

Research on the Quality Management System of Classroom Teaching in Higher Vocational Education

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Abstract—The construction and performance of classroom teaching quality management system are effective means to ensure the achievement of higher vocational education curriculum goals. Taking the “Analytical Chemistry” course of food quality and safety major as an example, the problems existing in the process of classroom teaching quality management are analyzed. Using literature research method, survey research method, case study method and practical training practice method, etc., the influence of teaching objectives, teaching design, teaching content, teaching methods, teaching evaluation and other factors on the quality of classroom teaching was studied. Based on student-centered, achievement-oriented and continuous improvement as the core, the classroom teaching quality management system of higher vocational education is constructed. The research results have guiding significance and demonstration role for the construction of high-efficiency classroom teaching quality management system in higher vocational colleges.

Index Terms—College graduated, classroom teaching, quality management system, evaluation standard

I. INTRODUCTION

Classroom teaching is a common stage for teachers and students, and it is also the main front for higher vocational colleges to implement talent training. The quality of classroom teaching is related to the achievement of higher vocational education curriculum goals and personnel training goals. The quality of classroom teaching is the core and foundation of the entire higher vocational education [1–3]. The construction of classroom teaching quality management system is helpful for the connotation construction of higher vocational education. The construction of classroom teaching quality management system can cultivate application-oriented skilled talents that meet the needs of regional economic and social development.

In recent years, the development of higher vocational education has realized the transformation from the original student management and student employment to classroom teaching quality management. How to improve the quality of course teaching and personnel training has become the focus of various institutions of higher learning. Many scholars have explored the quality management of classroom teaching and put forward a series of methods and measure. The research results promote the continuous improvement of the classroom teaching quality management mechanism system. The results of the study further improve the quality and level of classroom teaching. Taking the procurement and supply management course as an example, Zheng *et al.* [4] made a

diagnosis of the teaching objectives, teaching content, teaching methods and other factors in the classroom teaching process. Diagnosed problems are improved and optimized in a targeted manner. The quality of classroom teaching has been further improved. Xu [5] analyzed the main problems existing in the quality of classroom teaching of young teachers in higher vocational colleges, and put forward targeted strategies to improve the quality of classroom teaching. Although researchers have conducted a lot of research on strategies for improving classroom teaching quality, there are still many shortcomings. First, the research process is one-sided. Most of the researches analyze specific problems and put forward methods and measures to solve them. Second, The quality management of classroom teaching is the result of the interaction of multiple factors, but most studies often ignore the interaction between the various factors. The research results are not conducive to the improvement of the current situation of classroom teaching quality. Third, the research object lacks comprehensiveness.

Based on the current problems in classroom teaching quality management, taking the course of “Analytical Chemistry” as an example, this paper comprehensively and systematically explores the classroom teaching quality management mechanism from the aspects of course teaching objectives, teaching design, teaching content, teaching methods, and teaching evaluation. A classroom teaching quality management system based on the outcome-based education (OBE) concept is constructed. The research results can provide guidance and demonstration for higher vocational colleges to build a high-efficiency classroom teaching quality management system.

II. METHODOLOGY

Taking the course of analytical chemistry in Linyi Vocational College of science and technology as an example, this paper uses the methods of literature research, investigation and research, case study and practical training to explore the quality mechanism of classroom management in higher vocational education. The research results of this paper construct the classroom teaching quality management system of higher vocational colleges.

A. Literature Research Method

The literature research method (6–13) is mainly to collect and sort out the data related to this study. This paper searches the key words such as classroom teaching, quality management system, professional teaching paradigm and teaching evaluation mechanism in higher vocational colleges. This paper reads, analyzes and combs the relevant materials, and expounds the relevant theories involved in the research.

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B. Investigation and Research Method

The investigation and research method includes questionnaire survey and field survey. In the application process, the questionnaire survey and field survey data complement each other. According to the current problems of classroom teaching quality management in higher vocational colleges, this paper designs and analyzes the questionnaire. The contents of the questionnaire mainly include teaching objectives, teaching design, teaching contents, teaching methods, continuous improvement and so on. The options of the survey content mainly include three options: very satisfied, satisfied and dissatisfied. The field investigation is mainly to Linyi Vocational College of science and technology and Linyi Vocational College for face-to-face communication with students. Field research mainly focuses on the impact of teaching objectives, teaching design, teaching contents, teaching methods and continuous improvement on classroom teaching quality. Combined with the existing literature analysis results, this paper puts forward relevant suggestions to improve the quality of classroom teaching through investigation and research.

C. Case Study Method

Taking Linyi Vocational College of science and technology as a pilot, this paper makes a case study on the classroom teaching quality management system. This paper firstly investigates the current situation of application-oriented skilled personnel training, and then analyzes the results of classroom teaching quality management on personnel training. Through the analysis of the existing data and the results of the questionnaire survey, this paper studies the quality management system of the classroom teaching of "Analytical Chemistry".

D. Practical Research Methods

Practical research method is a method that comprehensively uses education, management, statistics and other disciplines to analyze problems. Based on the results of the "Analytical Chemistry" case study, the research results are used in the classroom teaching process of other courses. The popularization and application of the research results provide basic data for the construction of the classroom teaching quality management system in higher vocational colleges. On this basis, the quality management system of classroom teaching in higher vocational colleges is constructed. The research results provide a new paradigm for the improvement of classroom teaching quality in other vocational colleges.

III. RESULT

In this paper, the construction of the classroom teaching quality management system of "Analytical Chemistry" is studied by means of literature research, investigation research, case study and practical research.

A. Achievements of Literature Research Method

Retrieval using the classroom teaching, quality management system, professional teaching paradigm, teaching evaluation mechanism, etc. as keywords in

vocational colleges. During the research process, more than 100 articles of various types were consulted. By reading and analyzing literature, the problems existing in classroom teaching quality management are comprehensively sorted out and systematically analyzed. At present, the reasons for the problems of classroom teaching quality in higher vocational colleges mainly include the following four aspects:

First, the design of course objectives is unreasonable, and the degree of correlation with graduation requirements is low. For example, the graduation requirement of food quality and safety major requires students to have the ability to analyze and detect various metal ions in food. During the course goal setting process of "Analytical Chemistry", we often only focus on the explanation of the principles of analytical methods, while ignoring the application of theoretical knowledge in the actual testing process. The failure to combine the course objective setting with the practical application is the root cause of the problems in the classroom teaching quality management system of Analytical Chemistry. Therefore, how to set course objectives is the basis for improving the effectiveness of classroom teaching quality management system.

Second, the teaching content has not changed completely. Teaching content is out of touch with social development and industry needs. For example, the course content of Analytical Chemistry focuses on the principles of various detection methods. These contents are basically the classic contents of "Analytical Chemistry". The specialty of food quality and safety has developed rapidly in recent years, which has put forward new requirements for analysis and detection technology. The setting of the course content is out of touch with the needs of the industry, resulting in a boring classroom teaching process, and students' enthusiasm for learning is not high. Therefore, how to set the course content to fully reflect the latest needs of the industry development is the key to improving the efficiency of the classroom teaching management system.

Third, the use of teaching methods is inappropriate. At present, in higher vocational colleges, the method of classroom teaching is still the traditional teaching method. However, new teaching methods such as case-based, heuristic, and flipped classroom have not been widely used. The student-centered situational teaching model has not yet been established. For example, the teaching of "Analytical Chemistry" course content mostly relies on multimedia courseware. The process of classroom teaching is the process of one teacher explaining the courseware. During the whole classroom teaching process, the participation of students is low, and some students cannot study seriously. As a result, the course objectives cannot be fully achieved. Therefore, in the process of classroom teaching, it is necessary to choose appropriate teaching methods to realize the transformation of the subject status of the classroom from teachers to students. Therefore, in the course of classroom teaching, it is necessary to fully mobilize the initiative of students' learning to ensure the effect of classroom teaching.

Finally, the teaching evaluation is not comprehensive. The existing curriculum assessment methods in higher vocational colleges are single, and the assessment methods do not match the curriculum objectives. For example, the assessment of the

“Analytical Chemistry” course is usually carried out by means of examinations, which mainly examine the students’ mastery of basic knowledge points. The model of non-standardized testing linked to competency has not yet been established, resulting in a poor integration of learning and use, and a disconnect between curriculum goals and graduation requirements.

The results of the literature research provide a basis for how to build a classroom teaching quality management system with all elements of collaboration.

B. Achievements of Investigation and Research Method

During the research, a total of 280 electronic questionnaires were distributed to teachers and students of Linyi Vocational College of Science and Technology and Linyi Vocational College, and 262 were actually returned. The questionnaire survey mainly focuses on whether teachers and students are satisfied with the performance of the current classroom teaching quality management system. The surveyed teachers and students gave feedback on teaching objectives, teaching design, teaching content, teaching methods, continuous improvement, etc. The results are shown in the following Table I.

TABLE I: QUESTIONNAIRE SURVEY RESULTS

Category	Very satisfied	satisfy	dissatisfied
Teaching objectives	2	19	241
Teaching content	12	68	182
Teaching method	0	9	253
Teaching Evaluation	3	21	238

This paper analyzes the feedback results of the questionnaire in terms of teaching objectives, teaching content, teaching methods, and teaching evaluation. Among the above four factors, the teaching method has the greatest impact on the classroom teaching quality management system, and the dissatisfaction reaches 96.6%. Secondly, the influencing factors on the effectiveness of classroom teaching quality management system are teaching design and teaching evaluation. The impact of classroom teaching content on the classroom teaching quality management system is relatively minimal.

Field research was done at Linyi Vocational College of Science and Technology and Linyi Vocational College. The number of field surveys was 20. First, 90% of the respondents believe that teaching methods play a major role in the effectiveness of the classroom teaching quality system. Secondly, 80% of people believe that teaching content plays an important role in the effectiveness of classroom teaching quality management system. 60% of the respondents believe that the existing classroom teaching is limited to in-class teaching, ignoring the impact of pre-class and after-class on the improvement of classroom teaching quality. The results are shown in the following Table II.

TABLE II: FIELD RESEARCH RESULTS

Category	Very satisfied	satisfy	dissatisfied
Teaching objectives	3	7	10
Teaching content	2	6	12
Teaching method	0	2	18
Teaching Evaluation	2	7	11

The results of the questionnaire survey and field survey are basically the same, indicating that the choice of teaching method plays a decisive role in the effectiveness of the classroom teaching quality system. Therefore, how to choose the appropriate teaching method in the course of classroom teaching has become the focus of researchers.

C. Achievements of Case Study Method

A comprehensive and systematic study on the construction of the classroom teaching quality system of “Analytical Chemistry” for the major of food quality and safety was carried out by using the case study method.

First of all, from the perspective of time latitude, discuss the construction of the integrated classroom teaching process before class, in class and after class. The effectiveness of the classroom teaching quality management system not only depends on the classroom teaching part, but also plays an important role in pre-class preview and after-class review.

Secondly, from the latitude of course content, it discusses the construction of a systematic classroom teaching process. The systematic classroom teaching process includes rationally formulating teaching objectives, carefully designing teaching plans, changing classroom teaching content, continuously improving teaching methods, and comprehensively implementing teaching evaluation. Correlate the time latitude with the course content latitude, and finally form an all-round, full-process, three-dimensional “Analytical Chemistry” classroom teaching quality management mechanism and system. The results are shown in the following Fig. 1.

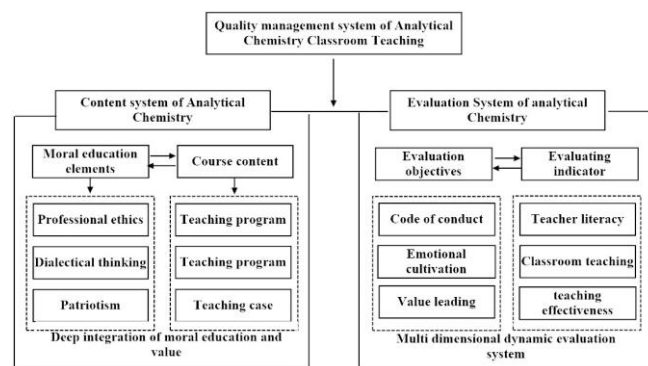


Fig. 1. Quality management system of analytical chemistry classroom teaching.

Course content and course evaluation are the key factors of teaching quality management. In classroom teaching, based on basic theoretical knowledge, integrating students’ interests and elements of moral education, reconstruct the course content, Combined with interactive and situational teaching methods, while teaching knowledge, it can mobilize students’ enthusiasm and improve students’ moral education literacy. Design a classroom teaching quality target system with ideological guidance, behavioral norms and emotional training as the core. Design an analytical chemistry evaluation index system with teacher literacy, classroom teaching and teaching effect as the core. Giving full play to the role of the ideological and political evaluation system of analytical chemistry course, this paper constructs the quality management system of analytical chemistry classroom teaching based on the course content, focusing on teaching

methods and evaluation.

D. Achievements of Practical Research Methods

Through the above research, a classroom teaching quality management system based on “Analytical Chemistry” was constructed. The management system has been widely used in the teaching process of environmental majors and food quality and safety majors, and has been gradually promoted to other higher vocational colleges other than Linyi Vocational College of Science and Technology.

Based on this, build a classroom teaching quality management system based on higher vocational education, lead, demonstrate and drive other higher vocational colleges to build a complete classroom teaching quality management system, and promote the improvement of classroom teaching effects.

IV. DISCUSSION

Based on the achievements of literature research method, survey research method, case study method and practical research method, this paper mainly explores how to build an efficient classroom teaching quality relationship system from the perspectives of student-centered, result-oriented and continuous improvement, mainly including the following several aspects:

A. Establish a Student-Centered Education Concept

The student-centered classroom teaching quality management system puts teachers and students on an equal footing and builds a community of teaching and learning. The student-centered philosophy is mainly reflected in teachers' continuous improvement of teaching methods, creation of new teaching experiences, continuous improvement and mutual promotion through learning and reflection. This paper studies the achievement analysis of graduation requirements and teaching objectives. This paper studies the support

analysis of teaching activities on the achievement of teaching goals and the analysis of teaching activities and goal achievement. Based on the student-centered education concept, a closed loop of classroom teaching quality management is formed, which is conducive to the improvement of classroom teaching quality.

B. Designing Learning Outcomes-Oriented Curriculum Teaching Objectives

The learning outcome-oriented curriculum teaching goal is one of the core elements of the classroom teaching quality management system. The instructional objectives of the course are designed around learning outcomes and linked to graduation requirements. It is guided by professional quality and ability-based, clarify the teaching orientation and teaching objectives of the course.

Curriculum objectives stipulate the learning outcomes that students should achieve after taking this course, which is the concrete embodiment of classroom teaching effect. Taking “Analytical Chemistry” as an example, the learning outcome-oriented curriculum objectives are mainly divided into three parts: knowledge-level ability, application-level ability and analysis-level ability. Taking the application of analytical methods and technologies as the ultimate goal, the curriculum objectives are set in reverse, so that students can truly understand what to learn and why they should learn, and on this basis, students can learn how to learn. The contents and teaching objectives of the constructed analytical chemistry course are shown in Table III.

In the case constructed above, moral education elements are integrated into the curriculum content and curriculum objectives. Students are guided by the specific application and application effect of analytical chemistry content. The students' interest and learning enthusiasm have been improved. In the process of classroom teaching, students strengthen the learning of basic knowledge of analytical chemistry and the cultivation of application ability.

TABLE III: CASE STUDY ON THE RECONSTRUCTION OF ANALYTICAL CHEMISTRY CURRICULUM CONTENT AND CURRICULUM OBJECTIVES

Chapter	Course content	Instructional objective
Introduction	Applications and challenges of analytical chemistry in food science, environmental protection, medical and health, aerospace and other fields	Understand the wide application of the significance of analytical chemistry learning, and realize the sense of responsibility and mission of analytical chemistry people
Introduction	Food safety incidents: Sudan red and Malachite incidents in 2005; Melamine incident in 2008; The gutter oil incident in 2010; Plasticizer events in 2011	Understand the important role of analytical chemistry in social service and improve students' awareness of abiding by discipline and law
Acid base titration	Hou Debang's "Hou's alkali making method"	Cultivate students' patriotism and enhance national consciousness and pride
Four titration	In the four major titration processes, there are titration jump, stoichiometric point, titration end point and end point error. Finding the commonness and individuality of the four major titrations is convenient for mastering the common laws in the four major titrations and understanding and mastering the unique concepts separately	Understand the laws of commonness and individuality in dialectical thinking
Four titration	The "three wastes" produced during the experiment shall be reasonably disposed of or recycled according to the regulations; During the experiment, the reagent is used sparingly to reduce the discharge of "three wastes"; The experimental process should be careful to reduce the repetition of experiments caused by operation errors, so as to reduce the use of reagents	Environmental protection should start bit by bit and enhance the awareness of environmental protection

C. Change the Course Teaching Content to Correspond to Industry Needs and Industry Standards

The content of curriculum teaching in higher vocational

colleges should be based on industry needs and industry standards, and should be guided by the knowledge, ability, and quality requirements of job responsibilities for talents,

optimize and integrate content, and combine theory with practice. Apply the principle of reverse design and forward implementation in teaching design, and implement students' learning results into the course implementation process. Establish a heuristic, interactive and case-based classroom teaching mode, enhance students' awareness of active participation in classroom teaching, inspire students to think actively, and improve the interactive, attractive and infectious of classroom teaching.

D. Construct Classroom Teaching Quality Evaluation Standards with the Goal of Continuous Improvement

Construct a classroom teaching effect evaluation mechanism from the perspective of students, that is, students participate in the evaluation, students participate in the formulation of evaluation standards, and the evaluation methods are diversified. By participating in the evaluation

process, students can fully understand the key points and difficulties of classroom teaching, which can improve students' learning effect. After the class, according to the teaching goals, measure the achievement of students' learning goals, as the basis for teachers' teaching reflection. The research results are conducive to promoting the continuous improvement of classroom teaching quality.

Taking "Analytical Chemistry" as an example, a student-centered classroom teaching quality management system has been established, and the achievement of students' learning goals has shown an upward trend. Students' mastery of basic knowledge has increased significantly, and their ability to apply basic knowledge to analyze problems and solve practical problems in the industry has been significantly improved. The results are shown in the following Table IV.

TABLE IV: EVALUATION STANDARD OF ANALYTICAL CHEMISTRY CLASSROOM TEACHING QUALITY

Target layer	Criterion layer	Subcriteria layer	Scores of different grades			
			excellent	good	qualified	unqualified
Evaluation standard of analytical chemistry classroom teaching quality	Target location	The course has clear construction objectives	4	3	2	0
		The curriculum objectives shall be incorporated into the talent training plan, curriculum quality standards, curriculum syllabus and curriculum examination and assessment plan	5	3	2	0
		Introducing the latest research results into instructional design	4	3	2	0
	Teacher literacy	Whether the preparation before class is sufficient, the teaching is passionate and infectious	5	3	2	0
		Have a strong ability of classroom organization and teaching, adaptability, classroom rhythm control and classroom evaluation	4	3	2	0
		Teach in accordance with the law, love their posts and work hard, care for students, unite and cooperate, and be a teacher	4	3	2	0
		Master advanced teaching ideas, have the spirit of teaching reform and unique teaching style	4	3	2	0
		Correctly guide students and establish correct values	5	3	2	0
		Be good at excavating the value of the professional curriculum itself and let students deeply understand the moral connotation behind the curriculum content	5	3	2	0
		Do not make illegitimate remarks, and stop other people's illegitimate remarks in time	5	3	2	0
	Student training	Students are familiar with the advanced deeds of industry model workers and model representatives	4	3	2	0
		Students' learning attitude is correct, and the excellent rate of Ideological and moral character and mental health evaluation is high	5	3	2	0
		Students have no improper comments online or offline, and have a high degree of attention and identity to the national social development both in and out of class	5	3	2	0
		Students have innovative spirit and high participation rate in various competitions	5	3	2	0
	classroom teaching	Teachers' guidance to students in the integration of emotion, attitude and values	5	3	2	0
		Focus on the integration of emotion, attitude and values	5	3	2	0
		In the teaching process, we can combine the hot topics in the society with the relevant professional knowledge, find the fit point with the students, and realize the value guidance	5	3	2	0
		Cultivate students' ability to think independently in a variety of ways	5	3	2	0
		There are abundant teaching resources for preview before class and discussion after class, so as to strengthen the whole process of learning	5	3	2	0
	Examination and assessment	The assessment reflects the effectiveness of classroom teaching on the basis of the evaluation of students' knowledge and ability	5	3	2	0
		teaching effectiveness	Students' satisfaction with teaching evaluation is high	3	2	1
	Teachers' evaluation of learning is above good		3	2	1	0

The above discussion shows that based on the case study results of the classroom teaching quality management system

of "Analytical Chemistry", a classroom teaching quality evaluation system with the OBE concept as the core is

constructed. The classroom teaching quality management system based on the OBE concept, including the integration of teaching objectives, teaching design, teaching content, teaching methods, teaching evaluation and other factors. Through the discussion of the research results, this paper finally builds an all-round, whole-process, and collaborative classroom teaching quality management system.

V. CONCLUSION

Based on the current situation of classroom teaching quality management in higher vocational colleges, this paper comprehensively and systematically analyzes the existing problems in classroom teaching quality management by using literature retrieval method, investigation research method, case study method and practical training practice research method.

On this basis, the teaching objectives, teaching design, teaching content, teaching methods, teaching evaluation and other elements that affect the quality management of classroom teaching are coordinated, and integrated into the classroom teaching quality management system centered on the OBE concept.

The research results have built a comprehensive, whole-process, and collaborative classroom teaching quality management system, and provided demonstration and guidance for the construction of classroom teaching quality management mechanisms in other vocational colleges.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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