

Study on Curriculum Assessment and Quality Assurance Ecosystem Reconstruction In the Post-epidemic Era*

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Abstract—The concept of continuous improvement has been throughout the comprehensive process of specialty construction and course teaching. In the post-epidemic era, how to integrate and reshape the original course ecology and teaching logic, and make use of multidimensional digital technology to construct the optimization scenarios of sustainable improvement for teaching and learning so as to guarantee and improve the quality of course teaching is worth further study. Based on the training applied talents oriented, facing course teaching evaluation and quality assurance model of "Software Engineering "for research and practice, aiming at the deficiency existing in the traditional curriculum teaching ecological system, with the help of the teaching quality guaranteed by the implementation of real-time evaluation strategy for micro learning units, complemented by flexible online and offline learning experiences, constructing and reconstructing the ecological system of course assessment and quality assurance which is beneficial to increase students' sense of learning acquisition and further improve the quality of course teaching.

Keywords-Curriculum assessment, Continuousimprovement, Ecosystem, Quality assurance

I. INTRODUCTION

The COVID-19 pandemic has impacted and changed the technology ecology and operational logic of many industries. For example, "facial recognition with mask" appears in the recognition technology route [1], and the mode of online education has been further emphasized and developed [2].It should be noted that this is also another reflection of concept for sustainable improvement. In view of the current curriculum teaching, how to integrate the existing teaching mode, to build and recreate the sustainable improvement of learning scenes and experiences online and offline worth focusing on; Meanwhile how to effectively optimize and reconstruct the teaching logic and supplemented with teaching implementation strategies in post-epidemic era,it is an urgent problem to establish an ecological system of curriculum assessment that adapt to student's dynamic learning needs. No matter what kind of teaching mode is adopted, in the final analysis, the assessment and evaluation mechanism for measuring teaching quality and students' learning will play a key role. In the process of specialty construction and specific

course teaching, it is necessary to build an effective assessment and evaluation ecosystem to ensure quality.

A. Specific Course Requirement

Taking "Software Engineering" as an example, it is a professional course covering more knowledge levels, and carries out theoretical teaching and practice assessment according to the overall requirements of professional training plan and curriculum syllabus. Centering on the basic theory, principle, thought and development trend of software engineering, combined with the new progress and trend of computer technology, the course requires students to master the steps and methods of each stage of software development, and cultivate and improve students' computer practice ability in the scenario of complex engineering problems. Lay a solid foundation for the future use of software engineering ideas and principles from the direction of the Internet of things software technology and services; At the same time, students are guided to improve their logical thinking ability and innovative quality in the context of professional fields. The course involves wide range of level, knowledge system, the main task is to face software development requirements under the background of new technology in various industries, conduct the effective software engineering theory and method of teaching, enable students understand and master the software engineering knowledge and tools for problem solution, improving students' perception, experience, analysis and the comprehensive ability to solve the problem in the complex scene of software development; Secondly, due to the uniqueness of the course, it is necessary to combine theory with practice in the teaching process and pay attention to cultivating students' ability of practical software design, development and problem solving.

- Problem

At present, there are still many problems and deficiencies in the actual teaching process during this course. For example, the traditional teaching and assessment model cannot well implement the teaching concept of "student-oriented" and continuous improvement,[3]Teaching quality cannot be effectively monitored and guaranteed; At the same time in the process of teaching organization.

- Policy

Due to restrictions of objective factors such as less scheduling, and student-faculty ratios, it is difficult for good

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teaching interaction and effective feedback, Therefore, stratified teaching and assessment cannot be carried out for different professional situations, it is necessary to improve the quality of teaching, in turn, students' learning effectiveness and the acquisition need to be promoted as well as teaching mode needs innovation. Student's practical capability cannot be effectively cultivated and improved.

- Concept

To realize the core concept of "student-centered", their learning effects cannot be well feedback, perception, evaluation, analysis and continuous improvement. Therefore, it is urgent to seek an objective, efficient and reasonable assessment and quality assurance system to fully reflect the state and quality of curriculum teaching and learning.

B Learning Analysis

At present, the motivation of students' autonomous learning is insufficient in the teaching process of theory and practice, the phenomena such as poor retention and activity in learning still exist, although mobile intelligent classroom platforms such as "XueXiTong" and "Rain Classroom" was adopted, the efficiency of teacher-student interaction is improved to a certain extent, as well as online resources such as MOOC and SPOC, and the quality of classroom control ,online and offline teaching process is improved [4].

However, teachers still fail to objectively evaluate and control the learning effect of students, and the overall evaluation and assessment system of the course learning effect is not well constructed and optimized; Subject to the "one-size-fits-all" course assessment, students only pay attention to the key content of written examination, but ignore the training of software engineering thinking and the ability to solve practical problems in the context of practical problems, Students do not have a good understanding of what to learn, why to learn, how to learn, do not know how to use in practical application? At present, the learning of courses mainly has the following group characteristics:

Some students have a good grasp of the basic theoretical knowledge of computer system and have a good overall score in the course. However, they lack the theoretical thinking and practical problem-solving ability of software engineering, and cannot solve specific problems such as software demand analysis and tool modeling.

these students deserve special attention in ecological reconstruction of curriculum evaluation system.

II. CURRENT SITUATION

At present, according to the course syllabus, the assessment method is comprehensive, whose links include the usual results and written examination results at the end of the term. The total score is 100 points. In the total evaluation results, the written examination accounts for 70% and the usual assessment is 30%. The usual results mainly consist of three parts: performance and attendance in classroom, homework and experimental report. The written examination is adopted for the final examination of the course, and the examination question bank is based on the overall requirements of the course outline. On the whole, the existing

assessment methods are relatively fixed and single, and fail to form a comprehensive curriculum evaluation ecosystem. It is difficult to form positive feedback and continuous improvement on teaching quality and students' learning effectiveness.

A. The Imbalance Of Evaluation

Generally, according to the analysis of curriculum learning situation, the existing unitary curriculum assessment method and evaluation system cannot well meet the new requirements of curriculum construction and quality assurance. It is urgent to study and build a new curriculum assessment and evaluation ecosystem, so as to promote the reform and reconstruction of learning situation; At the same time, most of the existing teaching focuses on the theoretical knowledge points, and does not take into account the practical application and the learning characteristics and state of students of various majors. Therefore, further in-depth research and overall reform are needed.

B. Teaching Mode Optimization

Under the existing teaching mode, theoretical knowledge and practical application are disconnected. Single classroom teaching is mainly completed by multimedia means. Teachers cannot understand and master students' learning effect in real time. There is also a lack of effective platform for interactive communication and Q & A with students after class. In this way, the two links of teaching and learning are disconnected and misplaced, and seamless connection cannot be realized, the teaching of theoretical knowledge cannot well reflect the solution to practical problems. Although the curriculum team has used the mobile smart classroom platform for teaching and interactive teaching in recent academic years, the effect is worthy of discussion; Therefore, it is urgent to reform the curriculum teaching mode so that teaching and learning can interact well.

Secondly, the existing curriculum assessment and student learning effect evaluation system is single and old, which cannot meet the cultivation and continuous evaluation and improvement of students' practical ability in time. At the same time, the existing assessment model has not taken into account the professional and individual differences of students, but "one size fits all". An important idea to solve the above problems is that it is urgent to take into account the current situation of the curriculum,

Make rational use of relevant online and offline platforms, reform the assessment methods and evaluation modes in combination with specific course contents, reconstruct the assessment and evaluation ecosystem, and form an ecological chain of students' real-time evaluation and feedback before, during and after class, so as to continuously improve the assessment and evaluation system, promote the in-depth reform and renewal of teaching mode and the integration and reconstruction of online and offline learning scenes, inside and outside of the classroom.

III.RECONSTRUCTION OF ECOSYSTEM

Since China was accepted as a signatory member of the "Washington Agreement" in 2013, the reform of engineering

education has been gradually rooted with the concept of results oriented Education [5].

A. A New Concept

The core concepts followed by engineering education are: results-oriented, student-centered and continuous improvement. These concepts guide and promote talent training and professional construction from a macro perspective, it also puts forward specific principles for the reform of curriculum teaching and evaluation model from the micro level. Results oriented Education (OBE) emphasizes that the goal of teaching implementation is the learning results obtained through the education process, objectively evaluate, assess and continuously improve the learning results, that is, the overall teaching system of the course is required to pay attention to the relationship between input and output, so as to ensure that students can obtain the maximum learning benefits with lower learning cost, OBE emphasizes the following four core questions:

What are the learning outcomes we want students to achieve?

Why should we let students achieve such learning results?

How to effectively help students achieve these learning outcomes?

How to know that students have achieved these learning results?

Ultimately, the result oriented teaching concept requires a reasonable and effective assessment and evaluation of the quality of the course and the learning effectiveness for students. Especially in the post epidemic era, the teaching methods, interactive atmosphere, learning experience and students' sense of acquisition from the course need to be reshaped and evaluated. Therefore, how to design harmonious and balanced, layered and diverse, flexible and controllable , in line with the characteristics of curriculum and learning situation is a key content that needs to be deeply studied. At the same time, compared with the traditional teaching model, OBE emphasizes self-evaluation comparison rather than students [6]. Emphasize whether the self-reference standard has been met, the evaluation results are often expressed by "conformance/non-conformance ", " reached / not reached ", " passed / not passed ", etc. It does not adopt the common standard of "one-size-fits-all" among students, so the evaluation results are not comparable. At the same time, it emphasizes the continuous improvement of teaching process and evaluation; The traditional teaching mode emphasizes comparative evaluation, which distinguishes excellent, good, medium and poor grades among students. The above comparison also provides the basis and support for the reconstruction of the curriculum evaluation and assessment system. Students' learning achievements need to be measured by evaluation system , so it is particularly critical to design an objective, reasonable and diversified appraisal price mechanism.

B. Instant Improvement

At the same time, continuous improvement is also an ecological chain of self-improvement and evolution. It runs

through the whole teaching process of teachers and learning cycle of students. From perception, evaluation, feedback and improvement, it iterates layer by layer and links with each other. This change is not achieved overnight. It should be systematic. Its ultimate goal is to implement the idea of results oriented. Therefore, according to the current situation of software engineering curriculum, it is necessary to reform the existing single fixed and lack of vitality curriculum assessment and evaluation ecology, reconstruct the curriculum assessment and evaluation mechanism, build a positive and harmonious ecological chain system, so as to promote the sustainable and healthy development of curriculum construction, and promote the continuous improvement of teachers' teaching effectiveness and students' learning achievements through the reconstructed system.

C. Special Attention

In the process of practicing the concept of continuous improvement, the following aspects deserve special attention:

The top-level design of curriculum assessment and evaluation mechanism. It includes the reform of assessment contents and methods, the optimization of assessment mode, and the construction of real-time hierarchical micro-circulation assessment and evaluation ecological chain based on subsection content;

The establishment of new logic of classroom teaching under the concept of continuous improvement. It includes the continuous renewal of teaching methods, the reconstruction of learning effectiveness evaluation model of theoretical and practical course content;

The establishment, evolution and reconstruction of the ecological chain of curriculum evaluation, including the integration of assessment and evaluation in scenarios of online and offline curriculum knowledge points, the refinement and establishment of assessment and evaluation standards of knowledge and ability inside and outside the classroom, and the determination and continuous improvement of evaluation standards of learning effectiveness of different groups of students.

IV.RECONSTRUCTION OF TEACHING

A. Digital Improvement

Take a look at the current situation of course teaching, at present, the teaching cycle is about 16 weeks, and learning period are relatively limited, of which more than half are practical teaching links. The course team teachers mainly use offline multimedia teaching methods to teach, and release related resources, homework, Q & A and interactive communication based on the mobile classroom platform. In the post epidemic era, integration of online and offline will become normal teaching scene. Nowadays, the teaching mode has not realized the concept of student-centered, nor met the requirements of the new assessment and evaluation system. Combined with the analysis of specific learning situation, some students have a certain understanding and accumulation of basic knowledge in computer system, so they can study and update the teaching methods, present and normalize the core knowledge in the main form of "micro video and small document" on the relevant curriculum platform, and allow

students to fully study independently, which not only improves the utilization rate of learning period, it also provides sufficient space for subsequent continuous real-time assessment and evaluation. This method can be regarded as an optimal teaching strategy. Teachers no longer assume the role of simple teaching, but become the role of real-time assessment and evaluation, discuss, answer, communicate and summarize students' learning questions and difficulties, and have more time and space to pay personalized attention to different student groups.

B. Reshape Of The New Teaching Policy

Based on the logic of the above new teaching mode, we should research and reform the examination methods at the same time. At present, only one written examination is conducted after the course has been completed. The "one-size-fits-all" assessment method cannot fully reflect the real learning results of different groups of students, and continuous improvement is impossible. Combined with the curriculum characteristics and objective factors, it is proposed to study and implement the reform of curriculum assessment methods. The written examination can be implemented twice a semester, which can improve the comparative quality of students' self-evaluation and the space for continuous improvement as a whole, and meet the macro requirements of the curriculum assessment and evaluation ecosystem. In the specific implementation process, two written examinations can be arranged at the end of the course, and the corresponding interval can be one or several weeks. The specific time and assessment content can be dynamically determined according to the implementation scheme, and two assessment schemes can be provided for selection and research:

The written examination will be conducted twice a semester, with different emphasis on the examination content and form. We have implemented the reform of the examination method, and it has achieved good results in teaching practice. The first time can be set in the middle of the semester or at the end of the semester, and the second time can be set in the final examination period; The first written examination mainly focuses on mastering the core knowledge points of the course. Taking the course of 《Software Engineering》 as an example, it mainly involves the basic theory of software engineering, software development process, structured / object-oriented analysis and design modeling tools, which plays a role of filter in the whole course assessment ecosystem; The second written examination focuses on the practical ability of applying software engineering theories, methods and tools to design and development of project.

Organize two examinations, and the examination contents and forms are basically the same. The first tends to be set in the mid-term period. The assessment content is core knowledge point test with software project practice assessment. The teaching team can set up the test questions and answers of the core theoretical knowledge points of the course in advance, which appear in the form of objective questions such as selection, fill in the blank and judgment. The teachers release the test questions on the convenient mobile classroom platform such as learning pass and Rain Classroom, and the test is completed in class, the platform summarizes

students' answers in real time, which not only completes the assessment efficiently, but also facilitates classified evaluation. At the end of the term, a written examination will be conducted again to consolidate and improve the students' learning effect and continuous improvement effect.

C. Teaching Practice Based On Course Assessment

The overall optimization principle of course assessment is based on the concept of continuous improvement, combined with the characteristics of course content and the strategic requirements of the construction of the above-mentioned course assessment ecosystem. The course team should simplify, update and optimize the test question bank again according to the dynamic changes of knowledge points of teaching content and the course evaluation logic of sustainable improvement, and eliminate the non-core knowledge points in the existing test question bank, reduce the details of operation problems out of practical application, highlight the core emphasis points, avoid the phenomenon of topic repetition, simplification and homogenization, weaken the assessment proportion of non-core theoretical knowledge points to a certain extent, and strengthen the assessment of common knowledge points in practical application and problem-solving situations. In our teaching practice, we focus more on the differences of students. Meanwhile, combined with the assessment requirements of students and courses, the following problems and details are worthy of in-depth study:

First, according to the internal requirements of curriculum teaching quality assurance, determine the specific implementation strategy of the examination and evaluation system;

Second, for course assessment, the assessment forms, strategies and quantitative indicators of usual learning status are refined to build a real-time micro unit evaluation cycle;

Third, based on the current learning situation, optimize and restructure the existing curriculum assessment and evaluation model, face the concept of continuous improvement, and assessment based on objects of the course is the best policy for continuous improvement.

By adopting the new teaching and assessment mode, we have made a real comparison between the two classes (Iot Engineering Class16、17) .As far as the three course objects are concerned, Class2017 is obviously higher than Class 2016. Some real data are as follows:

《Software Engineering》 Course Objects Result Comparison

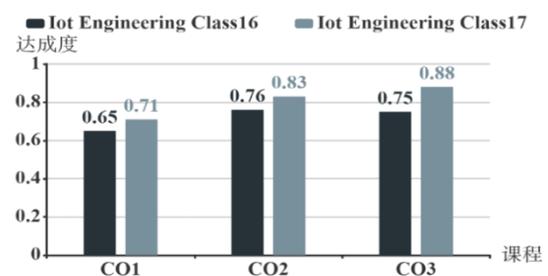


Fig.1. Comparison of course objects values

In our teaching practice, in order to make up for the shortcomings of the existing curriculum assessment and evaluation system, we reconstruct the assessment ecosystem based on the real-time evaluation strategy of small units. Combined with the teaching practice of software engineering, we adopt the first scheme to design and construct an improved curriculum assessment and evaluation system.

The curriculum is divided into end assessment and process assessment, That is, corresponding to the final examination and ordinary examination under the traditional examination mode, the end examination accounts for 70% and the process examination accounts for 30%.

TABLE I.ASSESSMENT PROPORTION

Course Object	Microunits	Assessment Proportion	Average result for student	Assessment for CO
CO1	Topic discussion	A ₀₁ (2%)	A ₁	$CO1 = \frac{A_1 + B_1 + C_1 + D_1}{A_{01} + B_{01} + C_{01} + D_0}$
	Homework	B ₀₁ (3%)	B ₁	
	Experiment	C ₀₁ (4%)	C ₁	
	Final exam	D ₀₁ (31.5%)	D ₁	
CO2	Topic discussion	A ₀₂ (2%)	A ₂	$CO2 = \frac{A_2 + B_2 + C_2 + D_2}{A_{02} + B_{02} + C_{02} + D_0}$
	Homework	B ₀₂ (3%)	B ₂	
	Experiment	C ₀₂ (5%)	C ₂	
	Final exam	D ₀₂ (10.5%)	D ₂	
CO3	Topic discussion	A ₀₃ (2%)	A ₃	$CO3 = \frac{A_3 + B_3 + C_3 + D_3}{A_{03} + B_{03} + C_{03} + D_0}$
	Homework	B ₀₃ (3%)	B ₃	
	Experiment	C ₀₃ (6%)	C ₃	
	Final exam	D ₀₃ (28%)	D ₃	

The terminal assessment is in the middle of the first term, and the offline written examination or online answer mode can be flexibly adopted according to the actual situation. Microunits can include pre-class Self-Learning (such as independent learning of section contents, preview, questioning, etc.), classroom learning (participation and activity of theme discussion, questioning and communication, completion of single practice test in class, online classroom interaction, etc.) After class learning feedback (online teaching video learning completion, homework, questions, etc.), the proportion of each

micro unit in the process assessment can be dynamically adjusted. Some details of assessment are as follows(Table I):

V. CONCLUSION

From the macro point of view, the reconstruction of the overall curriculum evaluation, assessment and quality assurance system is a systematic project, which needs to be considered and grasped in a multi-level system. The assessment and evaluation of students' learning achievements is not only based on the results of a certain examination and test or the quality of the curriculum report, but should be a multi-level, continuous improvement and dynamic evaluation ecology; At the micro level, each link of the course(such as each practice unit, each course and each knowledge unit) is the key unit constituting the whole course evaluation and assessment system. These small units organically constitute the whole course system and strongly support and reflect the quality and toughness of the course evaluation ecosystem. Is there a quality monitoring mechanism that students need to see at present?Rather than continuous improvement of learning effectiveness; Moreover, the evaluation is basically limited to the end, that is, the assessment after the end of the course does not effectively cover all links of the course. The real-time evaluation of small units of the course is often seriously missing. Due to the adoption of traditional comparative standards, the evaluation mechanism cannot touch the real-time learning effect, experience and feedback of each individual student in real time and efficiently, Even for individual evaluation, there will be deviations. For example, the level of machine test results is not directly related to the practical ability of system application. Therefore, how to integrate the assessment and evaluation ecological cycle of curriculum micro units and ensure the micro smooth circulation of curriculum is the key to open up and build the whole curriculum evaluation ecology and quality assurance system.

To sum up, the research on the real-time evaluation mechanism and specific strategies for small units of the course deserves special attention. Based on the course platform, in the teaching process of theoretical courses and practical links, a rapid real-time evaluation and feedback mechanism is set for the content of knowledge points in each section of the course, and the intelligent classroom platform is used to evaluate each student's individual learning process, feelings Conduct real-time tracking, analysis and feedback on the status, and then conduct multi-mode evaluation on the mastery of subsection knowledge points, such as timely evaluation of students in the form of random exercises, topic discussion, unit test, teacher-student interaction and other forms set in the existing curriculum resource database, and record statistical evaluation data. Importantly, pay attention to individual self-evaluation and comparison, Rather than a simple overall comparative evaluation. At the same time, the specific strategies should be implemented in combination with the optimized teaching mode, classroom time management strategy and students' dynamic grouping. The real-time evaluation of micro units should be incorporated into the usual performance evaluation system of the course, and the proportion of evaluation factors such as students' course participation, learning activity, online knowledge point unit retention, self-learning viscosity and

improvement effect should be appropriately increased in the usual performance, so as to build a hierarchical, diverse, flexible and controllable system. A sustainable and improved curriculum assessment and evaluation ecosystem should be in line with the characteristics of curriculum and learning situation.

There are still some key issues that need to be deeply considered and improved, such as how to effectively set the quantitative indicators of the real-time assessment and evaluation scheme in the curriculum evaluation system, how to effectively integrate and reconstruct offline teaching scenes to meet the requirements of the assessment and evaluation system, and how to effectively integrate the reform of assessment methods and the reconstruction of teaching modes.

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