Design on the Cultivating mode of Applied Talents Based on the OBE

Renshan Liu*
College of Computer, Hulunbuir College, Hulunbuir, China

*Corresponding author e-mail: 1727297071@qq.com

Abstract. The upgrading of social industry requires a large number of applied talents. Cultivating applied talents is the objective requirement of the transformation and development of local universities. OBE (Outcome-Based Education, which is expected to result oriented education) is a kind of education structure mode, which takes learning outcomes as the center to organize, implement and evaluate education. This paper systematically expounds the connotation and theoretical basis and characteristics of OBE education. Through the concept of OBE education, the paper designs process of formulating objectives and standards of cultivating applied talents, at the same time, integrates the curriculum system with the project decomposition method. Research and practice shows that the cultivating method based on OBE can effectively improve the engineering practice ability and innovation ability, which can provide operable theoretical guidance for developing high level applied talents cultivating.

1. Characteristics of applied talent Cultivation

1.1. The definition of applied talents
At present, our country is in the stage of transformation and upgrading of industrial structure, industrial development and technological innovation needs not only research-oriented scientific research talents, but also skilled technical talents and applied talents mastering the ability of knowledge theory and practice. How to understand applied talents. International Standard Classification of Education (ISCED) published by UNESCO gives a clear definition. The talents cultivated in the period of modern education are mainly divided into academic research talents, applied talents and practical professional technical talents [1]. Among them, the applied talents refer to the technical or professional talents who can apply the learned professional knowledge and skills to professional production and practice, and turn them into social production benefits. With the improvement of social requirements for talents, not only professional practice ability but also high professional quality is required, therefore, the cultivation of applied talents needs to implement the educational concept of the new era [2]. Professional talents who can apply the learned professional knowledge and skills to professional production and practice, and turn them into social production benefits. With the improvement of social requirements for talents, not only professional practice ability but also high professional quality is required, therefore, the cultivation of applied talents needs to implement the educational concept of the new era.
1.2. Characteristics of applied talent cultivation

In November 2015, the Ministry of Education issued the "Guidance Opinions of the Ministry of Education on the Transformation of Undergraduate Universities to Applied Types", stating that local higher education institutions in China should actively promote transformational development, improve the level of vocational education, and build applied undergraduate colleges and universities which have an organic connection with secondary and higher vocational education, and establish a connection mechanism with ordinary high school education, secondary vocational education and higher vocational education at the specialist level. So far, the state has clearly proposed the top-level design of "exploring the development of undergraduate vocational education", whose core idea is to "guide a group of ordinary undergraduate higher education colleges and universities to transform into applied universities", the concept of “applied talents” and “applied universities” is clearly defined. Obviously, China's applied universities have both the attributes of higher education and the attributes of vocational and technical education, which is the "cross-border" generation of higher education and vocational and technical education [3].

Applied colleges and universities belong to the "higher vocational education of undergraduate level in higher vocational colleges", which enriches and perfects the system structure and training level of modern vocational education in China. Vocational education not only cultivates skill-level talents at the specialist level, but also cultivates undergraduate level applied talent [4].

Applied colleges and universities set up a bridge between higher education and vocational education. Colleges and universities should develop appropriate application-based education methods based on their own basic conditions and social talent needs, and cultivate talents who not only have skilled skills, but also have the undergraduate course degree. The status of discrimination in the skilled talent education should been changed. The employment threshold and the social recognition of the skilled talent should been improved. Applied colleges and universities would provide the applied talents for our country "innovation-driven development, made in China 2025".

Most of the applied universities are undergraduate universities that have been upgraded after the popularization of higher education. In the orientation of running a school, they are basically based on the region, serving the localities. How to cultivate the urgently needed professional applied talents for local economy, new application-oriented talent cultivation models need to be explored. The OBE concept provides the necessary guidance.

2. Necessity of implementing OBE education concept

2.1. OBE education concept

OBE (OBE, Outcomes-Based Education Approaches) education concept is a kind of educational idea that is based on learning Outcomes and widely applied to professional engineering Education. It carefully organizes every link of teaching and enables students to achieve expected results in the learning process [5-6]. It takes the expected learning outcome as the target and has four main steps: expected learning outcome, realized learning outcome, evaluated learning outcome, and used learning outcome [7].

2.2. Research status of OBE

In order to analyze the research status of OBE concept in the aspect of applied talent training, this paper takes the keyword statistics of cnki website as an example to conduct keyword retrieval on the abstract of the literature, and the retrieval is shown in table 1 [8].
### Table 1. Keyword retrieval (Till September 18, 2018)

| Keywords                        | In 2018 Frequency | In 2017 Frequency | In 2016 Frequency | In 2015 Frequency |
|---------------------------------|-------------------|-------------------|-------------------|-------------------|
| OBE                             | 327               | 285               | 137               | 53                |
| Applied type                    | 6077              | 10550             | 10405             | 9212              |
| Applied type +OBE               | 47                | 38                | 5                 | 3                 |
| Applied talents training +OBE   | 21                | 10                | 2                 | 2                 |

Statistics shows that the research literature with "OBE" as the key word is increasing year by year. The literature with "applied type" as the research content has always been a research hotspot. The research literature related to "OBE and application type" also shows an upward trend. Although the research literature related to OBE is an upward trend, the number of studies is still small, and the depth and breadth of research needs to be explored.

Based on the above analysis, this paper takes the OBE education concept as the starting point, studies the applied talent training mode, and deeply draws on the talent training model of Shantou University's OBE integration. With the background of industrial integration and university-enterprise cooperation, the university-enterprise cooperation professional training mode which is formulated to carry out by the Hulunbuir University of Inner Mongolia would be reengineered in process. The paper strives to present the various stages of the whole training mode in detail, providing reference for the formulation of applied talent training programs.

### 3. Integration design of talent training based on OBE

The training mode refers to the organic unity of the objectives, specifications and methods of talent training. The talent training program reflects the overall design and planning of the talent training model, and has a leading role in improving the quality of talent training. In order to form and promote applied characteristics and quality of personnel training, we must design talent training programs scientifically and rationally.

In view of the cloud computing major jointly established by the Computer Science College and ZTE, through the research and discussion of college and enterprise, the talent training program based on the OBE concept has been formulated. So that OBE can be integrated into the development of training objectives and standards, and realize the integration of talent training programs. For example, the OBE concept can implement integrated design of knowledge, ability, quality and curriculum system in the expected learning outcome stage, and implement teaching strategies in the realized learning outcome stage, and comply the integrated design of course content, learning methods and teaching methods; In the evaluated learning outcome stage, the implementation of the assessment method and the evaluation mechanism is designed.

#### 3.1. Develop expected learning outcomes at the professional level

Based on the survey of the needs of graduates, employers and social industries, and combining with the conditions and positioning of university, this paper demonstrates the training objectives of university-enterprise cooperation major, as well as the knowledge and ability and quality required for the implementation of these objectives. Based on the CDIO Competency Outline, the expected learning outcomes that can be quantitatively evaluated at the professional level are formulated [9].

The applied talent training needs to set the expected learning outcome. The learning outcome should not be single, but multiple. OBE divides the learning outcome into knowledge achievement, technical achievement, ability achievement and quality achievement. Knowledge achievement refers to the degree to which students acquire the basic theoretical knowledge related to the major. Technical achievement refers to the proficiency of the students on the basis of the theoretical knowledge they have acquired. Ability achievement means that the students can achieve lots of knowledge and skilled technical operation after learning. Quality achievement refers to the result of the “artisan spirit”
obtained by the students through comprehensive quality education [10], and the expected learning outcomes are presented in the form of training objectives. The expected learning outcomes of cloud computing major are shown in Table 2.

**Table 2. Expected learning outcomes**

| ti | Definition | Means and methods | Expect to achieve learning outcomes |
|----|------------|-------------------|-------------------------------------|
| 1. Knowledge objectives (Knowledge outcomes) | It refers to the application of professional theoretical knowledge to practical operation process. | When explaining professional knowledge, it combines some practical cases or phenomena to make abstract theoretical knowledge easy to understand and master. | 1.1 Professional basic knowledge L2 1.2 Relevant subject knowledge L2 1.3 Basic Engineering Knowledge L3 |
| 2. Skill objectives (Skill outcomes) | It refers to the technical ability in the process of practice, namely, the practical ability. | Through experiments and practice courses, the professional skills of students is improved. | 2.1 Cloud system deployment L3 2.2 Project planning L4 2.3 System operation and maintenance L3 2.4 Application system development L3 |
| 3. Ability objectives (Capacity outcomes) | It refers to the innovative ability of analyzing and solving problems when encountering problems in the process of experiment and practice. | Through experiments and practice, students are allowed to discuss freely, analyze and solve problems independently, and cultivate their ability to deal with problems. | 3.1 Knowledge application ability L2 3.2 Competitiveness in job market L3 3.3 Teamwork ability L2 3.4 Innovation and entrepreneurship L3 |
| 4. Quality objectives (Quality outcomes) | It refers to having a firm political stand, correct outlook on life, world outlook and good professional ethics, high humanistic quality, physical and mental quality. | Design general education, comprehensive education and the second classroom to achieve quality training. | 4.1 Humanistic quality L3 4.2 Professional quality L3 4.3 Professional ethics L2 4.4 Physical and mental quality L2 |

Table 2 uses Bloom’s Taxonomy as a framework to describe the level of expected learning outcomes (levels) that students should achieve in completing a particular project. L1...L6 is used to indicate the degree of capability required for this level. If there is no requirement, leave it blank (L1-understanding; L2-comprehension; L3-application; L4-analysis; L5-integration; L6-evaluation).
3.2. Design an integrated curriculum system with expected learning outcomes

Through the decomposition of the project, the course content is divided into a series of tasks. The students play the role of the engineer in the actual work position in the process of completing the task. Through setting up a variety of training projects, students are guided to think actively, discuss in groups and evaluate themselves, so that students can understand theoretical knowledge, master practical skills, cultivate professionalism, improve learning interest and teaching quality.

Based on the project decomposition method and combined with the OBE integrated curriculum design idea, the courses are designed inversely around the expected learning outcome. The contribution and degree (level) of each course to realize the expected learning outcome are clarified, and the integration training is carried out according to the knowledge achievement, skill achievement, ability achievement and quality achievement. The curriculum system is designed as shown in Table 3. Among them, the orientation of skill achievement and ability achievement fully embodies the modular design idea.

Table 3. Professional integrated curriculum system

| knowledge achievement | skill achievement & ability achievement | quality achievement |
|------------------------|----------------------------------------|---------------------|
| Professional Basic Courses | Professional and practical courses | Quality development and innovation courses |
| C language programming | Virtualization technology + data sharing and data integration practices (complex operation type) | Quasi-professional orientation training |
| Computer composition and structure | Cloud storage + cloud platform operation and maintenance and high-performance system construction (development project type) | Career positioning and development |
| Operating system principles and applications (Linux) | Enterprise Network Security Management + Cloud Security Engineering Practice (Industry Project Type) | Job search ability training |
| Data structure | JAVA program design + cloud application system development practice (development project type) | Innovation and entrepreneurship practice |
| Database principle | Enterprise network interconnection + IP network integrated networking training (current network operation type) | |
| Database System Development and Application (MySQL) | Hadoop basic and application + big data processing and intelligent decision technology practice (complex operation type) | |
| Mathematical logic | Graduation internship (industry project type) | Innovation and entrepreneurship practice |
| JAVA language foundation | Graduation thesis (design) (double tutor system) | |
| Java Web programming | |
| Linux server advanced application | |

3.3. Teaching strategies to achieve learning outcomes

The expected learning outcome at the professional level is ultimately implemented through the curriculum. Determining the learning outcomes at the curriculum level, the implementation strategy is the core. Teachers should fully design course content and take diverse teaching methods according to the type of learning outcome, so as to effectively achieve the expected learning outcome. The modular design idea of project decomposition is adopted in professional practice course. The course is decomposed into several projects, and the project is decomposed into several modules, which breaks down the design mode of chapter system of past courses and makes the division of knowledge and
skills clearer. Project decomposition is adopted in the course of Enterprise Network Interconnection + IP Network Integrated Networking Training.

Among them, teaching strategies are carried out in three aspects: basic information, self-learning design and classroom design. (1) Basic information. The basic information refers to the instructional teaching materials that need to be presented to the students in the course teaching, including course information, course syllabus (syllabus, training syllabus, examination syllabus), teaching schedule, teaching design and so on; (2) self-learning design. Self-learning design refers to self-learning through the knowledge base, simulator training, micro-video, blog, experiment report, homework, and etc. (3) classroom design. Classroom design refers to the process of supporting the smooth development of learning activities, generally including teaching, operation demonstrations, group discussions, mixed teaching, MOOC teaching, group project implementation, etc. [11].

3.4. Make a good assessment of the actual learning outcomes at the professional level and the curriculum level

The quality of learning outcomes needs to be assessed by assessment. Therefore, a reasonable teaching evaluation system must be established. According to the OBE concept, teaching evaluation should shift from the evaluation of teaching conditions to the evaluation of the effectiveness of teaching, adopt diversified evaluation method, and evaluate student learning with professional level, course learning level, and comprehensive quality level.

At the professional level, in order to achieve the goal of assessing students' learning outcomes, the “trinity” assessment mechanism and system should be established in the education authorities, universities (including cooperative enterprises) and the society, and ensure the assessment of students' learning outcomes to be effectively carried out.

Assessments at the course level may include process assessments and final assessments. Process assessment requires regular process, continuous collection of student learning outcome data, and resolution in the teaching process. Process assessment can use quantitative assessment and qualitative assessment methods. Quantitative assessment mainly includes homework and mid-term examination. The evaluation forms include diversified evaluation methods such as quizzes, questionnaires, projects, homework, reports, essays, works, and computer experiments. Qualitative assessment methods include self-assessment, peer assessment, classroom performance, and class discussion. The assessment of the course mainly examines the overall mastery of the students after completing the course. The assessment methods include theoretical knowledge assessment and experimental results evaluation. The theoretical knowledge assessment is to assess the degree of relevant professional knowledge through tests, questions and answers, etc. Experimental results evaluation Tests the student's professional skills through experimental operations.

The comprehensive quality level assessment mainly evaluates innovation and entrepreneurship quality, professional ability, comprehensive political quality, physical quality, moral quality, as well as life values, and measures the quality of actual learning output. The means of assessment include topics, activities, Cases, competitions, essays and many other forms.

4. Conclusion

Through the three stages of the OBE concept (ie, expecting learning output, realizing learning output, and evaluating learning output), this paper integrates the application-oriented talent training model, which breaks the traditional educational concept and greatly improves the quality of the talents cultivation, which is based on the results of student learning output, with knowledge, ability, and quality as the main axis, carefully designs the talent training model, curriculum system, curriculum teaching strategy, and learning output outcomes. In the implementation process, the project-decomposed way to modularize the curriculum system can improve the teaching effect of the course. The OBE education concept has obvious engineering education effect on the cultivation of applied talents. At the same time, it also needs to be continuously explored, improved and perfected in the
teaching practice according to different professional characteristics. So as to form a systematic and perfect new mode of applied talent training.

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