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Research on the path of integrating craftsmanship into the talent cultivation process of applied undergraduate universities in the context of big data era

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Abstract

Based on the factors influencing the cultivation of practical talents in colleges and universities in the perspective of craftsmanship, this paper proposes a talent cultivation path based on craftsmanship, which provides some useful ideas and references for both the cultivation of talents in colleges and universities and the study of craftsmanship. In order to verify whether the talent cultivation method of applied undergraduate colleges and universities integrating craftsmanship is effective. A higher education quality assessment model based on the neural network-like architecture and fuzzy evaluation algorithm is proposed, and the basis of activation function selection in the neural network-like architecture, the implementation process of algorithm steps and the specific meaning of algorithm steps are explained. Finally, the learning process data of the students of related majors were selected and analyzed. The scores of "practical ability", "innovation ability", "management ability" and "moral character" of the evaluated classes The overall rating of the class is 80.1, which is an excellent level with reference to the rating guidelines. Therefore, this cultivation path has certain practical significance and theoretical value for the study of cultivating applied talents in colleges and universities under the perspective of craftsmanship.

Keywords: *craftsmanship, talent training, neural network, fuzzy evaluation algorithm, education quality assessment model*

Introduction

In order to adapt to the development of modern society, college students should not only have a strong level of professional skills, but also have good professionalism and professionalism, and only if they have strong comprehensive quality, they can stand out in the competitive society (Dai, 2020) (Wang Y Y 2018). However, in the current social environment, the mentality of some college students is relatively impetuous, and coupled with the influence of social unhealthy culture such as quick success and money first, their values have been shifted (X, 2018). The positive factors such as persistence, concentration, rigor and excellence contained in the craftsmanship spirit can, to a certain extent, prompt students to establish a correct worldview, outlook on life and values, and also promote the cultivation of students' craftsmanship spirit (Gao L 2019) (Wu, 2018). Combining

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school education with craftsmanship, we should focus not only on the cultivation of students' professional skills, but also on the cultivation of students' professional spirit and professionalism. Combining craftsmanship with personal spiritual connotation will equip students with excellent qualities such as dedicated research, meticulousness, ingenuity and pursuit of excellence in their self-growth and future development (Guan, Bao, Ren, & Song, 2022; Wang, 2020). In addition, in the process of job change and promotion, personal development can be effectively linked with job requirements, thus achieving the perfect integration of technology and spirit in their self-career and effectively promoting students' future sustainable development (Feng Y 2019).In the literature (Abrassart, Busemeyer, Cattaneo, & Wolter, 2020), it is argued that craftsmanship refers not only to those who are engaged in craftsmanship, but also to those who innovatively use existing technologies to solve various problems in the new era. The literature (Ni & Zhou, 2019) proposes a six-dimensional scale for measuring craftsmanship consisting of dedication, excellence, professional focus, innovation, breakthrough and responsibility, which is also used to evaluate the craftsmanship of manufacturing employees.

The literature (J, 2013) argues that American craftsmanship, as a unique combination of unbridled creativity and practical business sense, has played an important role in promoting business development in the United States and is one of the important factors in making the United States the largest economic power in the world. The literature (Aoyama, 2015) emphasizes the need to explore the development of the model of Japanese craftsmanship from the perspective of the global market economy and culture.The literature (Suleman, 2016) argues that the expansion of higher education has triggered scholars to study the skills that are beneficial to the talent development of skilled students, the importance of interpersonal, communication and teamwork skills in the development of skilled personnel, and the need to increase the emphasis on the level of information technology skills to produce graduates who can adapt to the requirements of the workplace and qualified employability. The literature (rawer, 2014) systematically describes the background of the development of community colleges in the United States, community college recipients, educators, educational goals, educational funding, university services, and social roles of community colleges. The literature (McCormack & Zieman, 2017) focuses on technical education in rural communities at Hopkinsville Community College in the United States. This college develops technical education pathways. In terms of pedagogy, problem-based instruction is emphasized. It also emphasizes cross-sector and cross-industry collaboration to ensure that students are better equipped to complete practical content in engineering and technology fields. Some scholars have also taken other perspectives to enhance the quality of applied human resource development, such as the literature (Burns, 2017), which suggests that community college faculty should be encouraged to use scholarship to increase student motivation so that they can continue to innovate in their practice and improve their innovation skills.This paper researches the four-dimensional practical paths for the cultivation of applied talents in colleges and universities under the perspective of craftsmanship, analyzes the cultural construction, "school+enterprise+job" construction and education construction with vocational ability as the core, and proposes the paths

for the cultivation of applied talents in undergraduate colleges and universities with the integration of craftsmanship. The fuzzy evaluation algorithm of college education quality based on the class neural network architecture is also proposed, which can effectively integrate the forward propagation mechanism, multi-level feedback mechanism and fuzzy quality evaluation mechanism in the talent cultivation system and provide the theoretical basis for rational analysis of the weak links of student ability cultivation in the talent cultivation process. Among them, the forward propagation mechanism is based on the process data and uses the logic and support relationship between entities to quantitatively analyze the entities. The fuzzy quality assessment mechanism makes a comprehensive evaluation based on the results of forward propagation and multi-level feedback, and then makes a qualitative assessment of the entities. The multi-level feedback mechanism integrates the results of qualitative and quantitative analysis and provides hierarchical feedback based on the talent cultivation system, which provides the basis for the continuous improvement of the neural network-like architecture. Finally, the specific results of the algorithm implementation were analyzed by selecting the learning process data of students from relevant majors, and the experimental results were used to verify the effectiveness of the talent cultivation approach of applied undergraduate universities incorporating craftsmanship.

Design of talent training quality assessment algorithm based on class neural network

Design of evaluation algorithm

The flow chart of the algorithm in the proposed talent training quality assessment model based on the class neural network architecture is shown in Figure 1.

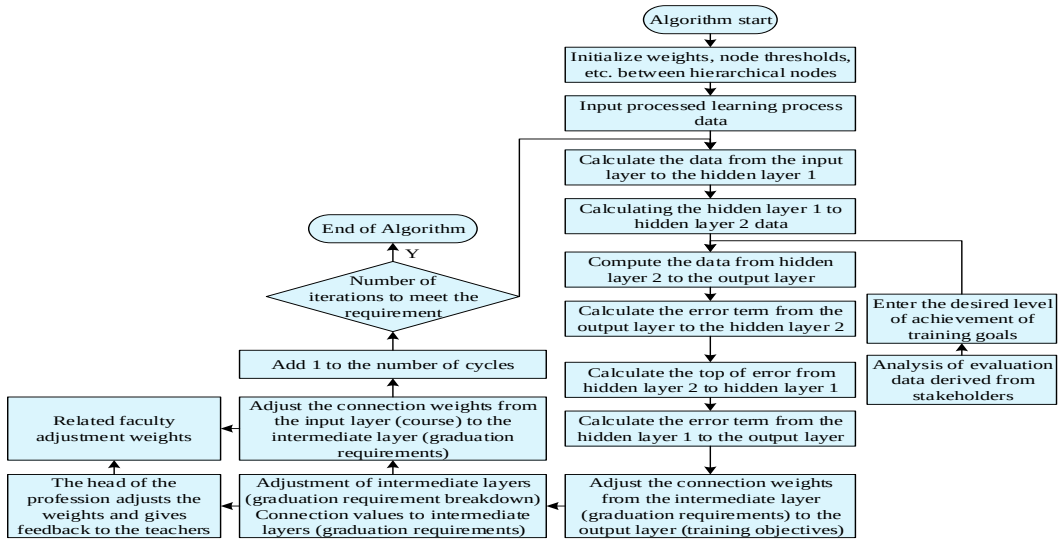

Figure 1 Flow chart of evaluation model based on neural network-like architecture

In order to make the process data in the quality assessment model more accurately reflect the degree of achievement and provide a basis for feedback, the algorithm described below is designed, which is divided into two main parts: the forward propagation and multi-level feedback algorithm (FPMFA), and the fuzzy quality assessment algorithm. The specific implementation of the algorithm is described below.

FPMFA algorithm

The FPMFA algorithm in the higher engineering education assessment algorithm based on QNN architecture mainly consists of the forward propagation mechanism and multi-level feedback mechanism in Figure 4.1, which is used to quantitatively assess the student education process data and also obtain the achievement of training objectives and graduation requirements based on the learning process data. The detailed process and main algorithms of FPMFA are described below.

w_1, w_2 and v are the connection matrices between the four levels of the initialization network, where w_1 is the connection weight matrix between the course level entities and the graduation requirement subdivision points. w_2 is the connection weight matrix between graduation requirement subdivision point entities and graduation requirement entities: v refers to the connection weight matrix between training objectives and graduation requirements.

$$w_1 = \begin{bmatrix} w_{111} & w_{112} & \mathrm{L} & w_{11n} \\ w_{121} & w_{122} & \mathrm{L} & w_{12n} \\ \mathrm{M} & \mathrm{M} & \mathrm{O} & \mathrm{M} \\ w_{1m1} & w_{1m2} & \mathrm{L} & w_{1mn} \end{bmatrix} \quad w_2 = \begin{bmatrix} w_{211} & w_{212} & \mathrm{L} & w_{21z} \\ w_{221} & w_{222} & \mathrm{L} & w_{22z} \\ \mathrm{M} & \mathrm{M} & \mathrm{O} & \mathrm{M} \\ w_{2n1} & w_{2n2} & \mathrm{L} & w_{2nz} \end{bmatrix} \quad v = \begin{bmatrix} v_{11} & \mathrm{L} & v_{11} \\ \mathrm{M} & \mathrm{O} & \mathrm{M} \\ v_{z1} & \mathrm{L} & v_{zd} \end{bmatrix} \tag{1}$$

At the same time, the function $E(\theta)$ is introduced to determine the gap between the actual degree of achievement and the desired degree of achievement, and $E(\theta)$ is:

$$E(\theta) = \frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2 \tag{2}$$

y_i and $\hat{y}_i$ represent the desired degree of achievement of the training objectives and the actual degree of achievement of the training objectives obtained by using the neural network-like architecture and based on the process data, and n represents the number of training objective items. The input data of this architecture is the pre-processed data of students' examination results, homework results and experimental results, etc. The initial weights come from the actual suggested weights of experts in the relevant professional fields.

The input values of the course layer and the random values of the nodes in the training objective

layer, graduation requirement layer, and graduation requirement subdivision layer of this class of neural network architecture are:

$$X=\begin{bmatrix}x_1 & x_2 & \mathrm{L} & x_m\end{bmatrix}^T\begin{cases}b_1=\begin{bmatrix}b_{11} & b_{12} & \mathrm{L} & b_{1n}\end{bmatrix}^T\\ b_2=\begin{bmatrix}b_{21} & b_{22} & \mathrm{L} & b_{2z}\end{bmatrix}^T\\ b_3=\begin{bmatrix}b_{31} & b_{32} & \mathrm{L} & b_{3l}\end{bmatrix}^T\end{cases} \quad (3)$$

In order to reasonably assess the degree of attainment of each entity and to achieve logical relationships between entities at different levels, it is necessary to implement the forward propagation process in this type of neural network architecture, and to achieve the association relationships between entities at the levels according to the connection weights between the layers and the input values at the course level requires activation of the forward propagation mechanism, and the processing of the input values by the nodes in the graduation requirements subdivision layer, the graduation requirements layer and the training objectives layer and the sigmoid numerical compression of the output values are described below:

$$\begin{cases}net_1=w_1^Tx+b_1, h_1=g_1\left(net_1\right)\\ net_2=w_2^Th_1+b_2, h_2=g_2\left(net_2\right)\\ net_3=v^Th_2+b_3, \hat{y}=g_3\left(net_3\right)\end{cases} \quad (4)$$

At the same time, the output value of each layer of the QNN architecture represents the actual achievement of the entity. The final output values of the training target are also output in the form of a matrix, and the representation of the actual achievement of the training target $\hat{y}$ and the processing of $\hat{y}$ are described as follows:

$$\hat{y}=\begin{bmatrix}y_1 & y_2 & \mathrm{L} & y_l\end{bmatrix}\hat{y}=g_3\left(v^Tg_2\left(w_2^Tg_1\left(w_1^Tx+b_1\right)+b_2\right)+b_3\right) \quad (5)$$

Based on the above processing of the connection weights between entities and entities at each level of this class of neural networks, the forward propagation mechanism in the architecture of this class of neural networks is activated to establish the association relationships among the four levels of entities.

In order to activate the multilevel feedback mechanism and facilitate the next step, the $\delta^{(k)}$ partial derivative is introduced to calculate the error of cultivating the target layer entities, k in $\delta^{(k)}$ denotes the number of adjustments of this neural network architecture, and $\delta^{(k)}$ is:

$$\delta^{(k)}=\hat{y}\,\mathrm{e}\,(1-\hat{y})\,\mathrm{e}\,(\hat{y}-y) \quad (6)$$

The purpose of the multi-level feedback mechanism is to form a feedback loop by adjusting the

weights between the layers and calculating the error terms between the entities of the different layers. Therefore, in order to calculate the error between the training target level and the graduation requirement level the calculation formula is described as:

$$\nabla(k)_v = \frac{\partial E}{\partial v} = h_2 \cdot \delta_1^{(k)T} \tag{7}$$

Similarly, the error terms between graduation requirements and graduation requirements subdivision layer entities and between graduation requirements subdivision layer and course layer entities are described by:

$$\begin{aligned} \nabla(k)_{w_2} &= \frac{\partial E}{\partial w_2} = h_1 \cdot \left(h_2 \, \mathrm{e} \, (1-h_2) \, \mathrm{e} \, \left(v \cdot \delta^{(k)} \right) \right)^T \\ \nabla(k)_{w_1} &= \frac{\partial E}{\partial w_1} = x \cdot \left(h_1 \, \mathrm{e} \, (1-h_1) \, \mathrm{e} \, \left(w_2 \cdot \delta_1^{(k)} \right) \right)^T \end{aligned} \tag{8}$$

$\delta_1^{(k)}$ represented by the equation described as:

$$\delta_1^{(k)} = h_2 \, \mathrm{e} \, (1-h_2) \, \mathrm{e} \, \left(v \cdot \delta^{(k)} \right)^T \tag{9}$$

The connection weights and bias terms between the training goal level and graduation requirement level, graduation requirement and graduation requirement subdivision points are updated according to the above error terms. The connection weights between different levels can be adjusted according to the error between the desired and actual attainment of the profession. At the same time, the adjustment results of the weights can provide feedback basis for the leaders of related majors, so as to formulate the improvement strategies of the professional talents training system and promote the continuous improvement of the quality of higher engineering education.

Update the relevant parameters between the training target layer and the graduation requirement layer by setting the rate at update to η. The equation at update is described as:

$$\begin{cases} b_3^{(k)} = b_3^{(k-1)} - \eta \dfrac{\partial E}{\partial b_3} \\ v^{(k)} = v^{(k-1)} - \eta \nabla(k)_v \end{cases} \tag{10}$$

Update the relevant parameters between the graduation requirement layer and the graduation requirement subdivision layer by setting the rate at update to η. The equation at update is described as:

$$\begin{cases} b_2^{(k)} = b_2^{(k-1)} - \eta \dfrac{\partial E}{\partial b_2} \\ w_2{}^{(k)} = w_2^{(k-1)} - \eta \nabla(k)_{w_2} \end{cases} \tag{11}$$

The connection weights and random bias terms between the graduation requirement subdivision layer and the course layer are updated according to the error terms. According to the adjustment results of the weights, the situation is fed back to the course instructors, who, as the direct executors of the teaching links in the course system, selectively make appropriate adjustments or modifications to the previous teaching contents and links according to the feedback results, and improve the reasonableness of the connection relationship between the course system and graduation requirement subdivision points through continuous adjustment. The formula at the time of updating is described as:

$$\begin{cases} b_1^{(k)} = b_1^{(k-1)} - \eta \dfrac{\partial E}{\partial b_1} \\ w_1^{(k)} = w_1^{(k-1)} - \eta \nabla(k)_{w_1} \end{cases} \quad (12)$$

The learning process data in the teaching process is an important basic data for education quality improvement. The FPMFA proposed in this paper can be applied to the daily education teaching in colleges and universities to improve the teaching quality by analyzing the learning process data, and at the same time, the FPMFA also provides an important basis for elaborating the relationship between different entities in the higher education talent training system.

Fuzzy quality assessment algorithm

Therefore, in order to improve the rationality of the talent cultivation system, the graduation requirement subdivision points should receive more attention in the feedback path. In the design of the fuzzy quality assessment mechanism, the degree of achievement of graduation requirement subdivision and the weight of the association between graduation requirement subdivision and course entity are used as evaluation indexes, and the specific process is described as follows.

Determination of affiliation functions and λ -intercept values

The reach of an entity is used as the domain of the affiliation function $A(u)$, and the range of values of $A(u)$ is [0,1] and any reach of the entity is within the domain of $A(u)$. Where u represents the total cumulative percentage of attainment at a certain point. Since the affiliation degree of entities in this talent cultivation system model cannot find a function expression that is exactly consistent with the image of the affiliation degree function, the affiliation degree in the experiment of this paper is evaluated by education and teaching experts in relevant professional fields as the evaluator, and the actual λ -intercept value is also derived according to the actual level and ability of the profession and combined with the expert's opinion.

Fuzzy quality assessment method

In improving the teaching quality and realizing the feedback loop, the reasonableness of the correspondence between the teaching links and the graduation requirements subdivision directly

determines the rationality of the talent training system, accordingly, the analysis of the achievement of the graduation requirements subdivision should be paid attention to when improving the rationality of the talent training system. To sum up, in designing the fuzzy quality assessment method, the weight of the linkage between graduation requirement subdivision points and courses is chosen as the index for assessment.

For the different graduation requirement breakdowns, the indicator factor set for the assessment is defined as:

$$F = [f_1 \quad f_2 \quad f_3 \quad \mathrm{L} \quad f_n] \tag{13}$$

f_i indicates the specific content of the i nd evaluation index factor corresponding to the graduation requirement subdivision point. i takes the value range $1, 2, 3, \ldots, n$.

The weight vector A_s corresponding to the s st graduation requirement subdivision is defined as follows:

$$A_s = [w_{f_1} \quad w_{f_2} \quad w_{f_3} \quad \mathrm{L} \quad w_{f_n}] \tag{14}$$

The value of w_{fk} is the linkage weight of the assessment indicator factor f_k for the graduation requirement subdivision, the value of w_{fk} is the linkage weight between the course entity and the graduation requirement subdivision entity, and the value of k is in the range of $1, 2, 3, \ldots, n$.

The fuzzy attainment rating scale for quality assessment is defined as follows:

$$C = [c_1 \quad c_2 \quad c_3 \quad \mathrm{L} \quad c_n] \tag{15}$$

c_j denotes the evaluation result of the j nd level in the set of achievement levels of the graduation requirement subdivision, i.e., the j rd fuzzy quality evaluation level, and the value range of j is $1, 2, 3, \ldots, e$.

A fuzzy comprehensive evaluation vector is obtained by defining a fuzzy evaluation matrix. In this paper, the assessment results of graduation requirement competence are provided by the method of employing evaluators to fill in the graduation requirement subdivision point assessment form, and the invited evaluators include the head of the major, teachers, relevant enterprise personnel and student representatives, etc. Therefore, the fuzzy quality assessment matrix R_s corresponding to the s st graduation requirement subdivision point can be obtained by the fuzzy quality

assessment form filled out by the assessors, R_s described as follows:

$$R_s = \begin{bmatrix} a_{11} & \mathrm{L} & a_{1e} \\ \mathrm{M} & \mathrm{O} & \mathrm{M} \\ a_{n1} & \mathrm{L} & a_{ne} \end{bmatrix} \quad (16)$$

Element a_{ij} in the fuzzy quality assessment matrix indicates the percentage of the j rd fuzzy quality assessment level corresponding to the i nd fuzzy quality of the assessment factor for that graduation requirement subdivision point, where the percentage refers to the ratio of the number of people corresponding to the fuzzy attainment assessment level at that point to the total number of assessors in the same assessment index factor.

The fuzzy integrated assessment matrix B_s calculated from the weight vector A_s and the fuzzy quality assessment matrix R_s corresponding to this graduation requirement subdivision is shown below:

$$B_S = A_S \times B_s = \begin{bmatrix} w_{f1} & w_{f_2} & w_{f_3} & \mathrm{L} & w_{f_n} \end{bmatrix} \times \begin{bmatrix} a_{11} & \mathrm{L} & a_{1e} \\ \mathrm{M} & \mathrm{O} & \mathrm{M} \\ a_{n1} & \mathrm{L} & a_{ne} \end{bmatrix}$$
$$= \begin{bmatrix} b_1 & b_2 & b_3 & \mathrm{L} & b_n \end{bmatrix} \quad (17)$$

The fuzzy comprehensive evaluation matrix B_s represents the final evaluation result of the graduation requirement subdivision, where b_i represents the evaluation result of the i rd achievement level corresponding to the graduation requirement subdivision.

By determining the image of the affiliation function and the λ -intercept value, we can obtain the development trend and achievement situation of the corresponding graduation requirement subdivision and provide feedback based on the results.

Choice of activation function

The development of biological networks has inspired and driven the development of artificial neural networks. A neuron in a biological neural network receives signals from other neurons through multiple dendrites, and the amount of signal that accumulates in the cell compared to a threshold determines whether to transmit the signal outward through the axon. The role of the activation function is to decide whether to continue to transmit the signal or not. The types of activation functions are broadly classified into linear and nonlinear activation functions.

Different activation functions have different characteristics. Sigmoid function is chosen as the activation function, considering the practical meaning of data compression and processing in the proposed higher engineering education quality assessment model. Sigmoid function can compress the value to the range of (0,1), and the magnitude of the compressed data remains unchanged. In the higher education quality assessment model proposed in this paper, the actual meaning of the degree of attainment requires that the value of the degree of attainment must fall within the range of 0 to 1, and the sigmoid function is chosen as the activation function of the model. The actual meaning is that the corresponding entity has a very high degree of achievement.

The model, when outputting the entity values for each level, obtains the actual degree of support of the entity at that level to the entity it points to, i.e., the degree to which the entity can support the entity at the next level it points to; therefore, the range of values must fall between 0 and 1. When an entity has a very high degree of support to the next level entity it points to, the support of the entity should be compressed close to 1, i.e., it basically has a full support to the entity it points to; when an entity has a very low degree of support to the next level entity it points to, the support of the entity should be compressed close to 0, i.e., it basically does not have any support relationship to the entity it points to.

The practical path of cultivating applied talents in colleges and universities based on the perspective of craftsmanship

Continuously strengthen the construction of campus culture in higher education to create an atmosphere of revering artisanship

Campus culture construction of colleges and universities is an important part of school development, and colleges and universities should take campus culture construction as the leader and make full use of this implicit educational resource to actively spread and promote craftsmanship. Campus culture is not only a phenomenon but also a kind of atmosphere. How to actively promote craftsmanship in campus culture construction is a topic facing campus culture construction of colleges and universities. Therefore, the cultivation and promotion of "artisan spirit" should also pay profound attention to the practical role of campus culture, and reflect the artisan spirit in three aspects of campus culture construction: comprehensiveness, distinctiveness and modernity.

First, the comprehensive nature of campus culture construction. Campus culture is a comprehensive cultural phenomenon that contains several aspects, generally including material culture, institutional culture, spiritual culture and activity culture.

Second, the characteristics of campus culture construction. The campus culture construction of higher education is not a uniform and one-sided repetition. In the campus culture construction, we should fully consider the actual development of the school itself, combine the school's development history, cultural tradition, social customs and the region, create our own

characteristics, effectively integrate the artisan spirit and reflect the uniqueness of cultural education.

Third, the era of campus culture construction. Campus culture construction needs to reflect the requirements of the times, grasp the social development trend of the new era, combine with the current physical and mental development characteristics of students, based on the actual, pioneering and new, constantly digging the contemporary features and connotations of the artisan spirit, constantly enhance the integration and development of the artisan spirit and campus culture construction in the new era, solidly and effectively promote the campus culture construction to deepen, in the new era of higher vocational application-oriented talents In the cultivation of higher vocational applied talents in the new era, we will continue to create the atmosphere of the times that advocates the artisan spirit.

Widely carry out the great artisans into the campus, vivid examples focus on the artisan spirit

Hold a report on the advanced deeds of the great craftsmen. Firstly, through the activity of "Artisans on Campus", we focus on improving the quality of talent cultivation in colleges and universities, and vigorously promote the characteristics of the artisan spirit of the times, which is glorious in job labor, valuable in job skills and great in job innovation.Invite great artisans into the classroom.

First of all, classroom teaching in colleges and universities is an important part of talent cultivation, and the cultivation of craftsmanship must be organically combined with classroom teaching. The great artisans come from the front-line production and service positions, and their high skills and professionalism are the best template for the cultivation of applied talents in colleges and universities.

Secondly, to let the great craftsmen enter the classroom, combine their own reality and interact with the higher vocational students is the concrete performance of the organic unification of vocational education and education. Through classroom teaching, students' interest in learning is enhanced, and students can feel the quality and ability requirements of applied talents from the closest frontline, so as to clarify their own professional development trend and future career development direction.

Finally, through the vivid and practical examples of the great craftsmen themselves, students are guided to aspire to cultivate the craftsmanship themselves and to promote the active practice of craftsmanship.

"School + enterprise + job" construction path

It is the inevitable trend of the development of the times to integrate craftsmanship in the process of cultivating applied talents in colleges and universities, and the cultivation of applied talents should fully meet the needs of social development. Specifically, schools and enterprises should

cooperate deeply, set different types of posts in enterprises and schools according to the development needs, closely interact and exchange between schools and enterprises, make full use of the resources of both sides, realize the complementary advantages, take the post construction as the link, strengthen the post awareness, enhance the skill level, fully integrate the cultivation of craftsmanship into the vocational education, which is beneficial to the cultivation of applied talents in colleges and universities.

First of all, each secondary teaching college or professional teaching department should integrate with an enterprise (company) with the same or similar specialties to form a "four-combination" talent cultivation mechanism of cooperative schooling, cooperative education, cooperative employment and cooperative development.

Secondly, as the department head of the enterprise, he can be the assistant of teaching management in the second-level college and professional department of the school, or the deputy director of the teaching and research department of the relevant profession, through these positions, the enterprise can effectively participate in the professional construction and talent training of the school.

Thirdly, students from colleges and universities can go to the departments, workshops and other related positions of enterprises that match with their own majors for on-the-job internship to experience the production and operation activities of enterprises, enhance their professional practice ability, improve their professional skills and deepen their understanding of craftsmanship in the actual work of their positions.

Integration of craftsmanship into a career education system with vocational ability as the core

Career education can be said to be a more specialized and technical field of research and teaching, based on psychology and pedagogy to analyze and study different career behaviors from multiple perspectives such as cognition, environment, emotion and ability, and also combine with sociology and economics to analyze human career behaviors and their associated factors and actual impact effects from different perspectives.

Higher vocational colleges and universities are responsible for delivering high-quality technical and applied talents, so they should focus on cultivating students' vocational literacy and vocational awareness in their daily education and teaching. Colleges and universities should actively establish a career education system centered on craftsmanship, effectively implement the cultivation of craftsmanship into the education work, and continuously improve the vocational ability of students.

In order to meet the needs of the times and popularize the career education of college students, the public course "Career Planning" is commonly offered in major universities, and the course "Career Planning" is used as a grip to cultivate the spirit of craftsmanship, and a series of systematic

courses are taught to carry out in-depth career education. Career system education is carried out through a series of systematic courses.

Figure 2 shows the diagram of the construction of "career planning" course, which is combined with different majors as an extension course of professional thinking education and professional character education, and can be combined with specific majors to convey the cultivation of craftsmanship. Through the construction of "career planning" course, it can enhance students' awareness of career development, improve their vocational ability and help cultivate craftsmanship.

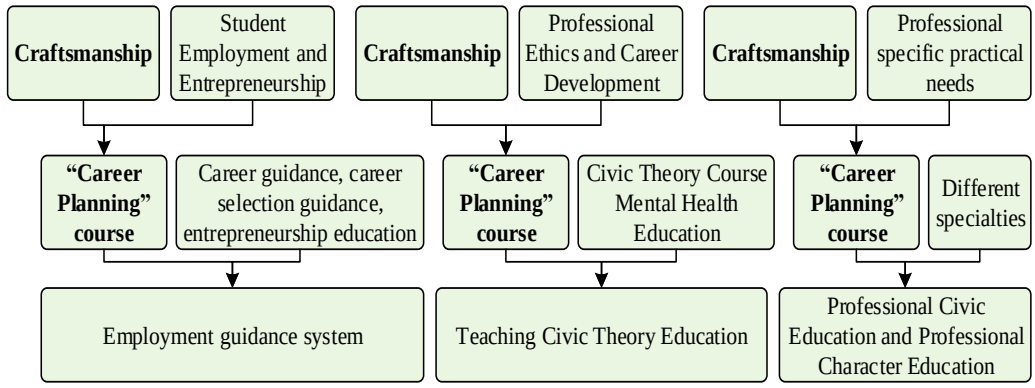

Figure 2: Schematic diagram of course construction of "Career Planning"

Quality evaluation of talent cultivation path

Individual quality evaluation

After the establishment of an applied talent cultivation path integrating craftsmanship, it should be possible to apply it in practice in order to realize its value and promote the real improvement of the quality of applied talents with craftsmanship. In this paper, we choose to evaluate a college student who is about to graduate, and analyze the quality of the evaluees by showing the process of implementing the quality evaluation model. It should be noted that when the model is established there should also be a set of scoring guidelines as the basis for implementing the evaluation.

The scoring guidelines are usually developed by a senior evaluation group, and after considering the similarities and particularities of each major in higher engineering education, the scoring guidelines are formulated to meet the quality evaluation of talent cultivation in higher engineering education. And after the evaluation rules are completed, collective training is conducted for the evaluation team to unify the grading standards and make the evaluation more fair.

According to the scoring guidelines, the model of this paper was used to evaluate the appraisee A. The scoring guidelines stipulate that the appraisee A scores "less than 60, 60-70, moderate, 70-80, 80-90, good, and 90 or more", and the indicators are shown in Table 1.

Table 1: Evaluation indicators

	Evaluation Indicators	Number
Knowledge structure	Basic subject knowledge	A1
	Professional and technical	A2
	Knowledge of related disciplines	A3
	Instrumental knowledge	A4
Practical skills	Theoretical application ability	A5
	Design and operation ability	A6
	Comprehensive engineering skills	A7
Innovation ability	Innovative thinking	A8
	Innovative behavior	A9
Social adaptability	Team Awareness	A10
	Collaboration ability	A11
	Self-learning ability	A12
	Expressive communication skills	A13
Management ability	Knowledge management skills	A14
	Project management ability	A15
Ideological and moral character	Personal grooming	A16
	Basic ethics	A17
	Social ethics	A18
	Professional ethics	A19

The quality of the evaluated talents was evaluated by the quality evaluation model of higher engineering education. The evaluated students got 74.6 points for "knowledge structure", 77.7 points for "practical ability", 79.9 points for "innovation ability", 79.1 points for "social adaptability" and 81.6 points for "management ability". The "social adaptability" scored 79.1 points, "management ability" scored 81.6 points, and "moral character" scored 84.7 points. From the evaluation results, the evaluees performed well in "management ability" and "moral character", but the rest of the indicators were in the middle level, and the overall level was medium.

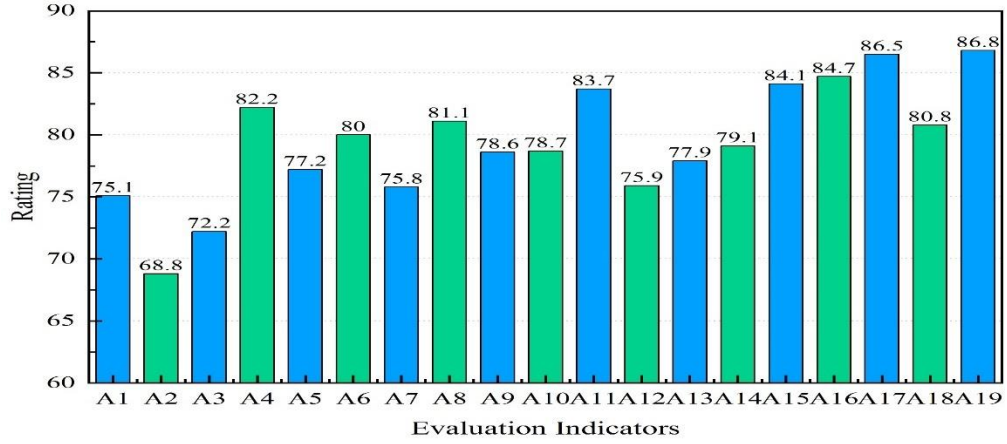

Figure 3: Individual student evaluation scores

Overall quality evaluation

If all members of the evaluated group are evaluated by the higher engineering education talent cultivation quality evaluation model, the final result of the evaluation reflects the quality of the group, as an example: all students in the class of the above-mentioned evaluated person A are evaluated by the same method, and the results are shown in Figure 4.

From the evaluation results, we can see that the evaluated classes' "practical ability", "innovation ability", "management ability", and "moral character The scores of "practical ability", "innovation ability", "management ability" and "moral character" are greater than 80 points, 80.8, 80.5, 80.2 and 82.1 respectively, which are at the excellent level with reference to the scoring guidelines. "Knowledge Structure", "Social Adaptability", scored between 70 and 80 with 78.4 and 78.6, respectively, referring to the scoring guidelines, at an intermediate level. The overall class rating of 80.1 is at the excellent level.

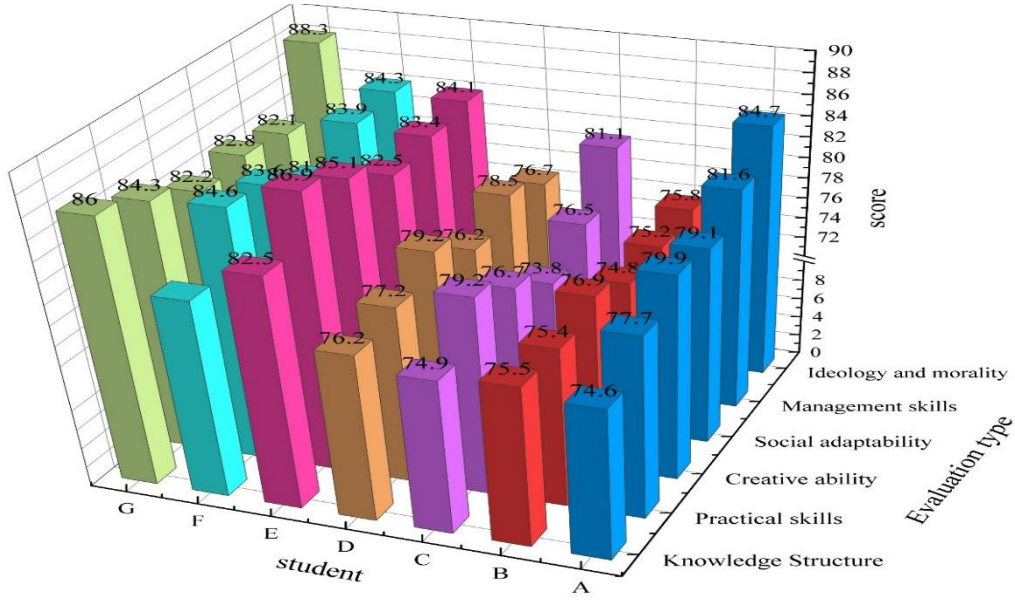

Figure 4: Overall class evaluation

Conclusion

This paper analyzes three dimensions: the path of culture construction, the path of "school+enterprise+job" construction, and the path of education construction with vocational ability as the core. Culture construction is the spiritual path to promote the cultivation of skilled talents, "school+enterprise+job" construction is the school path to improve the cultivation of skilled talents, and education construction with vocational ability as the core is the school path to realize the cultivation of skilled talents, which forms the "three-dimensional one" practical path for the cultivation of practical talents in colleges and universities under the perspective of

craftsmanship. "The practical path of cultivating practical talents under the perspective of craftsmanship is formed. In order to evaluate the practicality of this cultivation path, a fuzzy evaluation algorithm of higher engineering education quality based on the class neural network architecture is proposed. The problems of FPMFA, the method of fuzzy quality assessment, the selection of activation function and data processing are also described in detail.

Finally, in the individual quality assessment, the evaluees performed well in the areas of "management skills" and "moral character", scoring 81.6 and 84.7, respectively. Then, the overall quality evaluation of the evaluated class was 80.1 points, which is an excellent level. Therefore, this paper's talent cultivation method based on craftsmanship is of practical value.

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