corresponding operational procedures according to regulations. But this evaluation method is not comprehensive enough to thoroughly assess students' actual comprehensive abilities. For example, in practical work situations, students' problem-solving abilities, coordination and integration abilities at different stages of operation, and innovative thinking demonstrated in practice have not been fully considered in these assessments [14]. In addition, existing teaching evaluations lack sufficient attention and consideration for the professional qualities that students should possess, such as professional ethics, professional attitude, teamwork spirit, and communication skills.

(3) Single evaluation content

In the current evaluation work of many vocational colleges, the core of evaluation still focuses on the coverage of textbook content, but there is insufficient attention to the fit between teaching content and actual industry needs [15]. The existing evaluation framework shows obvious rigidity, making it difficult to keep up with the continuous development of the industry and make timely adaptive adjustments to the emergence of emerging technologies and dynamic changes in job requirements. Moreover, insufficient consideration was given to the integration and expansion of teaching content, resulting in ineffective consolidation and connection of knowledge between different courses [16]. This situation makes it difficult for students to build a comprehensive knowledge system, and when facing complex problems in practical work, they may be unable to effectively solve them due to fragmented knowledge.

(4) Single evaluation method

The current evaluation system overly emphasizes students' final exam scores and skill assessments, but neglects the gradual progress and continuous improvement of students in the teaching process [17]. It failed to recognize the knowledge and skills accumulated by students through daily project practice and group assignments. At the same time, there has been no evaluation of whether innovative teaching methods have truly improved educational outcomes, nor has there been consideration of how personalized teaching can effectively support students of different academic levels and learning styles. This makes it difficult for teaching evaluation to fully reflect students' learning process and growth trajectory, which is not conducive to individualized teaching and development.

(5) Neglecting the evaluation of ideological and political education in courses

In teaching evaluation, it is often difficult to examine whether teachers have cultivated students' patriotism and guided them to establish correct values and other ideological and political education content in the curriculum, and it is also difficult to understand students' acceptance and internalization of ideological and political education content in the curriculum. Curriculum ideological and political education is an important way to implement the fundamental task of cultivating morality and talent. Neglecting the evaluation of its effectiveness is not conducive to cultivating high-quality technical and skilled talents with both morality and ability [18].

(6) Insufficient utilization of evaluation feedback

The evaluation results are mainly used for teacher performance evaluation and student achievement evaluation, but they fail to deeply explore the teaching problems and student needs reflected behind the evaluation data [19]. The failure to effectively utilize evaluation results to promote continuous improvement of teaching content and methods, as well as optimization and perfection of the curriculum system, has resulted in the loss of the promoting effect of teaching evaluation on improving teaching quality. This makes teaching evaluation only a form, unable

to truly play its role in guiding teaching improvement and enhancing the quality of talent cultivation.

3 The Application Significance of OBE Evaluation System in Classroom Teaching of Vocational Colleges

(1) The connotation of OBE concept

Based on the OBE concept, the primary task of education practitioners is to accurately and clearly define the expected learning outcomes that students should achieve at the end of their studies [20]. These achievements cover a wide range, not only involving knowledge and skills in professional fields, but also including innovative thinking, communication and collaboration skills, problem-solving abilities, and other fundamental qualities. Taking computer science as an example, the expected learning outcomes not only require students to master professional knowledge and skills such as programming languages and algorithm design, but also to have the ability to use the learned knowledge to solve practical software problems, possess good teamwork spirit to complete large-scale project development, and have innovative thinking to propose novel software design solutions [21].

After clarifying the expected learning outcomes, educators will use this as a basis to plan teaching content, select teaching methods, and develop evaluation methods to ensure that teaching activities can effectively help students achieve these goals. This educational model is like carefully establishing a pathway for students to directly apply it to practical fields, enabling them to be more fully prepared and better meet the various requirements of society and the work environment. For example, in engineering majors, under the guidance of OBE philosophy, students can proficiently apply theoretical knowledge learned in practical project operations, possess the ability to solve engineering practical problems, and quickly adapt to the work environment after entering the workplace, creating value for enterprises.

(2) The Significant Significance of Applying OBE Concept to Classroom Teaching Evaluation System in Vocational Colleges

1) Accurately anchor teaching direction

The results-oriented evaluation method, like a guiding light for teachers, can help them clearly define the professional abilities and qualities that students should possess in their respective professional fields. This makes the setting of educational goals more targeted and closely aligned with the actual needs of the industry. In traditional teaching models, the setting of teaching objectives may be relatively broad and disconnected from actual work scenarios [22]. The application of OBE concept ensures that teaching activities focus on enhancing students' abilities, effectively avoiding the disconnection between classroom knowledge and practical application scenarios.

Taking the automotive maintenance major as an example, the teaching objectives determined through the OBE concept will clarify the professional skills that students should possess after graduation, such as automotive fault diagnosis and maintenance operations [23]. Teachers carry out teaching around these goals, closely linking students' learned knowledge with practical work. In this way, graduates can quickly meet the requirements of the workplace, significantly enhance their employment competitiveness, and stand out in the fierce job market.

2) Focusing on the development of students' abilities

The OBE model effectively solves the problem of uneven basic knowledge reserves and learning abilities among students, achieving personalized teaching goals. In the teaching process, it provides strong support for students' personalized growth. In the evaluation process, educators can accurately perceive the learning progress and difficulties faced by each student.

For students with relatively weak basic knowledge, teachers can provide specialized additional tutoring to help them consolidate their foundation. For example, in mathematics courses, one-on-one tutoring is arranged after class for students with weaker comprehension abilities, providing detailed explanations for difficult problems. For students with excellent academic performance, more expansive learning tasks are assigned to stimulate their learning potential [24, 25]. For example, providing opportunities for students with strong programming skills to participate in complex project development and encouraging them to explore innovative solutions. This differentiated teaching strategy ensures that teaching activities meet the developmental needs of different students, effectively promotes substantial progress for each learner, and comprehensively improves the quality and effectiveness of education.

(3) Optimize the construction of the curriculum system

The OBE teaching evaluation mechanism provides strong support for vocational colleges to accurately perceive the dynamic changes in the industry's demand for professional and technical talents. Relying on this system, the school is able to quickly and flexibly adjust professional courses, optimize course content in detail, and ensure that it is highly in line with the actual needs of the industry [26]. Under the guidance of this evaluation framework, universities and teachers can fully tap into the value of evaluation feedback information, and systematically optimize the course structure by rearranging the course sequence, scientifically integrating content modules, and strengthening the internal logical connections between various disciplines.

For example, in the adjustment of e-commerce courses, based on the industry's emphasis on data analysis skills, data analysis courses are arranged in advance and integrated with courses such as marketing and customer relationship management, so that students can more systematically master relevant knowledge, avoid duplication and stacking of course content, and build a scientific and reasonable course system. This system can gradually and comprehensively cultivate students' comprehensive vocational abilities, enabling them to meet the specific requirements of the current industry and adapt to the constantly evolving development trends of the industry.

(4) Promote continuous improvement in teaching

The teaching evaluation mechanism based on the OBE concept provides clear and targeted feedback information for teachers. Teachers can accurately identify weak links in the teaching process based on students' learning outcomes. If most students perform poorly in a certain professional skill assessment, teachers can detect potential problems with teaching methods or content.

Subsequently, teachers can quickly adjust teaching strategies, optimize and upgrade course content, and improve teaching methods. For example, in the teaching of mechanical manufacturing courses, if students' mastery of part processing technology is not ideal, teachers can add practical operation steps, allowing students to deepen their understanding and mastery of knowledge through hands-on experience; Alternatively, the case-based teaching method can be used to introduce practical production cases for analysis and explanation, transforming abstract knowledge into concrete examples to help students better understand and apply it, thereby continuously promoting the improvement of teaching quality.

In short, the application of OBE concept in the classroom teaching evaluation system of vocational colleges has profound significance. It not only helps to improve teaching quality and cultivate high-quality technical and skilled talents that meet social needs, but also injects strong impetus into the sustainable development of vocational colleges.

4 Construction principles of classroom teaching evaluation system in higher vocational colleges based on OBE concept

(1) Results oriented standards

In the process of building a teaching evaluation system, adhering to the principle of results-oriented approach is undoubtedly the core supporting element. This guideline clearly states that precise definition of course objectives is necessary to ensure that the set goals are closely aligned and highly unified with the development direction of professional talents and the practical needs of the industry [27]. Taking the information technology industry as a typical example, cutting-edge technologies such as artificial intelligence and big data are showing a thriving development trend. In this context, the selection criteria for talent in enterprises have undergone a transformation. They no longer rely solely on having strong programming skills as the sole measure of talent, but rather expect them to have the ability to overcome complex algorithm problems and proficiently carry out data mining and deep analysis work.

Given the above situation, teaching evaluation work needs to be closely focused on the actual needs of students engaged in specific industry fields, while establishing clear, specific, and quantifiable evaluation criteria for students' learning outcomes. These standards should clearly demonstrate the professional abilities and qualities that graduates possess in future job positions. Taking the medical profession as an example, the evaluation criteria should not only consider students' mastery of medical theoretical knowledge, but also pay attention to their operational skills in clinical practice, such as the accuracy of surgical operations and the accuracy of diagnosing diseases. Through such evaluation criteria, it ensures that the students trained can seamlessly adapt to industry demands, quickly adapt to job positions, and create value for enterprises and society.

(2) Criteria for evaluating diversified themes

It is crucial to establish standards for diversified evaluation topics in order to achieve comprehensive and objective teaching assessment. This requires the gathering of diverse evaluation forces such as teachers, students, and industry experts to form a diversified evaluation subject model [28]. As the direct implementers of the teaching process, teachers can evaluate the achievement of teaching objectives and the effectiveness of teaching methods; As the main body of learning, students' feedback can directly reflect their experiences and gains in the learning process; Industry experts provide evaluation opinions from the perspective of professional practice and application based on their profound understanding of industry development trends and actual needs.

At the same time, implement diverse evaluation methods and continuously track students' performance throughout the academic process. Combining formative assessment and summative assessment, formative assessment focuses on students' progress and problems in the learning process, such as classroom participation, homework completion, etc., and provides timely feedback and guidance; Summative assessment is a comprehensive evaluation of students' overall learning outcomes at the end of a stage or course.

(3) Principles of comprehensive evaluation indicators

Following the relevant principles of comprehensive evaluation indicators is the key to building a scientific and reasonable evaluation system. By allocating the weight of each indicator reasonably, students' actual achievements in knowledge reserve, skill mastery, and professional ability can be accurately evaluated. Taking engineering professional evaluation as an example, the evaluation work should not only focus on testing students' understanding and mastery of theoretical content such as engineering principles and design specifications, but also require comprehensive and multidimensional consideration. Attention should be paid to students' practical operational skills, such as the ability to use various tools and conduct hands-

on experiments; Consider their team collaboration skills, such as the ability to communicate efficiently and collaborate closely with members in team projects; It is also important to value students' ability to solve practical engineering problems in engineering practice situations, such as the ability to accurately analyze problems, propose feasible solutions, and effectively implement them when encountering complex engineering situations [29].

(4) The principle of student-centered approach

By analyzing the results of stage evaluations in depth, educators can promptly identify the difficulties that students encounter during the learning process. For example, if students are found to have difficulty understanding the construction of complex models in mathematical modeling courses, teachers can adjust their teaching methods accordingly and provide more case studies and guidance.

At the same time, the evaluation system adopts a hierarchical evaluation method, fully considering the individual differences of students. According to the students' ability level, a hierarchical evaluation is conducted to customize exclusive evaluation methods for students with different basic knowledge and learning abilities. For students with weak foundations, evaluation can focus on mastering basic knowledge and improving basic skills; For students who have spare capacity, we encourage them to engage in innovative research and practical exploration, stimulate their learning potential, and achieve comprehensive development.

(5) Dynamic principle of the entire process

Given the continuous evolution of the industry and the dynamic characteristics of student learning processes, the teaching evaluation system must establish a flexible and dynamic adjustment mechanism [30]. The industry technology is showing a trend of rapid updates and upgrades, and market demand is constantly evolving dynamically. Taking the new energy vehicle industry as an example, with the booming development of the industry, the evaluation system used by related professions must quickly incorporate knowledge and skill assessments in emerging fields such as battery technology and intelligent driving.

This dynamic adjustment mechanism has good adaptability, ensuring that teaching evaluation accurately meets emerging needs. By dynamically controlling the entire evaluation process, the teaching evaluation system can maintain its scientific effectiveness for a long period of time, laying a solid and powerful foundation for cultivating high-quality talents that conform to the trend of the times.

5 Building a classroom teaching evaluation system based on OBE concept in higher vocational colleges

Based on the advanced concept of Outcome Based Education (OBE), we have carefully crafted an innovative higher vocational education evaluation system that covers "one cycle, two stages, three dimensions, and four disciplines". This comprehensive evaluation model is unique in that it cleverly integrates the teaching process with learning outcomes, while introducing a professional ability assessment mechanism, greatly enhancing the scientific, rigorous, objective, and effective nature of classroom evaluation. Through these continuous optimization and improvement measures, the teaching quality of vocational colleges will steadily climb to a new height, thus laying a solid foundation for cultivating more professional talents with both high quality and high skills.

(1) "One cycle": continuous improvement cycle

This method is deeply rooted in the OBE (Outcome Based Education) philosophy, emphasizing that teaching evaluation is not an isolated activity, but an improvement process that requires continuous circulation and advancement. The process consists of five

interconnected stages: curriculum research, instructional goal setting, implementation of teaching activities, evaluation execution, and periodic feedback with adjustments. This closed-loop system (as shown in Figure 1) drives ongoing enhancement of educational quality through iterative refinement.

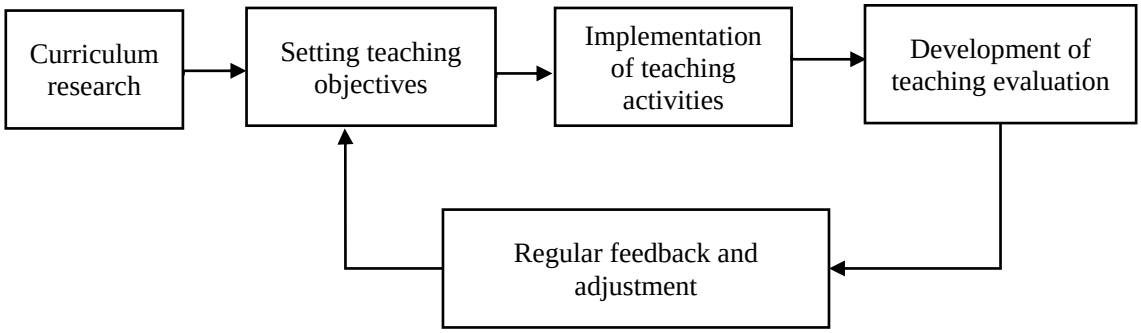

Figure 1: The circular path of classroom teaching evaluation system

1) Curriculum Research. By considering course positioning, student learning needs, and corporate employment requirements, this process utilizes methods such as faculty discussions, curriculum questionnaires, corporate interviews, and job competency surveys to assess the achievement of course objectives, identify teaching pain points and student demands, while simultaneously understanding the competency requirements for corporate positions. This comprehensive approach provides clear direction for designing an effective evaluation system.

2) Setting of teaching objectives. According to the research results, specific and measurable classroom teaching objectives should be defined, and the knowledge, skills and accomplishment of students should be achieved after completing the course.

3) Implementation of teaching activities. Teachers design the whole course according to the teaching objectives, carry out diversified teaching activities such as project teaching method, situational teaching method and theory-practice integration teaching method, so as to ensure that students can move towards the predetermined goals in the teaching process.

4) Teaching evaluation. Various evaluation methods and tools are used to formulate multi-dimensional evaluation indicators and curriculum assessment plans, so as to comprehensively evaluate students' process and final learning outcomes and judge whether students meet the requirements of teaching objectives.

5) Regular Feedback and Adjustments. Evaluation results should be promptly communicated to teachers, students, and relevant teaching management departments. Teachers can analyze issues in the teaching process based on feedback. For common student challenges, they should adjust teaching methods, content, and pacing accordingly, providing targeted group tutoring sessions. For individual student needs, categorized guidance should be offered to ensure instruction closely aligns with learners' actual requirements, thereby improving educational quality. Through these evaluations, students gain clear insights into their strengths and weaknesses in knowledge and skills, enabling them to refine learning strategies. At the same time, the management of the school can accurately identify the strengths and areas for improvement in the teaching process, and then plan and carry out targeted training programs and research activities. Through these measures, the optimization and upgrading of curriculum design can be achieved, and the rationality and effectiveness of resource allocation can be improved.

The commonly used dynamic adjustment model for process evaluation is as follows:

$$\Delta T = \alpha \cdot \left(P_{\text{target}} - P_{\text{current}} \right) + \beta \cdot \left(F_{\text{feedback}} \right) \tag{1}$$

where, P_{target} and P_{current} are the goals and current teaching performance, F_{feedback} is the feedback data (such as student grades and enterprise evaluations), and α and β are the adjustment coefficients. For example, if a student's skill assessment does not meet the standard ($P_{\text{current}} < P_{\text{target}}$), it is necessary to increase practical class hours ($\Delta T>0$).

(2) "Dual stage": process evaluation and final evaluation

1) Process evaluation

Process oriented evaluation focuses on the dynamic performance of students in their learning process. Firstly, this evaluation method uses attendance statistics, as well as dimensions such as student participation in classroom discussions and the number of proactive questions asked, to examine students' learning attitudes and reflect their enthusiasm and focus on the course. Secondly, it evaluates students' learning methods by observing their note taking skills, the rationality of their learning plans, and their ability to effectively utilize various learning resources, in order to assess their level of self-directed learning ability. Thirdly, this evaluation model focuses on the quality of students' answers to questions and their role in group cooperation, with a particular emphasis on their classroom performance. This helps to accurately assess students' mastery of knowledge and teamwork skills. Finally, it tracks the entire process of students completing their homework, in order to gain insights into their coping strategies when facing difficult problems - whether relying on independent research or actively seeking external help - thus uncovering the perseverance and exploratory spirit that students possess.

For students, process evaluation can give timely feedback on their learning status, let them know their strengths and weaknesses, clarify the direction of their efforts, and stimulate their learning motivation. For teachers, it is helpful to understand the teaching effect in real time, find out the advantages and shortcomings in the process of teaching implementation, and adjust teaching strategies in time.

2) Final assessment

Summative assessment focuses on evaluating learning outcomes. For theoretical knowledge, assessments such as knowledge tests and case analyses evaluate students 'memorization, comprehension, and application of professional knowledge. Practical skills are assessed through internship reports and hands-on evaluations to gauge students' proficiency in real-world operations and problem-solving capabilities.

From the students 'point of view, the final evaluation results directly reflect the learning outcomes of the course, and are an important basis for excellence evaluation and promotion. From the school and teachers' point of view, it can comprehensively evaluate the teaching quality and judge whether the teaching objectives are achieved.

(3) Three dimensions of teaching evaluation: in-depth consideration of knowledge, skills, and literacy

In the complex system of teaching evaluation, the "three dimensions" - knowledge dimension, skill dimension, and literacy dimension - are like three solid pillars, jointly supporting the comprehensive and scientific evaluation of students' overall quality. These three dimensions are interrelated and complementary, providing precise guidance for improving teaching quality and students' future career development.

1) Knowledge dimension: Building a solid professional foundation

The knowledge dimension is the fundamental level of teaching evaluation, which focuses on assessing students' mastery of professional knowledge. This covers a deep understanding and accurate memorization of fundamental theoretical knowledge and core professional knowledge. Basic theoretical knowledge is like the cornerstone of a building, providing solid support for students to build a complete professional knowledge system; The core professional

knowledge is the essence of the professional field, which determines the depth of students' expertise in that field.

Students not only need to be able to accurately explain professional concepts and principles, but also possess the ability to analyze and solve general problems using the knowledge they have learned. Taking medical majors as an example, students should keep in mind basic theoretical knowledge such as human anatomy and physiology, while mastering core professional knowledge such as internal medicine and surgery.

2) Skill dimension: Strengthen practical skills

In the teaching evaluation system, the skill dimension occupies a crucial position. It focuses on students' ability to operate professional instruments and equipment, use professional software, and solve problems in practical work scenarios. Practical skills are a key part of students' process of transforming theoretical knowledge into practical operational abilities. Through comprehensive and in-depth practical training, students can accurately and proficiently master the operational skills of professional equipment, thereby significantly improving work efficiency and academic performance quality.

Innovation skills focus on cultivating students' innovative thinking patterns and abilities. For example, in the field of computer science, students not only need to be proficient in various programming languages and software tools, but also need to have the ability to design novel algorithms and develop practical software. By participating in project practice and various competition activities, students can continuously hone their practical and innovative skills, thereby improving their ability to solve practical problems.

3) Dimension of Literacy: Shaping Comprehensive Personality

The dimension of literacy emphasizes cultivating students' professional ethics and comprehensive abilities through academic learning and practical application. Professional ethics are the code of conduct that students must abide by in their future career development. A student with good professional ethics can maintain a high sense of responsibility and dedication in their work, abide by industry norms, and create value for the enterprise and society.

Comprehensive abilities include patriotic values, communication skills, self-learning ability, and problem-solving ability. Patriotic values can enhance students' sense of social responsibility; Communication skills enable students to communicate and collaborate efficiently with others; Autonomous learning ability can promote students to continuously adapt to the needs of knowledge iteration and innovation; Problem solving ability can help students calmly cope with various challenges. Incorporating these dimensions of literacy into the evaluation system can comprehensively and deeply evaluate the effectiveness of ideological education curriculum design, thereby cultivating high-quality talents with both noble character and excellent talent.

(4) The evaluation system of "four subjects"

1) Teacher evaluation

Education practitioners can use digital learning platforms to track the dynamic changes in students' academic progress in real time; In the process of classroom teaching, through meticulous observation of students' classroom performance, in-depth analysis of homework quality, and comprehensive and systematic analysis based on exam scores, accurate and comprehensive evaluations of students can be made. Moreover, teachers can provide targeted feedback and guidance based on individual differences among students, helping them optimize their learning strategies, enhance their comprehensive literacy and ability levels, and guide them to achieve academic goals steadily.

2) Student self-evaluation and peer evaluation

Student self-assessment requires students to deeply reflect and comprehensively examine their own learning process and final outcomes, which is beneficial for cultivating students' self-directed learning ability and enhancing their self-awareness. Through various channels such as

questionnaire surveys, student narratives, and online assessments, students can systematically review their performance in the course through self-evaluation and scoring, covering multiple dimensions such as knowledge and skill mastery, task completion quality, contribution to team collaboration, and time management ability. Subsequently, students need to write a self-reflection report, summarize and generalize their learning experience, accurately identify their own shortcomings, and clarify the direction for future improvement.

Peer evaluation among students can help promote collaborative learning, achieve mutual supervision among students, and effectively exercise students' critical thinking and teamwork abilities. During the implementation of the group project, team members evaluate each other's performance in discussions, task assignments, and outcome presentations, and provide constructive feedback to clarify their strengths and weaknesses. This process has further enhanced students' teamwork ability through continuous optimization and improvement.

3) Platform evaluation

By leveraging modern information technology and the advantages of online teaching platforms, we can synchronize course learning with assessments, ensuring the evaluation process spans the entire teaching cycle from pre-class to post-class. This enables real-time and dynamic assessment of classroom instruction. Through analyzing learning behavior data on online platforms, we can promptly monitor students' progress, participation levels, and assignment completion status. Additionally, intelligent teaching devices collect classroom interaction metrics such as the frequency of questions asked and answer accuracy rates, providing richer data foundations for comprehensive evaluation.

4) Expert evaluation of the enterprise

Invite frontline technical staff or industry experts to evaluate students 'hands-on projects. Based on industry standards and real-world operational requirements, assess students' project outcomes, identify discrepancies between practical operations and actual workplace scenarios, and share the latest industry trends and technological developments. This approach helps students understand market demands, enhances their practical skills and job-specific competencies, while assisting vocational colleges in timely adjusting teaching content and talent development strategies. The commonly used standardized model for enterprise expert evaluation is as follows:

$$S_{\text{enterprise}} = \frac{\sum_{j=1}^{p} \left(E_j \cdot I_j \right)}{\sum_{j=1}^{p} I_j} \tag{2}$$

where, E_j is the enterprise rating for the *j*-th skill (such as proficiency in equipment operation), and I_j is the industry importance weight (such as higher weight for safety regulations). For example, if a company emphasizes team collaboration ($I_2 = 0.3$), then this indicator has a greater impact on the overall score.

(5) Weight allocation

According to the characteristics and objectives of courses in higher vocational colleges, the weights of each evaluation index are determined by comprehensive consideration and balance. The composition and weight distribution of the teaching assessment and evaluation system are shown in Table 1. The calculation model for students' comprehensive scores is as follows:

$$\text{TotalScore} = \sum_{k=1}^{4} \left(\sum_{i=1}^{3} W_{k,i} \cdot S_{k,i} \right) \tag{3}$$

Where, *k* represents the "four subjects" (teachers, students, platforms, and enterprises), and *i* represents the "three dimensions" (knowledge, skills, and literacy). $W_{k,i}$ is the weight of each subject in the dimension in Table 1, and $S_{k,i}$ is the corresponding score. For example, the knowledge dimension score $S_{1,1}$ for teacher evaluation is multiplied by the weight $W_{1,1}$ (15% in Table 1) and accumulated to obtain the total score.

Table 1: Composition and weight allocation of teaching assessment and evaluation system

project	Evaluation content		subject of evaluation	Weight (%)		Total percentage (%)	General comment (%)
Process evaluation	Pre-class	Study the preview materials	Platform evaluation	5	10	60	100
		Pre-class quiz	Platform evaluation	5			
	In class	check on work attendance	Teacher, platform evaluation	5	40		
		Classroom participation	Student self-evaluation and peer evaluation	10			
		Implementation	Teacher, enterprise evaluation	20			
		Q&A during the lecture	teacher evaluation	5			
	after class	Homework or quizzes	Teacher, platform evaluation	10	10		
summative assessment	Dimension of knowledge	Closed-book written examination at the end of the term	teacher evaluation	15	15	40	
	The skill dimension	Final practical assessment	Teacher, enterprise evaluation	15	15		
	Quality dimension	Professionalism and comprehensive quality	Teacher, student evaluation	10	10		

The new assessment system actively encourages students to preview lessons, facilitating flipped classroom implementation and enhancing teaching quality. Daily attendance scoring now requires active participation in course activities, not just showing up. To evaluate students' comprehensive course performance, final exams account for 40% of total marks: closed-book tests assess theoretical knowledge application, practical assessments evaluate operational procedures and professional skills, while questionnaires measure career competencies.

6 Conclusion

This study focuses on the classroom teaching evaluation system based on the OBE concept in vocational colleges, and is conducted against the backdrop of the continuous development of vocational education and the attention paid to the OBE concept. Firstly, an in-depth analysis was conducted on the problems existing in the traditional classroom teaching evaluation system, such as the single evaluation subject and insufficient participation of external stakeholders such as enterprises; The evaluation dimension is single, focusing too much on results and neglecting students' practical application ability and professional ethics; The evaluation content is disconnected from industry needs, lacking flexibility and integration; The evaluation method is single and cannot fully reflect the learning process of students; Neglecting the evaluation of ideological and political education in courses is not conducive to cultivating talents with both moral integrity and professional competence; Insufficient utilization of evaluation feedback makes it difficult to promote continuous improvement in teaching. Secondly, the connotation of OBE concept and its important significance in the framework of educational and teaching evaluation were elaborated. The OBE philosophy emphasizes the reverse design of curriculum systems and teaching activities from predetermined outcomes, focusing on students' learning outcomes, covering professional knowledge and skills as well as comprehensive qualities such as innovative thinking, communication, and collaboration. Subsequently, based on the OBE concept, principles for constructing a teaching evaluation system were proposed, including result-oriented standards, diversified evaluation theme standards, comprehensive evaluation index principles, student-centered principles, and dynamic principles throughout the entire process. Finally, the "one cycle, two-stage, three-dimensional, and four subject" classroom teaching evaluation system based on the OBE concept was elaborated in detail. The "one cycle" refers to a continuous improvement cycle, which forms a closed loop through five stages: course research, teaching goal setting, teaching activity implementation, evaluation and execution, and regular feedback adjustment, promoting the continuous improvement of teaching quality. The "two-stage" refers to process evaluation and final evaluation, with process evaluation focusing on students' dynamic learning performance and final evaluation emphasizing learning outcomes. The "three-dimensional dimension" refers to the dimensions of knowledge, skills, and literacy, comprehensively evaluating students' professional foundation, practical ability, and professional competence. The "four subjects" include teacher evaluation, student self-evaluation and peer evaluation, platform evaluation, and enterprise expert evaluation, providing evaluation information from different perspectives.

Although this study has achieved certain results and successfully established a relatively complete classroom teaching evaluation system, there are still several issues that need to be further explored. Subsequent research can focus on the practical application effectiveness of this evaluation system in different professional courses, analyze its scope of application and existing limitations, and then carry out targeted optimization and improvement work. At the same time, with the rapid development of information technology, how to more efficiently utilize cutting-edge technologies such as big data and artificial intelligence to provide more accurate and comprehensive data support and decision-making basis for teaching evaluation has become a topic of great research significance and value. In addition, we will continue to explore effective methods, strengthen the close connection between the curriculum system and the actual needs of the industry, ensure that the teaching content and evaluation standards can always keep up with the pace of industry development, enhance the degree of fit between vocational college talent cultivation and market demand, and thus add stronger impetus to the high-quality development of vocational education.

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