RESEARCH ON CURRICULUM ASSESSMENT AND ACADEMIC EVALUATION REFORM OF COLLEGES AND UNIVERSITIES

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Abstract

The importance of college curriculum assessment and academic evaluation in higher education and teaching cannot be overstated, as it is essential for enhancing the quality of talent training. A suitable assessment plan and means of evaluation should not only consider students' knowledge, but also their thinking and problem-solving aptitudes, which will foster their creativity and practicality. Attention to research on curriculum assessment and academic evaluation of colleges and universities has grown in recent years due to the deep progress of education reform. This article studies the curriculum assessment and academic evaluation reform of Chinese universities. According to the current status quo, the necessity of curriculum assessment and academic evaluation is discussed, and reform measures are proposed on the issues of assessment and evaluation. The three core objectives of talent training and assessment, namely 'learning effects',' innovation of teaching methods and means, and enhancing the quality of talent training through a thorough assessment of students' learning effects, are to be achieved through the promotion of teaching methods and means. In -depth research and practice with academic evaluation. Explaining the specific methods and effects of the "Intelligent sensing and detection technology" courses, which are based on the major of the School of Mechanical Engineering at University of Jinan, is a professional basic course example.

Keywords: *course assessment, academic evaluation, innovation ability, quality of talent training, artificial intelligence, new quality productive forces*

1. INTRODUCTION

Course assessment and academic evaluation are important links in higher education teaching and are of great significance to improving the quality of talent training. As global education reform has become increasingly focused on, the research and practice of these two areas has been given more attention in colleges and universities.

In developed countries, many higher education institutions prioritize the assessment of students' entire capabilities and emphasize the harmonious combination of process and outcome evaluation[1,2]. They focus on nurturing students' creativity and practical aptitude. In course assessment, they not only consider students' mastery of knowledge, but also their thinking and problem-solving aptitude. For example, some universities in the United States use various forms such as project evaluation and peer evaluation to evaluate students' academic performance, so as to more comprehensively reflect students' learning outcomes. In addition, information technology and artificial intelligence technology are widely used to optimize the academic evaluation process. For example, through intelligent assessment systems and automated tutoring systems, real-time monitoring and feedback of students' learning process can be achieved. The utilization of these technologies not only enhances the effectiveness and precision of assessment, but also offers the potential for individualized education.

In stark opposition, Chinese universities have been gradually advancing in their reform of assessment and academic evaluation. Recognizing the restrictions of traditional assessment techniques, they have started to strive for a greater variety of examination methods and a higher proportion of regular scores in the overall score, in order to motivate students to further their regular education. This reform not only helps students better master knowledge, but also promotes teachers' innovation in teaching methods.

The Ministry of Education and other ministries have released a range of educational documents and policies, such as the "Opinions on Accelerating the Construction of High-level Undergraduate Education and Comprehensively Improving Talent Training Capacity", which has spurred Chinese universities to hasten the examination of novel models and techniques for course assessment and academic evaluation. More and more schools have begun to try to adopt diversified assessment methods and strengthen the assessment of students' comprehensive abilities[3]. Integrating modern information technology into the evaluation process, they strive to enhance both the accuracy and efficiency of the evaluation. For example, Tsinghua University has tried to comprehensively reform the existing academic evaluation system and implemented a graded grade assessment reform starting from the 2015 undergraduates. The goal of these reforms is to enhance students' capacity for both comprehensive quality and innovation through a variety of assessment techniques.

The research and practice of the reform of course assessment and academic evaluation in universities has important practical significance and far-reaching impact. The overall structure of the training system is shown in Fig.1. The teaching process of a course is shown in Fig.2. In the entire training system, assessment and evaluation are the key links in assessing whether the training objectives and graduation requirements have been achieved. The evaluation results furnish a foundation and backing for the realization and enhancement of the training goals and graduation requirements.

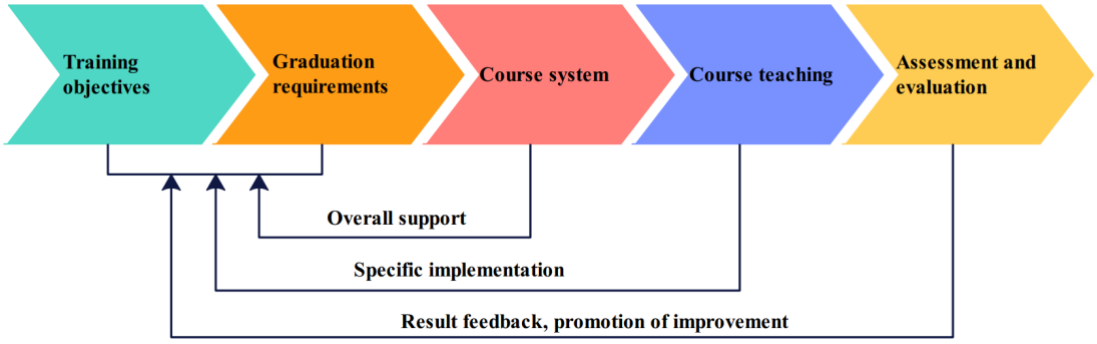

Fig.1. Overall structure of the talent training system

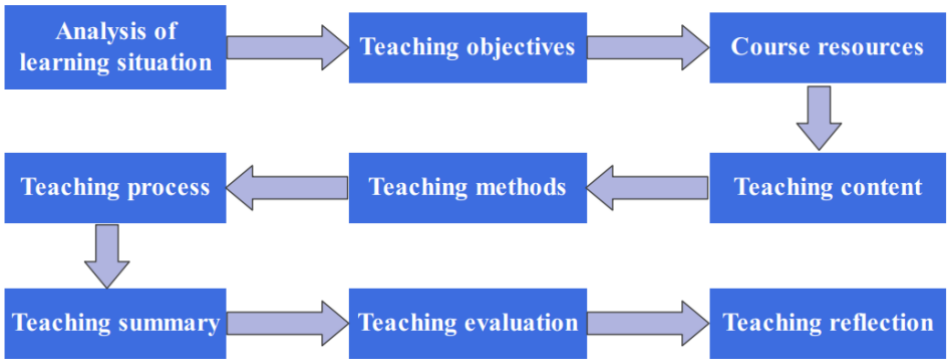

Fig.2. Schematic diagram of the course teaching process

2. MAIN RESEARCH CONTENT

In the process of talent training, course assessment is the most basic link, which is different from but closely related to academic evaluation. Table 1 analyses the relationship between the two from the aspects of evaluation scope, method, purpose and mutual connection.

Table 1. Relationship between course assessment and academic evaluation

	Course assessment	Academic evaluation
Evaluation scope	Learning outcomes of a specific course	Overall academic performance of students
	Measure the mastery of course content, application of skills and learning attitude	Learning progress, ability development and learning attitude involving multiple subjects
Evaluation methods	Final exams, regular grades, homework completion, class participation, etc.	Course assessment results, teacher evaluation, peer evaluation, self-evaluation, extracurricular activities, etc.
Evaluation purpose	To examine the learning effect of students on a certain course	To fully understand the learning status of students and provide a basis for teaching improvement
	To serve as a basis for whether students have passed the course	To discover students' learning problems and promote their all-round development
Mutual connection	Course assessment is an important part of academic evaluation	Academic evaluation provides a more macro perspective
	Course assessment results are one of the data sources for academic evaluation	Combining course assessment results with other evaluation information to obtain a comprehensive evaluation
	Improve teaching quality and promote the all-round development of students	Discover learning problems, provide feedback to teachers, and adjust teaching strategies

This manuscript, taking the students' success as the benchmark, concentrates on three primary objectives: a thorough assessment of students' learning effects, the encouragement of creative teaching approaches and techniques, and the enhancement of talent training. Artificial intelligence(AI) technology/means is employed to carry out in-depth research and practice on college course assessment and academic assessment, based on the examination of the connection between course assessment and learning evaluation. The specific research content mainly includes the following three aspects:

2.1 Comprehensive evaluation of students' learning outcomes

Traditional course assessment methods often focus on a single written test, mainly testing knowledge memory and test-taking ability, while ignoring students' practical ability, innovative thinking and teamwork ability. In order to more comprehensively evaluate students' learning outcomes, a diversified evaluation method was studied and designed, including but not limited to a combination of traditional written tests, practical operation assessments, project reports, oral expressions and other forms (Table 2). The objective of this approach is to assess students' aptitude in knowledge attainment, utilization of skills, problem solving, collaboration, creative thinking, and other facets. Additionally, formative evaluation is implemented to concentrate on students' advancement and alterations in the educational procedure, and to furnish prompt feedback and direction to assist them in more effectively adjusting their learning techniques and augmenting their educational results.

Table 2. Comparison of traditional and improved assessment & evaluation

Classification	Traditional assessment and evaluation	Improved assessment and evaluation
Assessment components	Attendance, homework, verification experiment, test paper	Classroom discussion, classroom test, group design report or presentation, open experiment, test paper
Assessment objectives	Score	Ability to meet graduation requirements
Student role	Receiver	Receiver, participant, executor
Teacher role	Evaluator	Evaluator, designer

We created an assessment system, illustrated in Fig.3 to assess and quantify the efficacy of talent instruction. The fundamental standard of evaluation is to have excellent moral character, certain professional qualities and professional knowledge, and to cultivate qualified professional talents.

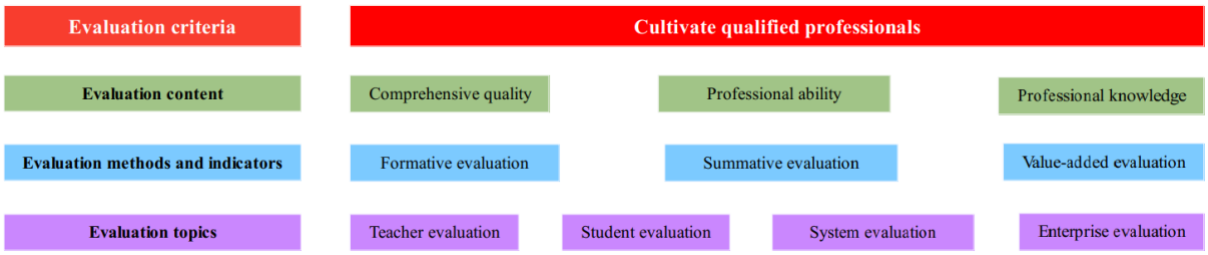

Fig. 3. Course assessment and academic evaluation system

2.2 Encourage the creativity of teaching approaches and techniques.

The innovation of teaching methods and means is an important way to improve teaching effectiveness and the quality of talent training. Traditional teaching techniques are typically teacher-focused and students are usually in a passive state of acquiescence.

This manuscript will study and practice new methods that are different from traditional lecture-based teaching, such as flipped classrooms, case teaching, project-based learning, etc., to stimulate students' learning interest and improve their learning initiative and creativity. In addition, it also explores the use of artificial intelligence technology/means (Fig. 4) to carry out teaching innovation and evaluation, such as using big data to analyse student behaviour, establish a multi-dimensional evaluation system, and use online education platforms, virtual reality technology, etc., to enrich teaching methods and improve teaching effectiveness. The introduction of these technical means can not only make teaching more vivid and interesting, but also provide students with more opportunities for independent learning and practical operations.

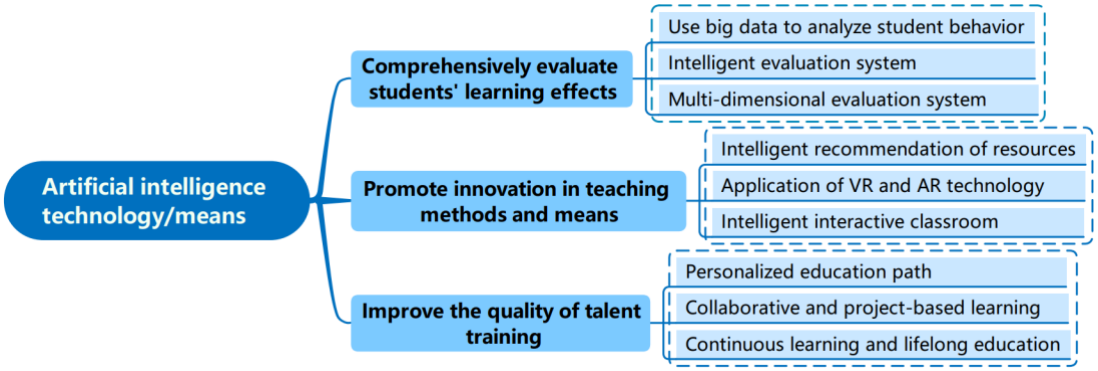

Fig. 4. Applying AI technologies/means to carry out curriculum innovation

2.3 Improving the quality of talent training

The aim of this project is to enhance the calibre of talent training. By revamping the course evaluation and academic evaluation system, we will foster the overall growth of students and enhance their overall quality and capability[4]. In particular, we will concentrate on the cultivation of students' critical thinking, creativity aptitude, team-working aptitude, etc., and give corresponding reflection in the evaluation system. We continually optimize teaching content and methods to meet students' learning needs and expectations, while simultaneously taking into account their learning experience and contentment with their employers. Collecting feedback from both students and employers is essential.

3. SPECIFIC IMPLEMENTATION METHODS

3.1 Construct a diversified evaluation system

In order to comprehensively evaluate students' learning effects, break the traditional single assessment method and construct a diversified evaluation system (Fig.5).

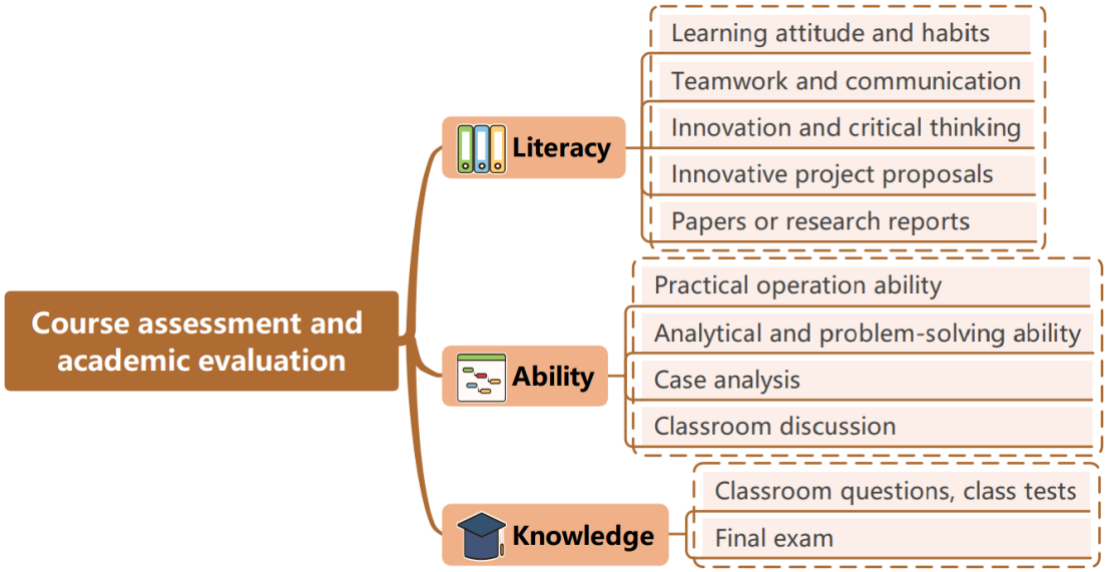

Fig. 5. Diversified evaluation system

3.1.1 Knowledge mastery evaluation

This part of the evaluation includes the process evaluation of course learning and the final evaluation at the end of the course. For the process evaluation during the course teaching process, it is mainly to use smart teaching platforms such as RainClassroom to carry out in-class interactive communication and student mastery tests to evaluate students' mastery of the basic knowledge of the course. Compared with traditional classroom tests, it has the advantage of real-time learning. At the beginning of the course, detailed evaluation indicators and scoring rules are formulated to ensure the objectivity and fairness of the evaluation. These evaluation standards and rules will also be announced to students in advance.

3.1.2 Evaluation of application skills

The school's objectives for positioning and professional training are reflected in the supplement of the course to practical operation-related assessments, with the goal of aiding students in utilizing their knowledge to solve practical problems and assessing their aptitude for skill application. By designing open-ended questions, case analysis and other assessment methods, students' innovative thinking is stimulated and their critical analysis ability is cultivated.

3.1.3 Evaluation of innovative thinking and critical thinking

Assessing students' teamwork spirit and communication skills through group projects and team assignments has a powerful influence on the formation of learning attitudes and habits, as well as the training of innovation and critical thinking. To accurately reflect students' collaborative learning, quantitative and qualitative evaluation methods are employed. At the same time, timely feedback and guidance are provided through course platforms, WeChat course groups, and Tencent QQ course groups. Regularly, students are questioned or provided written feedback to identify their aptitudes and shortcomings in education and proffer proposals for enhancement.

By introducing diverse assessment techniques, teachers can more accurately assess students' knowledge, abilities, qualities, and other facets, while also providing them with more personalized learning guidance. In summary, this can be a beneficial approach.

3.2 Innovation of teaching methods and means

Teachers can revolutionize their teaching approaches and techniques, thereby refining their teaching concepts, comprehending students' learning contexts and requirements more precisely, and then adjusting their teaching techniques and approaches, enhancing teaching efficacy, and better adjusting to the requirements of talent training in the modern age.

3.2.1 Carry out hybrid stratified teaching

By blending online and offline teaching resources, hybrid teaching can be achieved. Utilizing the learning platform created by the course, as well as the learning resources and interactive tools from other online education platforms, students can be granted greater autonomy and flexibility in their learning[5]. This self-built course platform is tailored to the needs of students of all levels. Students of exceptional ability can leverage the self-constructed platform of the course to engage in more contemplation, practice, and assessment, as well as to take part in creative experiments, science and technology contests, and teachers' research endeavours related to the course material. For ordinary students, normal teaching links are required, and extended exercises can be excluded without special requirements.

3.2.2 Reconstruct the course content arrangement and implement flipped classroom

If you want to carry out classroom teaching that focuses on design ability and thinking ability training, you need to reconstruct the course content so that students can keep up with the pace and effectively carry out discussions and thinking in class.

First, strengthen the design of the preview link. With the help of the course online learning platform, encourage students to conduct preview and knowledge review of the previous courses through video resources, introductory thinking, preview quizzes, etc. before class. Lay the foundation for in-depth knowledge application in the classroom. The teaching resource library established by the course group is updated in a timely manner, gathering high-quality teaching resources and tools, and furnishing

teachers and students with abundant resources and sources of motivation.

Second, carry out project-based learning. Project tasks of practical significance are designed by teachers. Group learning in class, along with in-depth discussions and case design analysis, allows students to apply the knowledge gained during the project to their practical operation and innovation capabilities, thus augmenting their active learning and problem-solving skills. Engage students in the design and assessment of instruction[6], and make them feel esteemed, equal, and essential through teacher assessment, student mutual assessment, and specialist assessment.

To ensure the successful transition to flipped classrooms and reconstructing course content, it is essential for teachers to take the initiative and take part in training and exchanges in a planned way. This will enable them to enhance their teaching level and creativity, foresee the changing times, and comprehend the qualities of their students.

3.3 Improve the quality of talent training

In September 2023, Chinese President Xi Jinping mentioned "new quality productive forces" for the first time. The core of new quality productive forces lies in scientific and technological innovation and high-quality development, which requires the education system to not only impart professional knowledge, but also cultivate students' innovation and practical abilities. Optimizing the course assessment and academic evaluation system can foster students' learning enthusiasm, nurture their innovation and practical aptitudes, and thus foster more top-notch and high-level inventive talents for the nation to meet the needs of the advancement of new quality productivity.

3.3.1 Emphasize teaching that is practical and augment creativity and practical aptitudes.

Linked to design and experiments, practical teaching should be augmented to enable students to expand theoretical knowledge and hone professional abilities in practice.

(a) In the signal spectrum analysis part of the course, students generally reflect that signal spectrum analysis calculation is difficult and difficult to understand. Utilize MATLAB software to generate and compare the spectrum of different types of signals, such as periodic square waves, triangle waves, periodic square waves mixed with white noise, periodic triangle waves blended with white noise, and more. Not only have a deep understanding of the difficulties, but also master the signal analysis tools.

(b) Students do not understand the creep and elastic aftereffect terms of mechanical sensors clearly, and find it difficult to understand the principle of strain gauges measuring displacement or force, especially positive and negative deformation. The course specially designed a "strongman" competition. Students divided into groups to analyse the principles and conduct on-site tests on different types of hand dynamometers. Through intriguing activities and collective conversations, the goal of comprehension and utilization is attained.

(c) Mechanical engineering is rife with vibration phenomena, and the analysis of them is intricate. How to visualize and visualize vibration? The course devised a "Visible Sound Wave Vibration" classroom experiment, in addition to the videos and case studies featured in the project. The teaching assistant made the salt particles covered on the plastic cloth of an empty container vibrate by emitting sounds of different frequencies. Then, with the help of the Chladni plate experiment, the different shapes of vibrations in the frequency range of 345Hz~6051Hz were observed. This not only gave students a concrete understanding of the vibration waveform, but also added a lot of fun to the course.

(d) The portable NI ELVIS experimental platform and Arduino UNO experimental box provide innovative design platforms for different test objects for students who have spare time and are willing to innovate. The Ministry of Education of China should foster industry-university cooperation projects, while also encouraging and guiding students to partake in innovation and entrepreneurship contests and subject competitions, depending on their course of study and depth of understanding. Additionally, participating teachers should collaborate with enterprises to carry out practical teaching and scientific research, and students should be provided with more practical opportunities and career development resources.

3.3.2 Implement the All-round Education in the Whole Process with All-staff and establish a student development support system

The curriculum and teaching management personnel and student management personnel work together to provide students with all-round support services such as academic guidance, career planning, and psychological counselling to promote the all-round development of students[6]. One of the authors, Jia Xuan, has many years of teaching management experience and can give targeted and effective suggestions on students' career planning and academic planning, which has important upper-level significance for students to understand this course from the perspective of academic and future career development. Teacher Xue Hao has rich experience in student work. He has led the student team to carry out college students' scientific and technological innovation work and summer social practice work for many years. He can observe and understand the students' knowledge practice application in actual workplaces at close range. Wang Peng, an outstanding young teacher, has made remarkable progress in the research of new flexible tactile sensors. He combines the latest and most cutting-edge scientific research results with course content, organizes them into cases and puts them into the course, which has a better role in promoting the cultivation of students' knowledge application and innovation ability. The research and development and production of the units where Senior Engineer Liu Juan and Chief Engineer Chen Kelon work are very consistent with the course content and professional fields, providing necessary support for students' practical training.

After the implementation from the 2021 academic year to the 2023 academic year, the reformed class is compared with the three classes that have been partially reformed and not reformed, and the average scores are 1 point, 4 points and 6 points higher respectively. Students' self-evaluation is also the highest.

To conclude, by constructing a varied assessment system, stimulating creativity in teaching techniques and approaches, and enhancing the calibre of talent instruction, the formation and execution of reform plans can effectively advance the reform of college course assessment and academic evaluation, while cultivating more outstanding talents with inventive spirit and practical aptitude.

4. CONCLUSION

A comprehensive and diversified course assessment and academic evaluation system, constructed through the hybrid teaching method, is of great importance in reforming college course assessment and academic evaluation. This manuscript seeks to achieve the following objectives:(1) To objectively and comprehensively assess students' learning effects and foster their overall growth. (2) Exploring and practicing new teaching methods and means, artificial intelligence technology and big data have enabled students to foster learning interest and initiative, thus enhancing teaching effects. (3) As industry needs evolve, the quality of talent training has been enhanced, thus fostering more high-quality talents with innovative spirit and practical ability for society.

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