Research Article

Construction of Applied Undergraduate Course Evaluation System Based on BP Neural Network

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The curriculum standard is a programmatic document that integrates the content of curriculum objectives, curriculum resource construction, students’ academic performance, and important reference and basis for teachers’ curriculum teaching and curriculum management evaluation. The purpose of this paper is to study how to analyze and study the evaluation of applied undergraduate courses based on the BP neural network and describe the construction of the system. This paper proposes the construction of the course evaluation system, which is based on the BP neural network and then elaborates on its concept and related algorithms and designs and analyzes the construction of the application-oriented undergraduate course evaluation system. The experimental results show that 90.74% of the currently used curriculum standards meet the requirements of applied talents training, 88.89% indicated that the course content was well aligned with professional standards, and 5.19% believed that the design of practical teaching links had a great effect on improving students’ skills. The curriculum is the basic way of education, teachers are the main body of curriculum implementation, and students are the carriers of curriculum effects. Taking teachers, students, and courses as evaluation elements in curriculum evaluation can highlight the core position of curriculum evaluation in curriculum construction.

1. Introduction

Since China’s higher education has entered the stage of popularization, applied undergraduate education has become an important part of undergraduate colleges. “Transition to application-oriented” is the proper meaning of higher education in line with China’s economic and social development and has become a hot spot in the transformation of colleges and universities in recent years. At present, more than 200 colleges and universities are carrying out corresponding pilot work and have achieved certain results. Artificial neural networks [1] have been widely used in many fields because of their robustness and adaptability in simulating the way the human brain works. As one of the most widely used models in the artificial neural network, BP neural network has the characteristics of a simple model and strong plasticity, which makes it widely used in many fields.

The research on the transformation of China’s applied undergraduate education has a lot of theoretical value and practical significance right now, especially in light of the country’s proposal to develop undergraduate vocational education and the pilot work of applied undergraduate pilot demonstration colleges and universities that has been rolled out across the country. There are many studies on the construction of curriculum standards currently available, but there are few studies on the construction of curriculum standards for applied undergraduate majors. This field’s relevant theories can be extended and enriched by research on this topic. It contributes to the development of applied undergraduate professional curriculum standards by providing new research ideas. Currently, relevant research on the development of applied undergraduate curriculum standards focuses on the development of curriculum standards for a single course, which lacks overall, systematic, and regularity. The main body, principles, processes, and basic elements of the construction of applied undergraduate professional curriculum standards are sorted out in this study, which leads to a systematic theoretical framework and
guiding suggestions. It overcomes the limitations of analysing a single curriculum standard, ensures the universality and guidance of the research findings, and aspires to provide an idea and method for professional curriculum standard research and development.

The innovations of this paper are as follows: (1) This paper combines BP neural network with course evaluation and introduces the theory and related methods of BP neural network in detail. (2) In the face of course evaluation, a questionnaire analysis was conducted on the director of the teaching and research section (professional person in charge), professional course teachers, and third-grade students of the applied major.

2. Related Work

Curriculum evaluation is the process of defining a curriculum and assessing its value, making value judgments based on actual descriptions, and expressing the evaluators' conceptual values and subjective wishes. Different evaluation subjects make different judgments on the same activity and the same thing according to their own needs and different concepts. The course evaluation function has the functions of guiding, adjusting, evaluating, and motivating. Using topic modeling based on latent Dirichlet assignments, Hideya collected approximately 60,000 datasets over nine years of college to analyze free descriptions obtained through course evaluation questionnaires, due to various limitations, including their manual classification [2]. The purpose of Ozdemir et al. [3] is to demonstrate the process by which teachers utilize learning analytics to achieve student reflection, student remediation, and teacher curriculum evaluation by assessing students' outcomes for curriculum goal achievement [3]. The aim of SM Rodriguez was to focus on the relationship between student assessment methods and e-learning satisfaction [4]. Guo et al. [5] reported an analysis of the satisfaction data of an Australian university for 11 consecutive semesters of information technology graduate programs [5]. Amjad and Linda [6] evaluate the effectiveness of the course teacher evaluation system from students' feedback on the corresponding courses [6]. Jin [7] constructed the evaluation index system of the microlecture teaching team for the first time by consulting a large amount of data [7]. Uziak [8] discussed the application of the Student Curriculum and Teaching Assessment (SECAT) in the curriculum of the Mechanical Engineering Department of the University of Botswana [8]. However, the inadequacy of these studies is that there is no in-depth study of a specific type of curriculum.

3. Method Based on BP Neural Network

3.1. Artificial Neural Network

3.1.1. Introduction. A neural network [9, 10] is to process information by imitating the structure of neurons in the brain. The best thing about it is that it can automatically find the correspondence between the input data and the output data through the training method. And, this learning process does not need to be controlled by humans, all it needs is to adjust various training parameters, which provides us with a very practical modeling method. In engineering and academia, it is often directly referred to as a neural network or a neuron-like network.

3.1.2. Biological Neurons. The basic structure of the human nervous system is the neuron (or nerve cell, as shown in Figure 1), which is the most basic unit of information transmission in the human body. Neuronal cells in the human body are composed of three parts: cell body, axon, and dendrite. Axons are used to output signals to other neurons, and because axons have many nerve endings, many neurons can receive signals. Dendrites are used to receive signals from other neurons. The cell body of a neuron is equivalent to the CPU of a computer, which processes the received signal and then outputs it from the axon. The place where the dendrites of a neuron connect with the nerve endings of the axons of other neurons is called a synapse.

3.1.3. Artificial Neuron Model. The neuron model of the basic unit of the neural network consists of three basic elements, as shown in Figure 2.

It has a set of connections, and the weight of each connection is represented by a weight. If the weight is greater than zero, the connection is opened, and the connection is less than zero.

It has a summation function to obtain the weighted sum of the input signals.

It is a nonlinear activation function. Common activation functions $\varphi(\cdot)$ are: sigmoid function, piecewise linear function, threshold function, etc., in addition to threshold $\theta$ (or bias-$\theta$).

3.1.4. Network Structure and Working Method. In addition to the characteristics of neural nodes, neural networks also have the characteristics of topology. There are two main connection methods:

(1) Feedforward Network. Each neuron of the network layer only receives the input data of the previous layer and then outputs it to the nodes of the next layer without feedback [11]

(2) Feedback Network. All nodes in the network are computational units that can also receive input and output data to the outside world, and each connection arc can flow in both directions

A feedforward network is mainly used for function approximation and pattern recognition from the effect. There are two types of feedback networks according to the utilization of the minimum points of the energy function: the first type is that all the minimum points of the energy function are used, and this type is mainly used as a variety of exposure memory. The second category only utilizes global minima, and it is mainly used to solve optimization problems.
3.2. BP Neural Network

3.2.1. Basic Structure. BP neural network \([12]\) usually consists of three networks: input layer, hidden layer, and output layer. BP neural network simulates the process of biological neural signal transmission through neurons, the layers are connected to each other through neurons, and the neurons of the same layer network are not connected to each other. Although the structure of the BP neural network is simple, it can exert its powerful function when many simple neurons converge together. The following is an example of the widely used three-level BP neural network (Figure 3).

3.2.2. Basic Principles. The operation process of the standard BP algorithm is mainly divided into two stages: the working signal receives the network error through forward propagation and the error signal passes through the backward transmission and then feeds back and adjusts the network \([13]\).

(1) The Forward Propagation Process of the Working Signal. The forward transmission process means that the working signal is transformed through the hidden layer through the input of the input layer and finally transmitted to the output layer and the output signal. If the obtained output signal satisfies the given criteria, the operation is terminated; otherwise, it will turn to the error back propagation process.

(2) Error Signal Back Propagation Process. The error signal is the difference between the actual output value and the expected output value obtained from the BP neural network through the forward function. During back propagation, the error signal is inserted from the output into the output plane and then transformed through the hidden layer.

The training process of the BP neural network is alternately iteratively carried out by the two processes of the working signal through the forward propagation operation and the error signal through the back propagation feedback to adjust the network. By continuously revising the network weights, the final actual output value is infinitely close to the expected value, and the operation is stopped when the predetermined accuracy is met.

3.2.3. Learning Algorithm. Taking the three-layer BP neural network in Figure 3 as an example, the operation process of the working signal in the forward propagation process and the feedback process of the error signal in the back propagation process are deduced, respectively.

In Figure 3, supposing the input layer of the BP network has the input signal \(A\), and the hidden layer consists of \(B\) neurons. Finally, there are \(K\) signals at the output level, the input of the neuron is denoted by \(v\), and the output is denoted by \(u\). The sigmoid function is used as the transfer function. The thresholds of neurons introduced into the hidden layer and output layer are \(x_0 = -1\), \(y_0 = -1\), respectively, the input vector \(X = (X_1, X_2, \ldots, X_n, \ldots, X_m)^T\), and the output vector of the hidden layer corresponding to
any training sample $X_k = (X_1, X_2, \ldots, X_m)^D$ is $Y = (y_1, y_2, \ldots, y_m)^D$. The actual output is $Q = (q_1, q_2, \ldots, q_k, \ldots, q_l)^D$, the expected output is $p = (p_1, p_2, \ldots, p_k, \ldots, p_l)^D$, the weight $w_{ai}$ from the input layer to the hidden layer is the weight $w_{ak}$ from the hidden layer to the output layer, and $d$ is the number of repetitions of the learning process.

(1) Forward Propagation of Working Signal. When $X_k$ is used as an input sample to operate through the output layer, it can be obtained.

For the hidden layer there are

$y_k^B = \sum_{a=0}^{A} w_{ab}^A x_{ma}, \quad b = 1, 2, \ldots, B,$

(1)

$u_k^B = f\left(\sum_{a=0}^{A} w_{ab}^A x_{ma}\right), \quad b = 1, 2, \ldots, B.$

For the output layer there are

$y_k^K = \sum_{b=0}^{B} w_{bk}^B x_b^B, \quad k = 1, 2, \ldots, K,$

(2)

$u_k^K = f\left(\sum_{b=0}^{B} w_{bk}^B x_b^B\right), \quad k = 1, 2, \ldots, K.$

From the previous four formulas,

$y_{mk} = u_k^K = f(v_k^K) = f\left(\sum_{b=0}^{B} w_{bk}^B x_b^B\right), \quad k = 1, 2, \ldots, K.$

(3)

For the unipolar sigmoid transfer function $f(x)$,

$$f(x) = \frac{1}{1 + e^{-x}}.$$

(4)

It has the characteristics of continuous and derivation and has

$$f'(x) = f(x) (1 - f(x)).$$

(5)

Formulas (1) to (5) are the basic framework of the three-layer BP neural network.

The sum of error energies, $E$, results from the unequal relationship between the expected and actual outputs obtained during network operation.

$$E(d) = \frac{1}{2} \sum_{k=1}^{K} (p_{mk} - q_{mk})^2.$$  

(6)

Let $e_{mk}(d)$ be the error signal obtained through the output layer during the forward propagation.

$$e_{mk}(d) = p_{mk}(d) - q_{mk}(d).$$

(7)

Thus, the sum of the error signal and error energy in the forward propagation process is obtained. Let $e$ be the desired precision that should be achieved. If $E \leq e$ is satisfied, the current operation is ended, otherwise, the back-propagation operation is performed.

(2) Backpropagation of the Error Signal. In this process, the error signal is propagated from the output stage to the input stage, the network is adjusted hierarchically and the network weights are modified. The specific dissemination procedure is as follows.
The weight correction amount from the hidden layer to the output layer is as follows.

In the standard BP algorithm, in order to gradually reduce the error, it must be corrected along the negative gradient direction of the weights. The weight correction amount $\Delta w_{ak}$ is proportional to the negative inclination direction of the error, namely,

$$\Delta w_{ak} \propto -\frac{\partial E(d)}{\partial w_{bk}}$$

(8)

Since the differentiable function is transitive, formula (10) can be rewritten as follows:

$$\frac{\partial E(d)}{\partial w_{bk}} = \frac{\partial E(d)}{\partial e_{mk}(d)} \cdot \frac{\partial e_{mk}(d)}{\partial y_{mk}(d)} \cdot \frac{\partial y_{mk}(d)}{\partial v^b_k(d)} \cdot \frac{\partial v^b_k(d)}{\partial w_{bk}(d)}$$

(9)

Here,

$$\frac{\partial E(d)}{\partial w_{bk}(d)} = e_{mk}(d),$$

(10)

$$\frac{\partial e_{mk}(d)}{\partial w_{bk}(d)} = -1,$$

$$\frac{\partial y_{mk}(d)}{\partial w_{bk}(d)} = f'(v^b_k(d)),$$

$$\frac{\partial v^b_k(d)}{\partial w_{bk}(d)} = u^b_b.$$

Thus, there are

$$\frac{\partial E(d)}{\partial w_{bk}(d)} = -e_{mk}(d) \cdot f'(v^b_k(d)) \cdot u^b_b.$$  

(12)

Let the local gradient

$$\frac{\partial E(d)}{\partial v^b_k(d)} = f'(v^b_k(d)) \cdot u^b_b.$$

(13)

Using the unipolar Sigmoid function as the activation function, we have the following equation:

$$f'(v^b_k(d)) = \frac{\frac{\partial u^b_k(d)}{\partial v^b_k(d)} \cdot u^b_k(d)}{\frac{\partial v^b_k(d)}{\partial v^b_k(d)}} = f'(v^b_k(d)) \cdot u^b_k(d) \cdot (1 - u^b_k(d)),$$

(14)

So there are

$$\frac{\partial E(d)}{\partial v^b_k(d)} = -e_{mk}(d) \cdot e_{mk}(d),$$

$$\frac{\partial E(d)}{\partial v^b_k(d)} = u^b_k(d) \cdot e_{mk}(d),$$(15)

The correction amount for $w_{bk}$ is

$$w_{bk} = -\mu \frac{\partial E(d)}{\partial w_{bk}}$$

$$= \mu \left( \frac{\partial E(d)}{\partial v^b_k(d)} \cdot \frac{\partial v^b_k(d)}{\partial w_{bk}} \right)$$

(16)

$$= \mu \delta^b_k \cdot u^b_k.$$  

where $\mu$ represents the learning rate of the network, both $\delta^b_k(d)$ and $u^b_k(d)$ can be obtained, so the weight correction $\Delta w_{bk}(d)$ can be obtained by formula (21). In the next iteration, the weight of any node from hidden layer $B$ to output plane $K$ is

$$w_{bk}(d + 1) = w_{bk}(d) + \Delta w_{bk}(d).$$

(17)

The weight correction value from the input layer to the hidden layer is as follows:

Similar to the above adjustment methods, there are

$$\frac{\partial E(d)}{\partial v^b_b(d)} = \frac{\partial E(d)}{\partial v^b_b(d)} \cdot \frac{\partial v^b_b(d)}{\partial w_{bk}(d)} = \frac{\partial E(d)}{\partial v^b_b(d)} \cdot x_{mb}(d).$$

(18)

Let the local gradient

$$\delta^b_l = \frac{\partial E(d)}{\partial v^b_l(d)}$$

(19)

$$= \frac{\partial E(d)}{\partial u^b_l(d)} \cdot \frac{\partial u^b_l(d)}{\partial v^b_l(d)}$$

(20)

Because

$$E(k) = \frac{1}{2} \sum_{k=1}^{K} e_{mk}^2(d).$$

(21)

Therefore,

$$\frac{\partial E(d)}{\partial u^b_l(d)} = \sum_{k=1}^{K} \frac{\partial E(d)}{\partial v^b_l(d)} \cdot \frac{\partial v^b_l(d)}{\partial u^b_l(d)} = \sum_{k=1}^{K} \frac{\partial E(d)}{\partial v^b_l(d)} \cdot \frac{\partial v^b_l(d)}{\partial u^b_l(d)}$$

(22)

3.3. Evaluation of Applied Undergraduate Courses

3.3.1. Applied Undergraduate. The classification of higher education according to the level of education is a relatively recognized classification method in the current theoretical
research on the classification and positioning of Chinese universities. China’s higher education can be roughly divided into three types, and the three types of colleges and universities correspond to the cultivation of research-oriented talents, as shown in Figure 4.

Application-oriented undergraduate colleges and universities are a type of college that can be found throughout the Chinese educational system. They are numerous and serve a large number of undergraduate students. This school differs from other universities in that the training, research, and service objectives are all at the application level. It is employment-oriented in terms of talent output, aiming to be at the forefront of economic construction in a specific local area by providing the necessary and corresponding application-oriented senior talents and application-oriented intellectual achievements. The relationship between production, education, and research is very close [14, 15], and such colleges and universities pay special attention to coconstructing applied research with enterprises and institutions, as well as disciplines and industries.

The research object proposed in this paper, the application-oriented undergraduate colleges mainly refers to the general undergraduate colleges that exist in the statistics of the education department and typically exist between higher vocational colleges and subordinate comprehensive (research) colleges and universities, and most of them are under the management of local governments at all levels [16]. Compared with research-oriented undergraduate universities, application-oriented undergraduate universities mainly have the following connotative characteristics, as shown in Figure 5.

3.3.2. Course Evaluation. The principles of the applied undergraduate course evaluation system lie in three aspects, as shown in Figure 6.

**Developmental Principle.** With the progress of society, the continuous improvement of social needs, and the continuous development of disciplines, the design of the curriculum evaluation system should aim at social needs and discipline development, and the evaluation content should be dynamic and adaptable to development.

**Progressive Principle.** The realization of the training objectives of applied undergraduate courses is achieved through the progressive nature of professional courses. In the process of cultivating talents, through systematic learning, students’ knowledge structure and ability are constantly changing, and their knowledge, understanding, mastery, and application of learned knowledge and skills are also constantly changing. Only through progressive evaluation can it be determined whether the trained students are approaching the training goal [17, 18].

**Validity Principle.** The design of the application-oriented undergraduate course evaluation system should conform to the actual situation of the course development direction, and the indicators are highly judging to ensure that the evaluators can give accurate evaluations according to the indicators, which is effective.

4. Experiment on the Construction of an Applied Undergraduate Course Evaluation System

4.1. The Formation of Undergraduate Course Evaluation System and Indicators. Expert consultation questionnaires were designed by themselves with the proposed primary and secondary indicators as the main body. The questionnaire includes (1) a letter to experts, briefly explaining the subject of the questionnaire, the purpose of the survey, the meaning of the survey, the background of the research, related concepts, and instructions for filling in the form. (2) It includes general demographic data including gender, age, job title, education, field of work, and years of work. (3) It includes the index content, index score, and index
The main content of the investigation is to determine whether the design of the evaluation system is reasonable; whether the description of the indicators is clear and operable; whether the words are standardized. The experts proposed to adjust the inductive dimensions of several indicators and further consulted relevant literature according to the experts’ suggestions. After the discussion by the research group, the first round of expert consultation questionnaires was formed. The candidate indicators of the evaluation system include 18 first-level indicators and 54 second-level indicators [19] (as shown in Figure 7).

It should analyze the reliability and validity of the formed undergraduate professional course evaluation system and test whether the first-level indicators in the constructed evaluation system can make an overall judgment on the setting, implementation, and effect of professional courses and whether the secondary indicators can judge the problems in the setting and implementation of professional courses, and point out the direction of improvement and can evaluate the effect of the course in time [20].

4.2. Questionnaire Survey Results. In order to ensure the representativeness of the questionnaire survey samples to the overall application-oriented undergraduate colleges and universities, with the help of the Internet platform, the author conducts a sample survey of the directors (person in charge) of the teaching and research offices, teachers of professional courses, and third-year students of applied majors in the demonstration colleges and universities for the cultivation of applied talents, to comprehensively understand the construction and actual use of professional curriculum standards in various colleges and universities. The survey time is from January to February 2022. Using the Internet as a medium, the respondents completed and submitted the questionnaires through tools such as personal computers or mobile phones. Invalid questionnaires were removed, and 366 valid questionnaires were retained, with an effective rate of 100%.

A total of 366 questionnaires were recovered in this survey (Table 1), including 56 questionnaires for the director of the teaching and research department or professional leader, 54 questionnaires for teachers of professional courses, and 256 questionnaires for students.
Before the questionnaire survey, the questionnaire passed the validity evaluation by 3 course experts or subject experts.

On the basis of the high reliability and high efficiency of the questionnaire, SPSS and EXCEL statistical tools are used to organize, count, and analyze the results of the questionnaire data. The conclusions drawn from the survey can well reflect the current situation of the construction and implementation of professional curriculum standards in various colleges and universities and have a strong reference.

4.2.1. Course Objectives. The scientificity and rationality of the course objectives are guaranteed. It is mainly manifested in that the compilation of curriculum standards follows certain principles, which avoids the randomness of the compilation process, and the revision frequency of curriculum standards is relatively reasonable, ensuring that the curriculum objectives closely follow the requirements of regional economic and social development for talent training specifications.

The results of the questionnaire survey of the director of the teaching and research section or the person in charge of

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**Table 1: Composition of survey samples (N = 366).**

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of Teaching and Research Office (professional leader)</td>
<td>56</td>
<td>15.30</td>
</tr>
<tr>
<td>Professional course teacher</td>
<td>54</td>
<td>14.75</td>
</tr>
<tr>
<td>Third-grade students</td>
<td>256</td>
<td>69.95</td>
</tr>
</tbody>
</table>

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the major show (Figure 8(a)) that the principles followed in the preparation of professional curriculum standards are 51, accounting for 91.07%. There are 48 people follow the guiding principles, accounting for 85.71%, and 48 people follow the operability principle, accounting for 85.71%. There are 45 people follow the theoretical principle, accounting for 80.36%, and 38 people follow the timeliness principle, accounting for 67.86%.

The objectives of the course are clearly defined. It is mainly manifested in the determination of course objectives mainly by decomposing talent training objectives, rationalizing the development trend of disciplines, and fully considering the needs of society and students’ development needs. The course objectives thus determined can be understood by students and have a full understanding of the industry in which they will be employed in the future. The results of the questionnaire survey of the director of the teaching and research section or the person in charge of the major show (Figure 8(b)) that the main basis for compiling the professional curriculum standards is 48 people, accounting for 85.71%. According to the professional development needs of disciplines, there are 45 people, accounting for 80.36%, and 45 people according to the development needs of students, accounting for 80.36%. According to the professional talent training plan, there are 41 people, accounting for 73.21%.

The results of the student questionnaire survey (Table 2) showed that 65 people (25.39%) expressed a very clear understanding of the main employment and occupational aspects of their majors; 159 people (62.11%) were basically clear, and 35 people (13.67%) were unclear. There are 42 (16.41%) who said they were very clear about their understanding of the talent training goals of their majors, 170 (66.41%) said they were basically clear, and 44 (17.19%) said they were unclear.

4.2.2. Course Content. The results of the teacher’s questionnaire survey (Figure 9(a)) showed that 49 (90.74%) of the currently used curriculum standards met the requirements for the cultivation of applied talents. There are 48 people (88.89%) indicated that the course content and professional standards were well aligned, and 46 people (85.19%) believed that the design of practical teaching links had a great effect on improving students’ skills.

The results of the student questionnaire showed (Figure 9(b)) that 78 (30.47%) thought it was very useful in terms of the influence of the content taught by teachers on their future work, 115 people (44.92%) thought it was relatively useful, 57 people (22.27%) thought it was not very useful, and 6 people (2.34%) thought it was not useful.

4.2.3. Course Evaluation. There are numerous methods of evaluation. This is primarily reflected in the fact that a single final exam-type outcome evaluation is no longer used to assess students’ academic achievement. More assessment methods are used, combining the traditional grade assessment process with end-of-semester grade assessment, which is more acceptable to both teachers and students. Teachers are evaluated in the classroom in a variety of ways, including academic evaluation, peer evaluation, and leader evaluation. The results of classroom teaching evaluations are generally recognized by teachers.

The results of the questionnaire survey of the director of the teaching and research office or the professional leader (Figure 10(a)) showed that 11 people (19.64%) expressed the use of outcome evaluation in terms of the evaluation method of students’ academic achievement. There are 5 people (8.93%) said they used process evaluation, and 40 people (71.43%) said they used the combination of result evaluation and process evaluation. In terms of the evaluation methods of teachers’ classroom teaching quality (Figure 10(b)), 52 (92.86%) of them said they had the method of evaluating teachers by students and 35 (62.5%) of them had the method of evaluating teachers by teachers. There are 33 people (58.93%) indicated that there was a way of supervising and evaluating teachers, and 33 people (58.93%) said that they had a way of evaluating teachers by the teaching and research department.

4.3. Evaluation System and Evaluation Indicators

4.3.1. Trinity Evaluation System. This research constructs an application-oriented undergraduate course evaluation system from three dimensions of courses, teachers, and students, which meets the requirements of course evaluation elements. According to the determined course objectives, syllabus, teaching materials, course assessment, and practice links, five first-level evaluation indicators are included as indicators of the curriculum dimension, and these indicators can be used to evaluate the setting of the curriculum. Seven first-level evaluation indicators, including teaching attitude, communication, teaching means, lesson plans, teaching content, teaching methods, and bilingual teaching, are included as indicators of teacher dimensions. These indicators can be used to evaluate teachers’ teaching implementation. The five first-level evaluation indicators of knowledge, skills, emotion, learning attitude, and ability are included as indicators of the student dimension, and these indicators can evaluate students’ learning effect.

4.3.2. Course Objectives. The applied undergraduate course is a highly technical major, but the evaluation content of the practical link design still stays in the practical design of each course, which lags behind the current situation of the practical curriculum reform. It cannot reflect the connection and development of practical design, nor can it guide the cultivation of students’ professional ability. In this study, the evaluation index of curriculum practice has been upgraded from pure skill practice to vocational skill practice. It guides the curriculum not only to focus on the practice of basic skills but also to focus on the connection between basic skills and job-related practical skills, and to highlight the characteristics of professional quality and professional adaptability. Such evaluation indicators meet the requirements of the curriculum to cultivate students’ practical application
Table 2: Students’ understanding of talent training goals and curriculum goals.

<table>
<thead>
<tr>
<th>The degree of understanding of professional personnel training objectives</th>
<th>Employment and career-oriented understanding degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very clear</td>
<td>65</td>
</tr>
<tr>
<td>Basically clear</td>
<td>159</td>
</tr>
<tr>
<td>Not clear</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>44</td>
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Figure 8: Curriculum-related principles. (a) Principles of curriculum standard preparation (multiple choices). (b) The principle of clear course objectives (multiple choices).

Figure 9: Student and teacher evaluation of course content. (a) Evaluation of the curriculum standards currently used. (b) The impact of what teachers teach on future work.
ability and guide the transformation of professional skills to vocational skills.

4.3.3. Teaching Content. The new curriculum reform requires that the boundaries of subjects should be diluted, the connection between courses should be strengthened, and the mutual penetration and organic integration of courses should be emphasized. The existing teaching content evaluation standards focus on whether the teaching content is clearly expressed, whether the key points are explained in depth, whether the theory is linked to practice, etc. These standards cannot promote the teaching content under the new curriculum reform to meet the requirements of infiltration and integration between courses. Combined with the current status of the evaluation of teaching content in professional courses, the evaluation of teaching content has added a coherent teaching content evaluation before and after courses, which meets the requirements of curriculum reform. Evaluation indicators help guide teachers to focus on the coherence of teaching content between professional courses and ensure that the knowledge system of students’ learning content is complete, coherent, and structured.

5. Discussion

Through the study of relevant knowledge points of literature works, master the relevant basic knowledge and analyze how to conduct research on the evaluation of applied undergraduate courses based on the BP neural network. This paper expounds on the concept and learning algorithm of the BP neural network, studies applied undergraduate course, explores course evaluation, and analyzes the applicability of the BP neural network in the construction of course evaluation system through experiments.

Applied undergraduate courses should adhere to the systematic and hierarchical nature of learning, be guided by training objectives, focus on professional needs, and focus on the continuation of course knowledge and skill learning in related courses, so as to achieve the role of knowledge and skill enhancement, to make the knowledge and skills mastered by nursing students systematic and holistic, so as to adapt to the needs of the profession. With the change of time, students’ mastery and application ability of course knowledge and skills are also constantly changing. It is obviously inappropriate to evaluate students’ mastery and application of knowledge and skills with the same evaluation content. It increases the evaluation content of students’ knowledge and skills in different course learning stages, not only focusing on the mastery of knowledge and skills during course learning but also paying attention to the subsequent evaluation of the consolidation and development of knowledge and skills after learning and the requirements of applied undergraduate courses [21].

Through experimental analysis, this paper shows that the construction of applied undergraduate professional curriculum standards should be based on the definition of the main body of curriculum standard development and the principle of curriculum standard development, and the research and construction of relevant elements of curriculum standards should be carried out. It mainly includes the general course background description of the course background, course nature, basic concepts, and design ideas, and the course goal clear part of the overall goals and specific goals. It includes the course content design part of the modular field of study, the course teaching schedule, the course organization and management, the course resource construction, and the course implementation plan part equipped with the course conditions. It includes the construction of course evaluation consisting of three subsystems: teaching materials and course resources, teachers’ teaching, and students’ academic evaluation. Among them, determining the nature of professional courses, clarifying the objectives of professional courses, constructing the content of professional courses, planning the implementation of

Figure 10: How students and teachers are evaluated. (a) Methods of evaluating students’ academic achievement. (b) Evaluation methods of teachers’ classroom teaching quality.
professional courses, and designing the evaluation of professional courses are the core main parts of curriculum standard construction.

6. Conclusions

The following points should be considered when designing curriculum content for the development of applied talents: the first is to choosing curriculum content based on curriculum objectives and occupational needs. The second is the modularization of course content around real-world work tasks. The third step is to breaking down the course content into learning areas and then refining each learning area into teaching situations. Fourth, defining the teaching objectives in terms of knowledge, ability, and quality for each specific learning situation, determining the specific content of unit teaching or learning, clarifying the requirements of unit teaching or learning training projects, and making recommendations for unit teaching, among other things. The development of applied undergraduate professional curriculum standards is a comprehensive project that incorporates all aspects of pedagogy and curriculum theory.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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