Exploration of a Mixed International Education Approach for Comprehensive Assessment of Chinese and International Students

Xinwen Gao(✉)

School of Mechatronic Engineering and Automation, Shanghai University, Shanghai, China
gxw3405@163.com

Abstract. With the deepening of international cooperation and exchange in Chinese education, more and more international students come to universities for exchange and study. In this paper, based on the education of international students in the international experimental classes of our department, we explore the establishment of comprehensive evaluation and assessmentindexes for the courses of these international experimental classes according to the evaluation objects, evaluation subjects, evaluation contents and evaluation methods, and form a comprehensive evaluation method of Chinese and foreign mixed international education courses based on neural network, which changes the previous traditional evaluation method. This method changes the traditional evaluation method and flexibly combines multiple evaluation methods to avoid the bias of students' performance caused by a single evaluation method, and to evaluate students' mastery of the course in a comprehensive way.

Keywords: Course evaluation · Comprehensive evaluation · Neural network · Skill development

1 Introduction

At present, with the deepening of international cooperation and educational exchanges in China, coupled with the influence of the "Belt and Road", more and more international students come to study in our university. According to statistics, the total number of international students in our university has reached more than 4,000, with more than 140 countries of origin, and the total number of international academic students has reached more than 1,800. In the face of such a large number of international students, how to make a unified assessment for the courses of international students from these different countries is one of the urgent problems. Currently, many foreign universities guide the internationalization of higher education, for example, Harvard University is to ensure the internationalization of its faculty through the system and to continuously improve the teaching level of faculty [1, 2]. Germany has constructed a series of cooperative mechanisms to promote internationalized teaching through the government [3, 4], and Singapore encourages teachers to introduce international cutting-edge research topics

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and projects into the classroom, so that students can cultivate the international perspective [5–8]. A tendency for compulsory courses to use different examination methods according to different types of courses [9], while the evaluation of internationalization courses in domestic universities is still mainly based on grades as the evaluation criteria of courses, lacking diversified evaluation elements [10, 11]. Based on the international experimental class of measurement and control technology and instrumentation of our department and the international education of mechanical and electronic engineers, a comprehensive course evaluation method with multiple evaluation coexists is established.

2 The General Idea of Comprehensive Assessment Method

In order to achieve this training objective, we have classified the courses of this international experimental class. There are 6 general courses, 16 basic courses in the discipline, 4 seminar courses, 11 practical courses, 41 professional elective courses and 6 courses on course design. Around the different nature, characteristics and types of these courses, we will propose a comprehensive assessment method for these courses according to the course objectives, course evaluation, innovation and entrepreneurship and other training objectives of professional engineering certification, as shown in Fig. 1, which will change the original assessment method of single exam,

essay and course report, but according to the types of these courses, the assessment target, assessment object, assessment content and assessment object will be divided according to the type of course; the assessment object will be shifted from the former instructor to instructors, outside experts and fellow students; the assessment content will be changed from the previous usual grades and examination results to basic theory, professional practice, innovation and entrepreneurship and learning attitude; the assessment method will be changed to process assessment and summative examination, report, essay, discussion and report, practical operation, etc., thus forming a kind of comprehensive assessment method. The assessment methods will be changed to process assessment and summative examination, report, essay, discussion and presentation, practical operation, etc., thus forming a comprehensive mixed Chinese and foreign international education course assessment model.

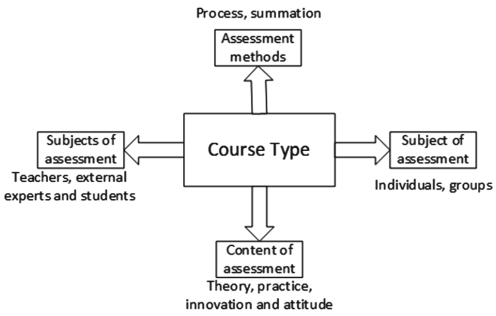


Fig. 1. General idea of a comprehensive evaluation of international education courses

3 Comprehensive Assessment Model

3.1 Comprehensive Assessment Structure

The international experimental class of measurement and control technology and instrumentation of our department and the international student education courses of mechanical and electronic engineering are mainly divided into general knowledge courses, subject foundation courses, practical courses (seminars, practical courses, course design) and elective courses. For this reason, this paper uses the comprehensive assessment structure shown in Fig. 2 to model the assessment of these courses.

The comprehensive assessment will classify all the courses according to the assessment object, assessment subject, assessment content and assessment method. The content of the assessment is also different for different types of courses: general studies courses are mainly based on Fig. 2 comprehensive assessment structure of mixed international education courses in students' analytical, thinking, practical, creative and teamwork abilities are assessed. The subject in the foundation courses, students' learning is mainly based on their usual learning situation and the final paper examination, in which the usual learning situation is mainly assessed by the discussion of students' questions in class, the teacher's questions in class, the students' online learning during the epidemic period, the practical situation in the laboratory class of the course and the final paper examination result. The practical courses mainly assess students' practical skills in combining theoretical knowledge with practice, their creativity in practice, their ability to solve problems in practice, their ability to cooperate with students, and their ability to write the final practice report. The elective courses also assess students' theoretical and practical skills, their ability to combine theory and practice, their creativity in the learning process and their attitude towards learning during the course of their studies, such as attendance in class, whether they answer questions actively in class, etc.

3.2 A Neural Network-Based Comprehensive Assessment

Through the structure chart of the comprehensive assessment of mixed international education courses, we have divided the assessment of mixed international students into different assessment methods according to the type of courses, but foreign students and domestic students have different cultures, education, lifestyles and languages, especially

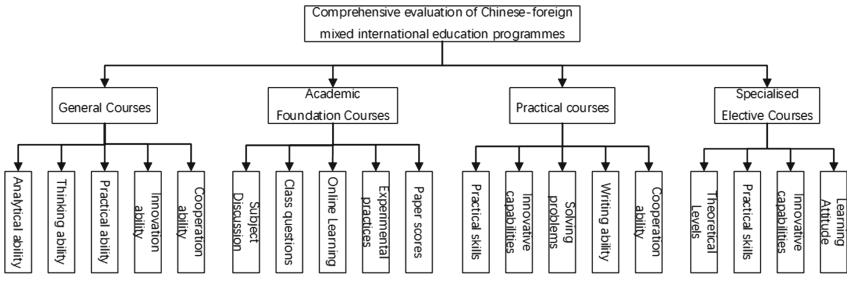


Fig. 2. Comprehensive assessment structure for international education courses

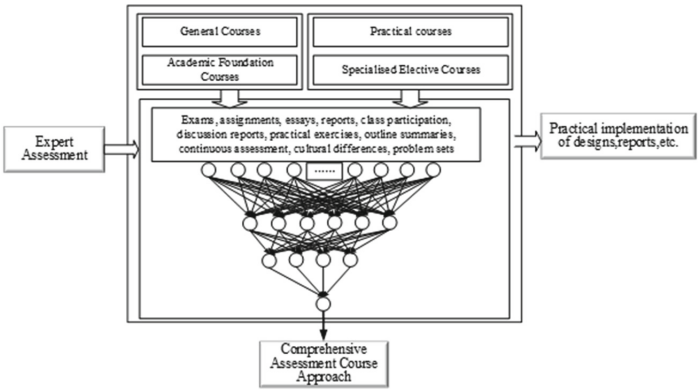


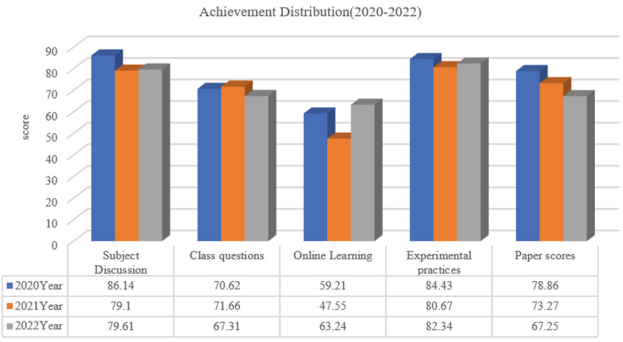
Fig. 3. A neural network-based assessment model for international education

in these two years due to the "new crown" epidemic. This poses a new challenge to the assessment of our international education courses, and we must have a resilient assessment model in order to adapt to these changes in teaching methods.

These new teaching modes and teaching methods are difficult to be assessed in the same way as before. This has led to a lack of Bayesian networks [12] to explore the correlation between courses and the use of clustering and classification methods [13] for assessment. Rather, we should make some predictions of new teaching models or teaching styles when we first build a comprehensive assessment model for the course, and at the same time be scalable for this comprehensive assessment model for the course. To this end, we propose to establish a comprehensive assessment model for this international class course based on neural network technology, and the model is shown in Fig. 3 below. In the model, some assessment abilities as well as assessment skills (combination of course theory and practice) in the assessment structure diagram in Fig. 2 are subdivided into assessment, assignment, essay, report, course participation, discussion and reporting, practical operation, virtual and real operation, outline summary, continuous evaluation, text The neural network is based on a neural network, which is used as a neuronal input for the assessment of some specific course content and some possible expected assessment content.

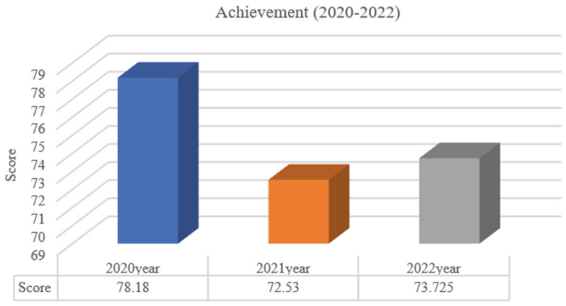
3.3 Analysis of Experimental Results

To demonstrate the toughness of the course's comprehensive assessment model, we tested one of the international class's discipline-based undergraduate courses - Fundamentals of Circuit Theory. We assessed students' class discussions, course questions, online learning, laboratory exercises and paper grades for the discipline-based course. Figure 4 shows the average scores of these assessment indices for these years in the international class over three years. From these scores, it is clear that the impact of the epidemic and online learning on the students is very high, and the students' online learning scores are very low in these three years, and with the influence of language, their international students are even less motivated to learn online. The results of these



	Subject Discussion	Class questions	Online Learning	Experimental practices	Paper scores
2020Year	86.14	70.62	59.21	84.43	78.86
2021Year	79.1	71.66	47.55	80.67	73.27
2022Year	79.61	67.31	63.24	82.34	67.25

Fig. 4. Average score distribution of basic circuit theory assessment indicators



	2020year	2021year	2022year
Score	78.18	72.53	73.725

Fig. 5. Average score of basic circuit theory

assessment indicators were entered into our comprehensive assessment model, in which we took into account the impact of the epidemic and online learning and reduced the weights of these indicators. The results show that our comprehensive assessment model is very helpful and we can adjust our teaching methodologies according to the students' scores, so as to avoid the potential decline in achievement that can be caused by a single assessment method (Fig. 5).

4 Conclusions

This paper changes the traditional assessment method and assesses courses of different nature, types and objectives in a differentiated manner, instead of using a single way of assessment. By examining Chinese and foreign students' mastery of the course from different angles and aspects, and taking into account the differences between Chinese and foreign students, the research on the algorithm for conducting comprehensive assessment of the course will focus on these issues, avoiding the possible bias in Chinese and foreign students' performance caused by a single method of assessment, and proposing a neural network-based comprehensive assessment method for mixed Chinese and foreign international education courses. The comprehensive assessment method is not limited to a single assessment mode, but is a flexible combination of multiple assessment methods.

When conducting the actual assessment of specific courses, it will be studied which courses are more suitable for examination-based approach and which courses are suitable for comprehensive assessment based on different types of courses. At the same time, the assessment of these courses will also examine Chinese and foreign students' mastery of these courses in a holistic manner through different perspectives and in different ways.

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