



# Research on Optimization of New Engineering Humanities General Education Courses Based on Outcome-based Education

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**Abstract:** In view of the characteristics of humanities general education and the requirements of engineering education certification, benchmarking the *Engineering Education Certification Standards*, this paper introduces the concept of outcome-based education, with excellent engineering talents' humanities indicators as the expected learning outcomes, humanities general education courses as core, grasps the development laws and practical paths of humanities general education, analyzes the reasonable direction of innovative development of humanities and general education courses in engineering majors under the new situation.

**Keywords:** outcome-based education, "New Engineering", general education courses

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## Introduction

Outcome-based education aims to evaluate students' comprehensive abilities to adapt to the future and society after graduation, emphasizing the evaluation of students' expected learning outcomes, achievement methods, and achievement degree. This concept was first proposed by American scholar Spady in 1981 and gradually formed a theoretical system<sup>[1]</sup>. The outcome-based education model is a method or approach that supports learning outcomes through the implementation of teaching activities, including expected learning outcomes, teaching activities, and outcome evaluation. In 2005, the American Association for Accreditation of Engineering Education introduced the concept of "outcome-based education" into the core competency requirements for graduates under the *Washington Accord*. In 2016, China became a formal member of the *Washington Accord*, marking the internationalization of China's engineering education development. Since then, engineering colleges in China have successively carried out outcome-based educational reform practices. Since the beginning of this century, outcome-based education has attracted the attention of Chinese scholars, especially since 2016, with the inclusion of engineering education in the international certification system, scholars' research in this field has shown a breakthrough growth trend. At present, research on outcome-based teaching reform both domestically and internationally is more focused on engineering majors and engineering courses in higher educational institutions, and vocational technical colleges. In view of this, the paper intends to conduct research on the reform and practice of humanities general education courses based on outcome-oriented education from the perspective of new engineering disciplines, aiming to provide practical and effective references and guidance for engineering majors to develop teaching models of humanities general education courses that meet engineering education standards from the perspectives of theoretical research and practical exploration, starting from the experience of frontline teachers and researchers in humanities general education courses.

## **1. Adjusting teaching mode benchmarking the *Engineering Education Certification Standards***

Considering the characteristics of humanities general education and the certification requirements of engineering education, this paper has benchmarked against the *Engineering Education Certification Standards*, introduced the concept of outcome-based education, with excellent engineering talents' humanities indicators as the expected learning outcomes, with the *Introduction to World Literature Masterpieces* course as the core, adjusted the teaching mode and enhanced the teaching effectiveness<sup>[2]</sup>.

### **1.1 Benchmarking the *Engineering Education Certification Standards* to make course objectives and enhance achievement**

#### **1.1.1 Humanistic literacy (Graduation requirement 3.8 of the *Engineering Education Certification Standards*)**

The course starts from classic literary works, provides a glimpse into the development laws of world literature, vertically understands the temporal sequence of world literature, and horizontally grasps the exchange and collision of literature among different ethnic groups. Based on a systematic understanding of the vertical and horizontal development of world literature, students can form a deep understanding of world classic works, thereby enhancing humanistic literacy, inspiring wisdom, and guiding life.

#### **1.1.2 Patriotism (Graduation requirement 3.8 of the *Engineering Education Certification Standards*)**

By leading students to discover the benevolence, wisdom, and beauty of Chinese literary classics, their interest in reading and learning can be aroused, which can inspire them to deeply read and appreciate classic works, comprehend the wisdom and beauty of national culture, adhere to cultural consciousness, and establish cultural confidence.

#### **1.1.3 International perspective (Graduation Requirement 3.10 of the *Engineering Education Accreditation Standards*)**

By understanding and recognizing literary classics from both the Eastern and the Western, students can form an overall understanding of world literature through the comparison and differentiation between classical and modern, China and the world. By discovering intellectual treasures and artistic beauty, students can be encouraged to communicate and exchange ideas with international students and foreign teachers both on and off campus based on learning tasks and topics, and also, they can conduct interview activities with experts and scholars both on and off campus, thus cultivating students' international perspective and humanistic feelings.

#### **1.1.4 Comprehensive ability (Graduation Requirements 3.3&3.9&3.10&3.12 of the *Engineering Education Certification Standards*)**

In the process of multicultural interaction, teachers should guide students to improve their critical thinking ability and more clearly maintain the discourse system of local cultural subjectivity. Through thinking exploration, practical activities, and expansion training, students are guided to transform knowledge into intellectual wisdom and externalize it into action abilities, thereby enhancing their humanistic literacy and comprehensive abilities.

### **1.2 Setting course modules based on outcome-based education to cultivate patriotism and form an international perspective**

The course is organized according to time sequence, and followed by six modules: mythology, epic, drama, legend, romantic novels, and initiation novels. Literary classics from both the Eastern and the Western are selected for reading to

help students to apply literary and aesthetic theories such as hermeneutics, phenomenology, and literary aesthetics to conduct interdisciplinary research, comparative analysis, and extended thinking on literary classics from the perspectives of literature culture, philosophy hermeneutics, and science sociology on the basis of the overall understanding of world literature. The course module setting is used to guide students' learning, life, and work.

### **1.3 Improving teaching methods and updating teaching models based on outcome-based education to enhance students' humanistic literacy and comprehensive abilities**

#### **1.3.1 Adopting constructivism teaching strategy to enhance students' learning interests, cultivate their patriotism and international perspective**

(1) Combining ubiquitous online and offline teaching activities

The knowledge teaching process mainly adopts a combination of teacher recording and resource introduction, and is conducted online; The quality cultivation and ability training are carried out through classroom activities and practical activities, and is conducted offline.

(2) Adopting a comprehensive education model that combines teaching and practice

Teachers' course teaching should focus on guiding students in terms of height, width, and depth, while students' practice should emphasize analysis, comparison, induction, summarization, communication, and expression when facing specific problems.

(3) Realizing a three-dimensional course content that combines classic works, time sequence, and spatial cues

Teachers should compare and identify classic works from the Eastern and the Western by work themes, enhance students' cultural confidence and national pride, cultivate students' recognition of the vast and profound cultural wealth of their own nation, and guide them to form a broad global perspective while cultivating their patriotism. This will provide students with opportunities of cultural immersion, spiritual nourishment, thereby improving their humanistic literacy.

#### **1.3.2 Implementing advanced teaching process to enhance humanistic literacy and improve comprehensive abilities**

(1) Multidimensional - Stereoscopic - Interactive

Teaching extends from the classroom to the internet, and the multidimensional teaching model promotes the ubiquity of learning activities; Teaching interaction, evaluation, and feedback are more visible and quantifiable, and interactive teaching activities are more efficient.

(2) Imitation – Practice - Seminar

In the course, the teachers first need to demonstrate the specific manifestations of literary and cultural differences between the Eastern and the Western, and lead students to be grouped according to their interests. Through group collaboration, students should conduct research and summary, and finally make report and presentation about their findings. Other groups can ask questions and discuss, and the teachers provide feedback at last.

(3) Task assignment - Independent research - Summary presentation

The teachers first describe the teaching content, teaching objectives, implementation methods, and time constraints of the task to the students, and the students are expected to plan, adjust, and evaluate the task during self-directed and collaborative learning. Through student-student communication and teacher-student communication, the extension of literature is connected to the life, achieving the expansion and extension of knowledge - literacy - ability, internalizing course knowledge into literacy, and externalizing it into comprehensive ability.

(4) Identification - Reflection – Discovery - Improvement

By reading classic works, students are guided to improve their appreciation level and enhance their discernment ability. They can learn how to discard the dross and select the essential, and reflect themselves, discover and solve problems, thereby improving their thinking, sentiment, literacy and abilities.

### (5) Reading – Thinking - Expression

By guiding students read classic literature, their interest in reading can be stimulated, their reading abilities can be enhanced; By encouraging them to think deeply, identify carefully, and express themselves boldly and skillfully, their oral and written communication skills can be strengthened ultimately.

### **1.3.3 Establishing multi-dimensional teaching evaluation system to promote teaching objectives achievement**

The concept of outcome-based education believes that teachers should set high expectations for students, believing and expecting that all students can achieve success; Secondly, teachers should provide and expand opportunities for students, enhancing their chances of successful learning, and offer them more flexible ways to demonstrate their learning outcomes. Therefore, a multi-dimensional teaching evaluation for the curriculum can not only grasp overall situation of students, but also comprehend individual differences, making teaching evaluation selective, procedural, dynamic, and comprehensive.

## **2. Conclusion**

On the basis of the investigation of the differences between China and the Western, the debate between ancient and modern times, and the controversial issue between theory and practice in general education, this paper explores the historical logic and contemporary approach of the implementation of the new engineering humanities general education curriculum under the concept of Chinese path to modernization, and proposes the optimization concept and implementation plan of modular curriculum design, constructivism teaching strategy, advanced teaching process, continuous improvement and perfection, aiming to providing practical and effective reference for colleges and universities to carry out the teaching model of humanities general education courses that meets the *Engineering Education Certification Standards*<sup>[3]</sup>.

### **Conflicts of interest**

The author declares no conflicts of interest regarding the publication of this paper.

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