Research on the Improvement of Early Childhood Teachers' Educational Research Ability Supported by Big Data Technology

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Abstract

Kindergarten teachers are very important guides on the path of young children's growth. Education is a difficult task, and teaching young children to enjoy learning, to live, and to love art is not enough based on what teachers learn in school alone, and much of it is inappropriate. Early childhood teachers cannot just take books and teach; they must have an attitude of research. It is difficult for teachers to receive good results without an attitude of research, because the work of early childhood education is difficult and complex. Early childhood teachers must coordinate multiple areas to educate young children in a holistic manner, which requires teachers to have strong learning and research skills. At present, there are not many studies on strategies to improve the educational research ability of early childhood teachers, and those that do exist focus more on scientific research, which is somewhat deviated from the educational research needed in kindergartens and can provide limited reference value to teachers, and there is still confusion about how to improve the educational research ability of early childhood teachers. Therefore, this paper proposes a study on the improvement of early childhood teachers' educational research ability with the technical support of big data. Based on big data and artificial intelligence technology, this paper investigates and analyzes the current situation of kindergarten teachers' educational research ability, and on this basis, conducts action research to explore the effective path to improve teachers' educational research ability.

Keywords

Big data technology, Early childhood teachers, Educational research skills, Deep learning

Introduction

The combination of kindergarten education teaching and research is the main expression of the extension and expansion of kindergarten teaching and research in the new situation. At present, the implementation in some early childhood institutions in China is not optimistic and requires reflection to find practical and effective strategies to solve the existing problems [1-3].

The educational research capacity of early childhood teachers can be divided into three levels according to the perspective of research horizon, which are macro and micro levels. Macroscopic educational research is concerned with the construction of basic educational theories and educational fundamentals and is far-sighted and more primarily concerned with conducting educational science research. The practical handbook of educational scientific research defines educational scientific research in this way: a creative cognitive activity aimed at exploring the laws of education by taking the phenomena occurring in the field of education as the object. It is the use of educational theory to study educational phenomena and explore

https://doi.org/10.71052/geb2025/WKSX2601 https://www.wonford.com/

new and unknown laws to solve new problems and situations. Educational research is a continuous, systematic, purposeful, and planned exploration activity. The steps of educational research are identifying a research topic; developing a research plan; implementing research work; and writing a research report. This level of educational research competence refers to the ability to conduct standardized, professional, and systematic educational research. Educational research at the level is thinking about and responding to some meso-level issues or topics in educational management and is designed to solve educational management and decision-making problems. The core of educational research competencies for early childhood teachers is shown in Figure 1.

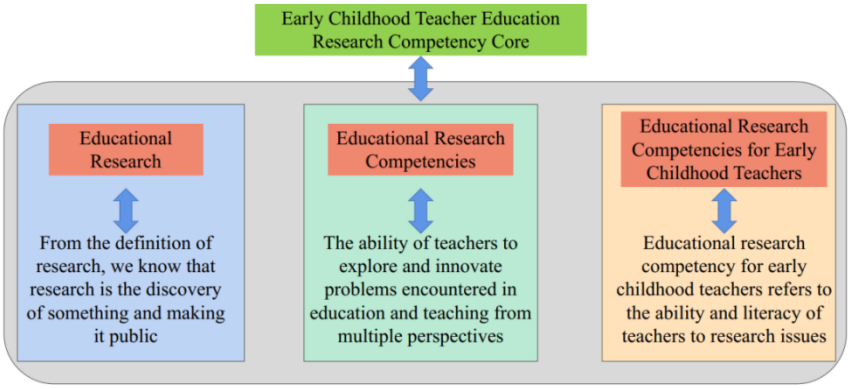

Figure 1. Early childhood teacher education research competency core.

Educational research ability of early childhood teachers refers to the ability and literacy of teachers to research problems, the awareness and ability to link theoretical knowledge with practice, the ability to think openly and independently, and the quality to develop a wide range of interests and conduct permeable learning. It is the ability to be professionally sensitive, reflective, research-minded and cooperative in collective educational activities, and to be proactive in improving one's work in early childhood education. Big data technology is a new technology that has emerged along with the continuous development of information technology, combined with advanced artificial intelligence and the Internet [4-7]. This technology can well assist people to start the analysis of problems, especially in processing data and screening information, big data has very strong advantages, so applying big data technology to early childhood teachers' educational research ability and management activities is essential to continuously improve the kindergarten operation Teachers can combine the application of big data technology to collect the daily attendance, learning and living conditions of children, and analyze the shortcomings of teachers' educational research ability with the help of big data, so as to help teachers take more effective measures to cope with them. In addition, with the development of information technology, parents also want to know the performance of children in kindergartens and various problems at anytime and anywhere, which require kindergartens to actively apply big data technology in the process of running kindergartens, so to continuously improve the information level of kindergarten teachers' educational research ability is a problem that kindergartens must pay attention to under the current new situation [8].

By constructing an evaluation index system of early childhood teachers' educational research ability, using the fuzzy comprehensive evaluation method to evaluate early childhood teachers' research ability in the context of industry-university-research cooperation, and conducting a case study with a kindergarten, we enriched the research system of early childhood teachers' research ability by proposing corresponding improvement strategies in four aspects, such as strengthening the ability of environment identification [9-10]. The Delphi method was used to construct the index evaluation system, and the hierarchical analysis method was used to determine the index weights, according to which an evaluation model based on five

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elemental links was proposed, and the evaluation model was applied to a vocational college for a case study, which provided a new research idea for the evaluation of early childhood teachers' research ability.

By using rough set theory, we constructed an index system of early childhood teachers' scientific research ability, simplified early childhood teachers' scientific research indexes by using attribute simplification algorithm, used this to find key factors affecting early childhood teachers' scientific research ability, and then used association rule algorithm to explore potential rules of early childhood teachers' scientific research ability, which provided decision support for analyzing early childhood teachers' scientific research ability and helped to comprehensively investigate early childhood teachers' scientific research ability. By establishing the scientific research evaluation index system of early childhood teachers in colleges and universities, the clustering algorithm in data mining theory is used to determine the scientific research index, and algorithms such as classification rule-based analysis method and Apriori algorithm are used to mine the association rules affecting the scientific research ability of early childhood teachers. It is used to reflect the research ability of early childhood teachers comprehensively.

Related work

Educational research skills of early childhood teachers

Currently, the pedagogical links between teaching and research are not strong enough to integrate the practical aspects of educational research links. Therefore, a strong linkage mechanism is a prerequisite for effective activity and protection. However, the links between many fields of study and research lack a complete organizational and management mechanism. So-called links are simply the interconnection of several kindergartens through official orders or documents, with inadequate guidance on strategies for scheduling events, advancing them, and assessing their impact, and a lack of a rational linkage system to manage them. The absence of linked teaching and research subjects, in order to accomplish the development goals of teaching and research, requires efforts to promote the collective social responsibility of each early childhood teacher to grow together, but due to our lack of knowledge of the teachers in the actual educational and pedagogical relationships in kindergartens and schools in each region, we also neglect to have an in-depth understanding of the real situation in the relevant teaching and research and pedagogical practices, and are unable to conduct case studies, and in some special places tend to ignore physical teaching theory practice and the real teaching needs of teachers in actual urban and rural schools. Over-emphasis on the power of the joint and single-minded development of large-scale educational activities ignores the actual goal of optimizing the work of kindergarten teaching and research.

The content of linked teaching and research deficiencies teaching, and research articulation is critical, and it is an important factor in improving the quality of actual teaching and learning. However, today in many closely interrelated subject doctrines and technical research topics, almost everything is proposed by the technical planners of professional organizations themselves, while there are certain problems in the main content of these research topic doctrines with obvious content drawbacks. There is often too much emphasis on collaborative learning and research, while also neglecting in-depth study of other aspects of the actual situation. Sometimes although it involves many aspects of activity games, life experience activities, independent development activities, etc., but also because the research is not deep enough, there is an undesirable phenomenon of emphasizing learning over playing, teaching over playing, etc. Too much emphasis is placed on various methods of teaching education research, ignoring the actual details of early childhood education research, which cannot fully reflect the current situation of teaching early childhood school subjects, and cannot give full play to the educational functions of various activities such as teams and groups. At the same time, too much emphasis is placed on learning research, neglecting research on

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teacher development, and learning resource development, and its linked content is relatively homogeneous, weakening the enthusiasm and initiative of teachers' participation in the link. There is a lack of reflection on linked teaching and research. In the process of combining education and teaching and research, teachers recognize the importance of teaching and research through various forms of research, but often lack the ability to reflect deeply and effectively. Although the various activities at work provide a platform for teachers to discuss issues, teachers only want to experience the classroom process, and time for reflection and practice is often short and time for discussion is scarce. Even when there is reflection, it is rather superficial and does not provide in-depth study of teaching and research issues.

Big data technology

Early childhood teachers' educational research skills are the ability to analyze and study a theoretical or practical problem in a scientific way. Scientific research is essentially an innovative activity, a practical activity that explores the objective laws of nature and society and is a driving force for the development of human society. Due to the early childhood teachers' educational research ability of early childhood teachers has received external attention, how to evaluate the educational research ability of early childhood teachers objectively and effectively has caused extensive research among scholars.

Some scholars have explored the feasibility and effectiveness of the evaluation index system of early childhood teachers' educational research ability by using fuzzy comprehensive evaluation method, hierarchical analysis (AHP), multi-objective decision making, data envelopment analysis (DEA), principal component analysis (PCA), factor analysis, association rule evaluation method, and gray theory evaluation, and have conducted research on the construction of the evaluation index system. The above scholars generally used the comprehensive evaluation method to analyze the level of educational research ability of early childhood teachers, but less involved in the construction of models and the implementation of prediction functions. Support vector machines were introduced into the multi-level index evaluation system of the independent innovation capability of national defense research institutes to predict their independent innovation capability. The SVM algorithm can deal with small samples, nonlinearity, generalization and high dimensionality, but it takes too long computing time in high dimensional data and often does not predict the true results when the data changes a lot.

The kernel function and parameter tuning are cumbersome. Some scholars have also used neural network algorithms to evaluate early childhood teacher education research ability, such as self-organizing feature mapping network (SOM) network, Hopfield network, probabilistic neural network (PNN), LVQ network, neural network, fuzzy neural network, and BP neural network [18]. Neural networks have their unique features in dealing with nonlinear problems, but the convergence speed is slow, the network structure is complex, the selection of learning parameters is generally determined empirically, and overfitting defects are prone to occur. To sum up, it is necessary to seek an appropriate method to construct a highly reliable model for evaluating early childhood teachers' early childhood teacher education research ability. Xgboost has good flexibility and accuracy in dealing with this problem, but the drawback of Xgboost is that it has more parameters and affects the prediction performance of the algorithm, so it needs to optimize its tuning process. Therefore, the tuning process needs to be optimized. This paper establishes the GA_XGBoost model based on Xgboost, which takes advantage of the global search and flexibility of the genetic algorithm, making it significantly more optimized than the Xgboost model in terms of parameters, convergence speed and evolutionary results.

Methods

Model architecture

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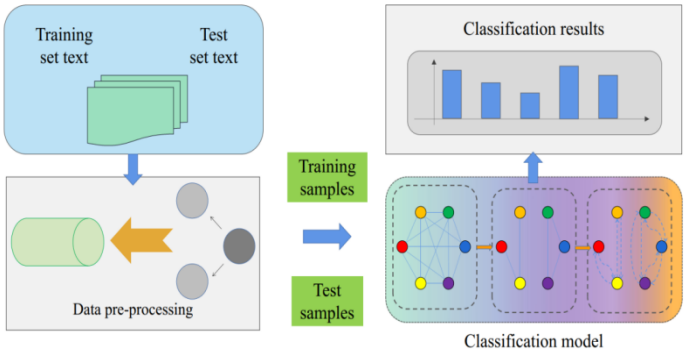

Figure 2. Model structure.

As shown in Figure 2, the research framework for improving the research capacity of early childhood teachers' education supported by big data technology is an end-to-end deep learning framework, which consists of four parts, namely, word embedding layer, semantic combination layer, convolutional attention layer, and output classification layer. The word embedding layer represents text sequences into a shallow semantic feature matrix with fixed dimensionality by pre-trained word vectors; the semantic combination layer generates a high-level semantic feature matrix by semantically combining the feature vector matrix with a long-short term memory network LSTM; the convolutional attention layer uses a convolutional neural network to extract features from high-level semantic features and generate adaptive attention weights; the output classification layer. The output classification layer is to adjust the feature dimension using the fully connected layer and classify them with SoftMax function.

Local semantic extraction

The role of the local semantic extraction layer is to focus on and extract the important contexts in the global context that are semantically related to the aspect items. LSTM and GRU are good at processing sequential text, and their performance is comparable, but GRU is structurally simpler and has fewer parameters. In this section, new aspect gates and complementary gates are constructed based on GRU, and the AGRU network is proposed so that the model can learn both sequence semantics and select specific aspect information. Intuitively, for each time step, AGRU retains contextual information related to aspect items by aspect feature vectors, while discarding irrelevant contextual information. The AGRU cell computes the context embedding x_t, the aspect embedding x_t^a, and the context hiding state h_{t-1} of the previous moment at time t as shown.

$$\begin{aligned} r_t &= \sigma(W_r \cdot [h_{t-1}, x_t] + b_r) \\ k_t &= \sigma(W_k \cdot [h_{t-1}, x_t] + b_k) \\ z_t &= \sigma(W_z \cdot [h_{t-1}, x_t] + b_z) \\ g_t^a &= \mathrm{ReLU}\left(W_{ga} \cdot [h_{t-1}, x_t^a] + b_{ga}\right) \\ \tilde{h}_t &= \tanh\left(W_h \cdot [r_t * h_{t-1}, g_t^a * x_t]\right) + g_t^a * l_t^a + k_t * l_t \\ h_t &= (1 - z_t) \cdot h_{t-1} + z_t \cdot \tilde{h}_t \end{aligned} \tag{1}$$

Where r_t denotes the reset gate, k_t denotes the complementary gate, and z_t denotes the update gate, all of which are processed by the sigmoid function; g_t^a denotes the aspect gate, which is controlled by the ReLU function.

$$\mathrm{ReLU}(x) = \max(0, x) \tag{2}$$

Due to the unilateral suppression of this function, the feature vector after the interaction between aspect features and context features is sparser after its processing, which is conducive to aspect-related context feature extraction. l_t^a and l_t denote the linear transformations of x_t^a and x_t, respectively, which are

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complementary to the dimensional space of AGRU units. Their expressions are shown.

$$l_t^a = W_{la}(x_t^a)$$
$$l_t = W_l(x_t) \quad (3)$$

$\tilde{h}_t$ denotes the candidate hidden state, which is controlled by the aspect gate, complementary gate, and reset gate along with the tanh function to update and retain the current input, thus selecting the aspect-oriented sequence context. W_{la}, W_l are the learnable weight matrices and deviation vectors.

Feature learning layer

The syntactic dependency tree can be transformed into a graph in which the nodes represent the words in each sentence, the edges represent the dependency labels between words, and the structure of the graph is represented by the adjacency matrix. To increase the closeness between the context and a particular aspect, the adjacency matrix, e, is calculated as shown in equation.

$$e_{ij} = d_{ij} * (t_{ij} + 1) \quad (4)$$

Where d_{ij} is the schematic function and a dependency relationship between node I and node j, d_{ij} is 1, otherwise it is 0. When node i and node j are aspect words, t_{ij} is 1, otherwise it is 0. RGAT has a multi-layer architecture, under the constraint of the adjacency matrix, each layer combines node features and dependent label features in the neighborhood based on multi-headed attention to the attention calculation and aggregation process to achieve each node vector. The output hidden state of AGRU is used as the initial hidden state of RGAT, and as the number of layers increases, the stacked hidden state of all nodes is generated iteratively. Taking layer l as an example, the update process of node I under the s-the attention head of the layer is shown in equation.

$$h_i^{ls} = \sigma\left(\sum_{j\in N_i} \alpha_{ij}^{ls}\left(W_v^{ls} h_j^{(l-1)s} + W_v^{lsr} r_{ij}\right)\right) \quad (5)$$

Where h_i^{ls} is the updated vector representation of node i, $h_i^{(l-1)s}$ is the vector representation of neighbor node j in the upper layer, $r_{ij}$is the dependency label representation between node i and j, and W_k^{ls}, W_k^{lsr} is the learnable weight matrix. α_{ij}^{ls} is the normalized weight coefficient, which represents the attention fraction of node i to neighbor node j.

$$\alpha_{ij}^{ls} = \frac{\exp\left((W_q^{ls} h_i^{ls})\left(W_k^{ls} h_j^{ls} + W_k^{lsr} r_{ij}\right)^T / \sqrt{d}\right)}{\sum_{j\in N_i} \exp\left((W_q^{ls} h_i^{ls})\left(W_k^{ls} h_j^{ls} + W_k^{lsr} r_{ij}\right)^T / \sqrt{d}\right)} \quad (6)$$

Where, d is the scaling factor of one attention head and W_q^{ls}, W_k^{ls}, W_k^{lsr} is the learnable weight matrix. The multi-head attention is learned according to equation, and different vector update representations about node i are obtained after several transformations, and the multiple vector results are stitched together to obtain the final target node representation h_i^{ls} layer 1.

Deep interaction fusion

The syntactic context obtained from the upper layer network belongs to coarse-grained text representation. On the one hand, RGAT models the dependencies between other words in addition to learning the correspondence between specific aspects and early childhood teacher education research competency words. On the other hand, the dependency tree parsing of complex sentences is not accurate enough and will mislead the model to focus on useless information and introduce additional noise. Compared with the syntactic context, the weight of redundant information in the local semantics is smaller, but it still affects

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the model performance.

The pooled vectors are projected into the space of target K classes using a fully connected layer to calculate the probability of each early childhood teacher education research competency assessment.

$$x = W_x^T h + b_x$$
$$y = \frac{\exp(x)}{\sum_{k=1}^{K} \exp(x)} \quad (7)$$

Experiments and results

Experiment setup

Confrontation sample validity validation was conducted on different network models, and the information related to the dataset was summarized by statistically analyzing multiple types of textual datasets for early childhood teacher education research competency assessment. The dataset for the experiment was constructed in this paper using multiple types of data, with an average of 6,000 early childhood teacher education research competency reports of each type. Since this experiment only needed to verify the comment statements that contained polyphonic words belonging to early childhood teachers' educational research competency tendencies, after manual screening, 5886 statements containing polyphonic words were left in the comments with the same proportion of positive and negative samples.

Adversarial sample data were generated using PGAS, and the adversarial sample data, passed into traditional models such as long and short-term memory networks and convolutional neural networks and some of the latest early childhood teacher education research competency assessment models to test the effectiveness of the generated samples. To verify the effectiveness of the proposed PGAS, the adversarial samples were first generated, and these adversarial samples were used as input to implement a black-box attack on the existing state-of-the-art early childhood teacher education research competency assessment models. The measurement of the effectiveness of the PGAS attack is reflected by the degree of decrease in the accuracy of the neural network model for the detection of the adversarial samples; the more the decrease in accuracy, the more effective the attack is. The configuration of the experimental environment is shown in Table 1.

Table 1 Software and hardware environment configuration

Parameters	Configuration
Operating system	Ubuntu 20.04.2 LTS
CPU	Inter Core i9-10900KF
CPU memory	62.7 G
GPU	GeForce RTX 3080
GPU memory	24G
Programming language	Python
Programming platforms	PyCharm
Graphics acceleration environment	CUDA11.2, CuDNN7.6
Deep learning framework	Potarch 1.7.0, Torch vision 0.8.1

Experimental results

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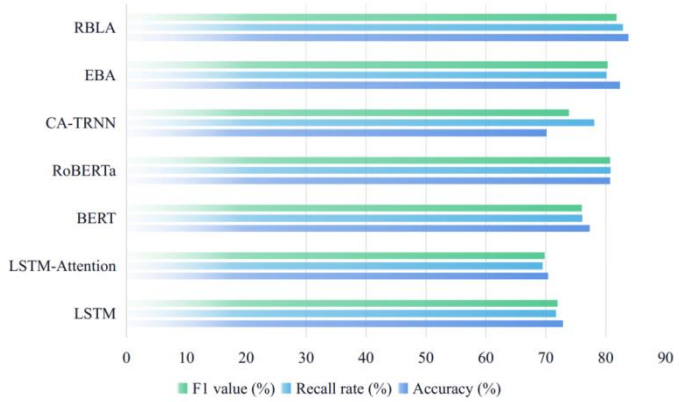

Figure 3. Comparison of experimental results.

To verify the overall performance of the RBLA model in the classification of implicit early childhood teacher education research competency, comparison experiments were conducted with the six models mentioned above to test their accuracy, recall and F1 values, and their experimental results are shown in Figure 3. From Figure 3 4, the RBLA model has 3.07%, 2.12% and 1.01% higher precision, recall and F1 values, respectively, compared with the RoBERTa model, which has the best performance among the four baseline models of LSTM-Attention, LSTM, BERT and RoBERTa. This indicates that the RBLA fusion model proposed in this paper has better performance on the implicit early childhood teacher education research competency analysis task compared to the typical baseline model. In addition, compared with the EBA model, which is the best classification model among the two current mainstream implicit early childhood teacher education research competency analysis models, CA-TRNN and EBA, the RBLA model has 1.44%, 2.72%, and 1.42% higher precision, recall, and F1 values than the EBA model, respectively.

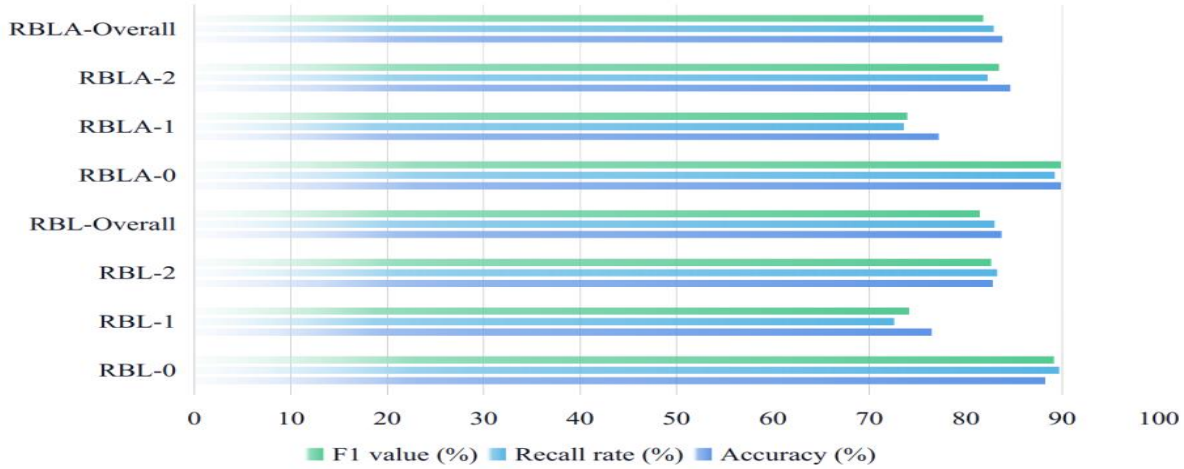

Figure 4. Comparison of the results of the assessment of early childhood teachers' educational research ability.

In this paper, the early childhood teacher education research competency tendency categories of implicit early childhood teacher education research competency tests are defined as neutral, positive, and derogatory, which are represented by the labels 0, 1, and 2, respectively. To investigate the influence of the attention mechanism in the RBLA model approach on the classification of early childhood teacher education research competency, we compared the performance of the RBLA model and the RBL (Roberta Bi-LSTM) model without the attention mechanism for the classification of implicit early childhood education research competency, and the experimental results are shown in Figure 4.

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As can be seen from Figure 4, the RBLA model proposed in this paper was 1.63%, 0.71%, and 1.73% more accurate than the RBL model in classifying three types of early childhood teachers' educational research competencies: neutral, positive, and derogatory, respectively. Similarly, compared to the RBL model, the RBLA model was 0.72% and 0.78% higher in F1 values for the neutral ECE teacher education research competency classification and the pejorative ECE teacher education research competency classification, respectively, and 1.04% higher in recall for the positive ECE teacher education research competency classification. Although the RBLA model was slightly lower than the RBL model in the recall rate of the neutral early childhood teacher education research competency and derogatory early childhood teacher education research competency classifications and the F1 value of the positive early childhood teacher education research competency classification, in terms of overall performance, the RBLA model was higher than the RBL model in terms of accuracy rate and F1 value.

Conclusion

Today is an era of pursuing excellence, and the desire for excellence in all walks of life has become stronger and stronger, and the source of these talents undoubtedly comes from education, and excellence in education cannot be separated from excellence in teachers. With the deepening of basic education reform and the call of the times for excellent early childhood teachers, early childhood teachers' textbook research literacy has become a key literacy for teachers, which is important to promote their professional growth and enhance the innovation level of education and teaching. The pre-service training of early childhood teachers' educational research literacy has the significance of laying the foundation for the growth of excellent early childhood teachers in the future and promoting research-based learning among teacher trainees. How to cultivate early childhood teachers' educational research literacy at the pre-service stage is an issue worthy of research and exploration.

In the early childhood education stage, the application of big data technology can well change the current teaching status quo, improve the scientific nature of kindergarten teaching and management activities, and enable kindergartens to obtain more targeted information. At the same time, the application of big data in kindergarten early childhood teachers' educational research ability can also enable early childhood teachers to implement targeted teaching by combining the characteristics of each child, so that each early childhood teacher's educational research ability can be fully developed. Therefore, kindergartens should continuously increase the learning and application of big data technology in the process of running kindergartens, make full use of advanced big data technology to improve preschool education informatization, and create favorable conditions for every early childhood teacher to actively participate in the improvement of early childhood teachers' educational research ability.

Acknowledgements

This work was supported by Guangxi Education Science "14th Five-Year Plan" 2021 Special Project for Capital Construction Research (Project No. 2021ZJY1968); Guangxi Education Science Planning 2021 Special Project for Preschool Vocational Education Schools (Project No. 2021ZJY808).

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https://doi.org/10.71052/geb2025/WKSX2601 https://www.wonford.com/

Reform of Football Training Professional Courses Based on Federated Learning under the "Internet+" Model

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Abstract

Federated learning can enable mobile devices to train a shared prediction model cooperatively, and save all training data on the device, so as to decouple machine learning and cloud storage data. This goes beyond forecasting on mobile devices using local models. Football training courses are the main subject of the school and an indispensable part of the physical education teaching process. The reform of the football teaching course also needs constant reform and innovation. China's football curriculum education is mainly from the perspective of competitive sports, focusing on the teaching of technical movements and rules of football, which hinders the long-term development of football education in China. In order to solve this problem, this paper takes the special football training courses in colleges and universities as the research object, and analyzes the present situation of campus football courses, the formulation of physical education teaching objectives, physical education teaching methods, the degree of connection between physical education content and physical fitness improvement, and the effect of physical education evaluation methods. Starting with the information-based football training special courses in the era of "internet plus", this paper summarizes the reform methods of physical education courses and explores the information-based football teaching reform mode in the era of "internet plus". The results show that the current education system cannot well meet the social needs of professional talents cultivated by Chinese colleges and universities. It is suggested that the football education mode of Internet + sports is a key measure to change the traditional physical education concept and education mode and promote the sustainable development of sports; the deep integration of "internet plus" and football education has a strong impact on the traditional course teaching in colleges and universities. Giving full play to the advantages of Internet resources in football course teaching and taking advantage of the convenience of mobile Internet terminals can effectively promote the informatization and intelligent development of football course teaching, effectively improve teaching efficiency, enhance students' acceptance and improve the matching of majors with the development of the times. The goal of physical education is reasonable, the teaching methods are diversified, the teaching contents are scientific, and the evaluation of physical education is reasonable. The research results have laid a solid theoretical foundation and theoretical guiding significance for the development of "internet plus" physical education curriculum reform. The reform and development of professional football training courses based on federated learning under the "Internet+" model will help to further improve the efficiency and quality of football training and will also have a positive significance in promoting the curriculum reform in colleges and universities.

Keywords

Intelligent reflecting surface techniques, Internet plus, Football, Special courses, Curriculum reform, Federated learning

Introduction

Federated learning can enable mobile devices to train a shared prediction model cooperatively, and save all training data on the device, so as to decouple machine learning and cloud storage data. This goes beyond forecasting on mobile devices using local models. With the rapid development of information technology, great changes have taken place in human society, affecting both study and life, and education and teaching can't be avoided. With the continuous improvement of higher education concepts and the integration of Internet technology and curriculum teaching, it has not only promoted the construction of educational informatization, but also created a new situation of scientific education [1,2]. The convenience, flexibility and effectiveness of teaching results and teaching process have also been highly recognized by society [3]. In the face of the rising Internet teaching, the relevant national education departments have introduced various educational reform policies, attached great importance to the construction and development of educational informatization, and quickly promoted the network technology into the classroom, so that students' ability to raise, analyze and solve problems and self-study ability can be continuously improved, and teachers' technical level can be continuously improved, teaching methods can be improved, and educational concepts can be re-taught [4-6]. As a highland of education, higher education continuously cultivates professional talents for the country, so it is imperative to reform and innovate the football training curriculum. The integration of information technology and education has become the mainstream trend of teaching reform [7-9]. The Ministry of Education has repeatedly stressed that it is necessary to give full play to the advantages of Internet technology, lead the comprehensive education reform, and deepen the popularization of online learning space [10]. Under the background of the Internet age, students can use the Internet to study anytime and anywhere, which can greatly meet diverse learning needs. At the same time, teachers can also use the network to carry out teaching, keep abreast of students' learning situation, break through the time and space constraints, ensure the teaching progress, broaden students' horizons and stimulate students' interest in learning. However, it is a great challenge to introduce "internet plus" into the teaching of special courses of football training and construct a distinctive teaching mode [11-13].

"Internet Plus" is an application that provides convenient production and services for all departments through the Internet, big data, cloud computing and other science and technology. Through the continuous mutual development of Internet + technology, a new "Internet +" environment has been constructed. Some researchers think that the Internet + is based on the path of the Internet platform support, realize the integration of all walks of life, can not only save costs, and can improve the efficiency of production, promote resource sharing, to achieve industrial upgrading, and can continuously extends new business, new model and new industry, establish each other industry network, forming a new pattern of industry.

With the application of internet plus in the teaching reform, the campus football curriculum has undergone a major reform. Some researchers have pointed out that with the deepening of the teaching reform of football major in China, campus football, as the latest policy, has achieved good results, combining campus football with football, and promoting the development of campus football through the popularization of football, so as to stimulate students' interest in football training courses and establish long-term football value [14-16]. Some researchers have pointed out that football is the main sport in college physical education departments, and the implementation of campus football policy has made football more concerned [17]. The reform of football teaching in college physical education departments is the most important thing. Through physical education class, extracurricular activities and leisure time, campus football activities and competitions are organized, and the teaching syllabus and teaching methods of campus football activities are reformed [18]. Some researchers have suggested that the teaching reform of football should meet the needs of the development of campus football, conform to the needs of the times,

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and make students participate in campus football by making a scientific and reasonable football syllabus, with students as the main body and the campus as the carrier, so that campus football can be carried out smoothly [19]. Some researchers have promoted football activities to reform football teaching reform, mainly by innovating teaching ideas and teaching methods, enriching the teaching content of football class, promoting the development of campus football and improving the teaching reform [20]. Some researchers believe that in the process of deepening education reform, colleges and universities should not only pay attention to training students to become professionals in physical education, but also combine with social development to meet the current social demand for physical education, and train students to become compound professionals in physical education. Under the "internet plus" environment, students can choose their favorite physical education courses and study independently in any place in their spare time by means of the terminal media of the network, thus truly embodying the teaching of "taking students as the center of gravity".

The reform and development of professional football training courses based on joint learning under the "Internet+" model will help to further improve the efficiency and quality of football training and will also have a positive significance in promoting the curriculum reform in colleges and universities. The effective integration of "internet plus" and football training special course education has also formed a channel between the supply and demand of physical education courses in colleges and universities, making it possible for the seamless connection between the supply side and the demand side, ensuring that students' demands for personalized and customized physical education courses are effectively responded, and promoting the transformation of traditional education mode. Taking the special football training courses in colleges and universities as the research object, this paper analyzes the present situation of campus football courses, the establishment of physical education teaching objectives, physical education teaching methods, the docking degree between physical education content and physical fitness improvement, and the effect of physical education evaluation methods, etc., and explores the information-based football teaching curriculum reform mode under the background of "internet plus" era, providing theoretical guidance for the development of physical education curriculum reform in "internet plus".

Current situation and existing problems of special courses of football training

Current situation of special courses for football training

Through the investigation of football courses in ten physical education departments of colleges and universities, it is found that all ten physical education departments have football majors, and only a few students of general football majors teach boys and girls in separate classes. Due to the physical conditions of male and female students, it is decided that the mixed classes of male and female students will be held in football teaching, which will enable male students to drive female students to improve their learning efficiency and teaching quality and will also be beneficial to the achievement of football teaching effect and goal.

Through the investigation of football courses in physical education departments, Table 1 gives the questionnaire of football courses in the semester. It can be seen that: most schools arrange football courses in the second, third and fourth semesters, but no colleges offer football courses in the fifth semester. The main reason is that most students don't know football, either theoretically or tactically. Through one year's study and exercise, students can improve their physical fitness. To get a preliminary understanding of football-related theoretical knowledge, at the same time, to cultivate students' interest in football, to tap their own potential in football, and to carry out targeted training and exercise for students, so as to give them a huge development space. If the course is arranged in the fifth semester, students' learning time will

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be shortened due to various factors, which are not conducive to the development of students' technical and tactical level and specialized ability.

Table 1. Questionnaire for the football class opening semester.

Start time	First semester	Second term	Third semester	The fourth semester	The fifth semester
Term start (institute)	1	3	3	3	0

Table 2 shows the class hours of football classes, and the syllabus of football majors in each school has no clear regulations regarding the class hours. At present, most students will work as teachers and coaches after graduation, but the incomplete and meticulous schedule of class hours can't meet the needs of society. At present, the teaching hours of the football course are 54-58 hours, so students can have a basic understanding of football, but can't achieve the goal of improving students' football skills and tactics, knowledge and theoretical basis. As for the number of football lessons arranged, we should pay attention to the needs of society. Some colleges and departments featuring football should effectively meet the strengthening of students' abilities in football, so that students can be competent for the profession of teachers in the future.

Table 2. Questionnaire on football class opening hours.

Class hours	48	54	58	64	72
Number of schools (institutes)	1	3	4	1	1

The necessity of special courses in football training

Under the background of quality education, society's requirements for talents have changed, and it is particularly important to pay more attention to talents' ability and accomplishment, and to strengthen the cultivation of talents' core accomplishment. However, at present, under the influence of traditional teaching concepts, many colleges and universities don't attach importance to football courses, and more emphasis is placed on professional skills and cultural knowledge courses, which are very unfavorable to students' all-round development. In order to better meet the requirements of quality education at present, it is necessary for college football teaching to cultivate sports talents.

Traditional football teaching philosophy is relatively backward, but traditional football teaching pays too much attention to students' theoretical knowledge, neglects students' sports ability, affects the improvement of students' sports ability, and is not conducive to students' all-round development. At the same time, colleges and universities pay too much attention to theoretical knowledge study, which is not conducive to students' future career development. It is very meaningful to reform the current football teaching, and colleges and universities need to pay more attention to it. Football course teaching also plays a positive role in the cultivation of students' interests. In actual teaching, it actively demands the development of football teaching market for students. Teaching the reform of college football courses is also in line with the requirements of market development.

With the arrival of the era of knowledge economy, the employment pressure of students is gradually increasing, and society has higher requirements for talents. At present, the positions related to football require students not only to have a solid theoretical foundation, but also to have a strong practical level. However, the teaching of students mainly focuses on the teaching of students' basic cultural knowledge. In this case, the students cultivated by colleges and universities cannot meet the requirements of the social

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market, and the teaching reform of football course is also in line with the requirements of market development.

Main problems of special courses in football training

Teaching content emphasizes practice over theory. Football courses have strong practicality, mostly outdoor teaching, and relatively few theoretical courses. However, in actual teaching, football pays more attention to the improvement of students' physical quality and sports ability. In class, it mainly leads students to carry out various sports, aiming at enabling students to master basic sports skills, neglecting the explanation of theoretical knowledge, which leads to students being in a passive state of physical exercise and weak learning objectives. In the long run, the football teaching content in colleges and universities focuses on the essentials and basic skills of sports events, and students do not have the awareness of lifelong physical exercise, nor can they internalize the spirit of competitive sports, which has a great impact on the teaching effect of physical education courses. At the same time, students' learning without understanding the spirit of sports will also lead to students' lack of interest and irregular movements, and the effectiveness of physical education teaching will be greatly reduced.

The teaching form is too single. In actual teaching, most college football courses still follow the traditional methods, mainly focusing on action explanation, demonstration, error correction, etc., which is far behind the requirements of contemporary physical education. The reform of teaching form has always been the focus of football curriculum reform. Under the constraint of traditional teaching environment, it is difficult to realize information-based teaching in the actual outdoor teaching scene. In the new era, football teaching environment is still dominated by traditional teaching. Although teacher demonstration helps to strengthen students' understanding and memory, and enhance the two-way interaction between teachers and students, football teaching is one-to-many. During teaching, teachers can only select universal questions to strengthen teaching, and one-to-one precise teaching cannot be realized. In the long run, the single teaching method has greatly weakened students' enthusiasm for participation, and some students' irregular actions can't be guided in time, thus killing students' interest in football. At the same time, football action needs to be completed instantly, with strong consistency and complicated action, so teachers can't demonstrate to students one by one, which leads to students' inability to master the essentials of action.

The management of football teaching lags behind. Football teaching in colleges and universities is not only a single classroom teaching, but also includes homework, health test, physical intelligence management and many other contents. In the new era, college football courses should not only shoulder the important task of improving students' physical quality, but also take the initiative to inherit the sports spirit and provide sports guidance, so as to cultivate a group of compound talents with excellent physical quality and all-round development of morality, intelligence, physique, beauty and labor. Looking at the current football teaching management in colleges and universities, the function transformation is lagging behind, and the information management mode of physical education teaching is not in place, which leads to the low work rate of physical education teaching. The content of sports information service is less, the advantages of Internet are not fully exerted, and the application of information technology is not deep.

The selection of football curriculum content lacks pertinence. As an important guiding material for football teaching, the content has a direct impact on the quality of football teaching, so it is very important to choose the content of football courses reasonably. Nowadays, when teaching students in colleges and universities, emphasis is placed on cultivating technical and skilled talents, and students are required to obtain the professional physical fitness required for their professional posts through football classroom teaching during the school period, so as to meet the requirements of post talents. This requires the school to choose the teaching methods and contents reasonably according to the actual situation of students in the

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face of students in different positions. When teaching football in colleges and universities, the course content is basically the same. At the same time, facing students of different positions and majors, different teaching contents are not adopted, which to some extent affects the effect of football teaching and is not conducive to the effect of football training. At the same time, teachers are more concerned about the completion of teaching tasks in teaching, and pay less attention to the learning effect, which leads to the violation of the actual concept of training sports talents.

The evaluation system of football teaching is not perfect. When teaching football courses in colleges and universities, there are often imperfections in the evaluation system, which are mainly manifested in the following aspects: there are unreasonable evaluation methods. When evaluating students' football, teachers only examine students' football skills and regard the evaluation as the final result of students, so it is easy to have unfair evaluation. In the evaluation process, there is an unfair situation, teachers use unified assessment standards for students, will also cause unreasonable assessment situation; After the completion of the assessment, the teacher did not guide the students' existing problems, which affected the improvement of students' football level.

Table 3. Teachers' football teaching methods.

Football teaching method	Teacher lecture	Teacher's lecture plus courseware	Teacher's lecture plus discussion	Students learn with tasks.
Proportion (%)	25	45	20	10

Table 3 shows teachers' football teaching methods. Most teachers adopt the form of telling and courseware, and courseware is one of the commonly used teaching media. Pictures, videos and other materials are added to the courseware to visually reflect the teaching content. However, courseware teaching has been developed for many years in China, and it is not innovative. In addition, the content of courseware basically comes from textbooks, which can't really improve the teaching effect.

Teaching reform of special course of football training under "internet plus 3" modes

With the penetration of "internet plus" model in college football courses, the content of football teaching has been continuously expanded. Teachers rely on advanced modern information technology to provide targeted learning plans for students, so that students can actively participate in sports training and maximize their physical fitness. However, due to the influence of traditional teaching, many colleges and universities have strengthened the reform of information-based teaching. However, due to cognitive bias, multimedia teaching only in theoretical classes does not give full play to the advantages of Internet resources, nor does it really integrate with football.

Football course teaching reform program

According to the physical characteristics of students in different grades to develop targeted football teaching objectives. After formulating the overall football teaching objectives, the teaching content of physical education in different grades is formulated comprehensively through the information teaching mode. In the actual situation, the school carries on the comprehensive and effective division of the physical education classroom teaching content to ensure that the students reasonably master the college football classroom learning content.

The single football teaching method can't meet the actual needs, so we must make use of the situational physical education teaching method to stimulate students' interest in learning. Therefore, in the process of practice, teachers make students devote themselves to football teaching scenes by setting them reasonably. At the same time, it is necessary to carry out the information-based teaching of college football courses

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under the background of the "internet plus" era, and create information-based teaching situations, mainly including competition scenes and game scenes. The specific implementation scheme is shown in Figure 1.

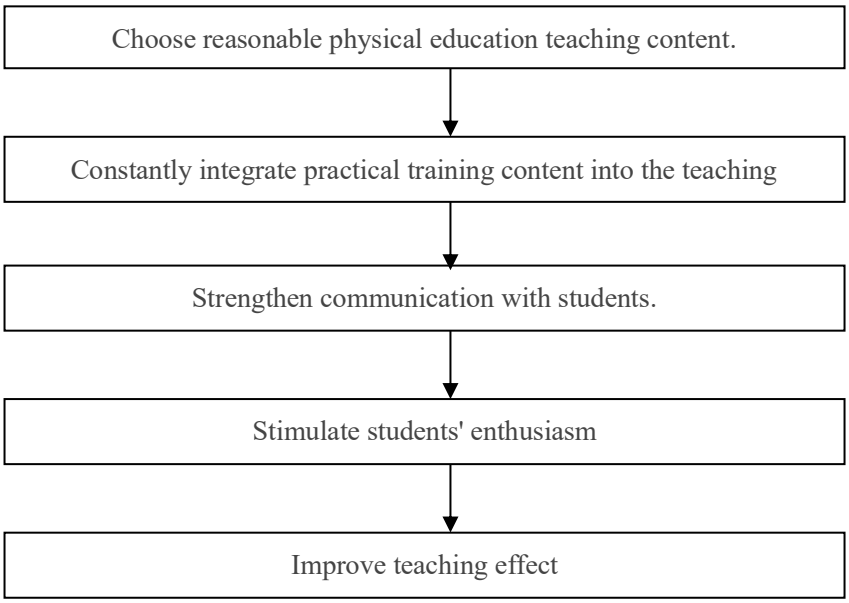

Figure 1. Football curriculum reform process.

Due to the rapid update of classroom learning content, the development of football teaching in some colleges and universities can't meet the improvement of students' physical fitness. Therefore, schools should take their own football teaching conditions as the basis, take students' demand for football learning as the core, apply innovative Internet technology, reasonably change the existing textbook content, and incorporate some football frontier information to lay a solid foundation for students' development. There is a big difference between the Internet-based football teaching course and the traditional football teaching process. Theoretical courses are often more than practical training courses. Although this is difficult to change, in order to really improve the football teaching level in colleges and universities, some practical training teaching contents must be appropriately added under reasonable circumstances. For example, students can be guided to carry out self-fitness in the teaching process. Teachers should guide and inspire students, teach them some self-fitness skills and enrich their knowledge structure. Let students apply the theoretical knowledge they have learned to practice, promote their development and progress, enhance their awareness of fitness, and truly establish the football concept of lifelong fitness. Football teachers should strengthen exchanges and communication with students, clarify students' interests and learning needs, make reasonable teaching plans with students as the main body, constantly stimulate students' enthusiasm and improve teaching effect.

Football teaching evaluation mainly affects students' learning efficiency. It is necessary to carry out football teaching evaluations reasonably and apply appropriate evaluation methods. With the reform of China's education system, the traditional exam-oriented education has gradually withdrawn from the stage, and quality-oriented education has taken the place of exam-oriented education and become the mainstream. Quality-oriented education pays more attention to students' comprehensive ability. In football teaching, we should build a diversified evaluation platform through information technology, enrich the evaluation content, improve the feasibility of evaluation, collect reasonable information, and formulate indicators reflecting students' learning situation and attitude, including achievement indicators and process indicators. Through the implementation of reasonable evaluations, students' attention to the football course has been

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enhanced.

Conclusion

Federated learning can enable mobile devices to train a shared prediction model cooperatively, and save all training data on the device, so as to decouple machine learning and cloud storage data. This goes beyond forecasting on mobile devices using local models. As a required subject in colleges and universities, football courses are an indispensable part of the physical education teaching process, and the reform of football teaching courses is constantly changing and innovating. China's football curriculum education focuses on the teaching of technical movements and rules of football, which hinders the long-term development of football education in China. In this paper, taking the special football training courses in colleges and universities as the research object, starting from the information-based football training courses in the background of "internet plus" era, we summarized the reform mode of physical education courses, and explored the reform mode of information-based football teaching courses in the background of "internet plus" era, which laid a solid theoretical foundation and theoretical guiding significance for the development of "internet plus" physical education curriculum reform. The main results are as follows:

(1) Through the investigation of the present situation of football courses in colleges and universities, most schools offer mixed classes for boys and girls. Most of the classes are taught in the second, third and fourth semesters, and the class hours are generally 54-58 hours; It is pointed out that the football education mode of sports in internet plus is the key measure to change the traditional sports education concept and mode and promote the sustainable development of sports. The deep integration of "internet plus" and football education, giving full play to the advantages of Internet resources and the convenience of mobile Internet terminals can effectively promote the informatization and intelligent development of football teaching, effectively improve teaching efficiency, enhance students' acceptance, and improve the matching of majors with the development of the times.

(2) The emergence of the "internet plus" teaching mode has caused a strong impact on traditional physical education. Focusing on traditional classroom teaching, we adopt the way of information teaching as a supplement, scientifically apply Internet technology and introduce mobile devices to inject fresh vitality into classroom teaching, boost the reform of physical education curriculum in colleges and universities, and realize the reasonable formulation of physical education teaching objectives, diversified physical education teaching methods, scientific physical education teaching content and rationalization of physical education teaching evaluation.

(3) Campus football characteristic school is the foundation project of the development of campus football, is the need for the sustainable development of campus football. The construction of football characteristic schools is a breakthrough to develop campus football, and a window to combine campus football, professional football and football youth training to work closely together. At the same time, through the selective evaluation system, excellent football reserve talents scattered in various schools can have the opportunity to stand out and be absorbed by professional clubs and national teams of different ages, so as to receive systematic training and become the backbone of the Chinese football team in the future.

Acknowledgements

This work was supported by the authors who would like to thank the financial support from Research and demonstration on self-help National Physical Fitness Evaluation and exercise-promotion based on smart phone. (Grant No: 2020SK2131).

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https://doi.org/10.71052/geb2025/ZSUO3950 https://www.wonford.com/

Reform of Teaching Mode of Ideological and Political Theory Course in Colleges and Universities under the Background of Mobile Internet

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Abstract

In recent years, the rapid development of the Internet has brought new opportunities to the teaching of ideological and political theory courses in colleges and universities. The teaching of ideological and political courses in colleges and universities under the Internet era should adapt to the new era, keep up with the trend, strive to improve teaching methods, and constantly improve and improve teaching efficiency, so as to achieve the purpose of profound education. Ideological and political theory courses in colleges and universities is the main channel to strengthen ideological and political education of college students. However, there are still some incompatible problems between the current educational model and the development of ideological and political courses in colleges and universities. Reforming this will effectively promote the cultivation and practice of college students' socialist core values, improve their ideological quality and moral standards, and ensure the cultivation of qualified builders and reliable successors with socialist characteristics. The application and reform of the teaching mode of ideological and political theory courses in colleges and universities must follow the correct guiding ideology and specific basic principles. The reform of the teaching form of ideological and political courses in colleges and universities needs to focus on practical teaching, keep pace with the times, closely connect with the society, actively guide students to correctly understand the current situation, strengthen students' ideals and beliefs, and constantly improve the attractiveness and effectiveness of ideological and political education. According to the specific theoretical analysis, combined with the current situation of ideological and political theory course teaching and teaching mode reform in colleges and universities, we can learn from the practice of ideological and political theory course teaching and its teaching mode reform. Therefore, this paper points out that colleges and universities support the teaching of ideological and political theory courses and the reform of its teaching mode.

Keywords

Internet, Ideological politics in colleges and universities, Traditional teaching mode, Teaching mode reform, Thought quality

Introduction

Xi Jinping emphasized at the National Education Conference: "Persist in deepening education reform and innovation and insist on serving the great rejuvenation of the Chinese nation as an important mission of education." [1,2] This marks the way forward, and at the same time puts forward innovations to speed up the reform of ideological and political theory courses. Under the background of mobile Internet, the teaching reform of ideological and political theory in colleges and universities has defined the core values of socialism [3-5]. Therefore, facing the challenges brought by the Internet to ideological and political

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theory courses in colleges and universities, ideological and political theory courses must improve their teaching methods to improve the efficiency of classroom teaching [6,7].

The Internet is the new frontier of today's era. The interaction and integration between higher education and the Internet will also become a new trend of its upgrading and development [8]. Therefore, in the era of mobile Internet, ideological and political theory course education in colleges and universities should adapt to the new era, seize opportunities, solve problems, speed up the reform of teaching methods, continuously improve the effectiveness and rationality of theoretical course teaching, and stimulate college students' enthusiasm for ideological and political research [9-11].

The course of ideological and political theory in colleges and universities is an important channel to improve the political, ideological and moral quality of college students and an important way to help them establish correct values [12]. In recent years, under the leadership of the CPC Central Committee and the National Council, ideological and political education in colleges and universities has achieved good results, but there are still some difficulties in the teaching of ideological and political courses in colleges and universities, which the party and the state attach great importance [13,14]. Therefore, the CPC Central Committee has repeatedly emphasized the importance of ideological and political education in colleges and universities and demanded that the reform of the teaching mode of ideological and political courses in colleges and universities should be strengthened to improve the teaching efficiency [15-17].

The influence of the mobile internet on ideological and political courses in colleges and universities

Impact on traditional teaching methods and teachers' right to speak

The Internet is full of the environment in which college students grow up, changing the way of thinking, learning methods and living habits of post-00 students. College students can use smart phones, laptops and other electronic devices in class to get information and exchange ideas in real time. However, almost all college courses, including ideological and political theory courses, are still traditionally taught on PPT and blackboard, so the traditional teaching habits of ideological and political theory teachers still exist, and some teachers will instinctively resist the implementation of new teaching methods. This situation is far from the reality of the mobile Internet society in the new era, and it can't effectively meet the strong demand of college students for communication. Even if the teaching content is very good, if it can't attract students' attention, the actual effect will be greatly reduced. Therefore, the educational reform of ideological and political theory courses in colleges and universities is imminent [18].

After entering the era of mobile Internet, the struggle between limited campus information and unlimited information in the ideological field will be more intense. Faced with the influence of various social tendencies and values, the discourse power of ideological and political theory teachers lies in the response and guidance to practice. The ideological and scientific nature of ideological and political theory courses in the mobile Internet society should be combined with the practice under the background of mobile Internet. At present, the teaching effect of ideological and political theory courses in colleges and universities is far from ideal, but there are many reasons for the low teaching efficiency of ideological and political theory courses. The main reasons are as follows: some teachers cannot keep pace with the development of mobile Internet society in classroom teaching and cannot effectively deal with the theme that brings mobile Internet society into ideological and political theory courses and cannot follow up with timely. The result is a long-term decline in the efficiency of college students. In order to meet the new demand of college students to give full play to their talents in college ideological and political courses, we need to adjust their expression in ideological and political theory courses. The characteristics of mobile Internet are shown in Figure 1.

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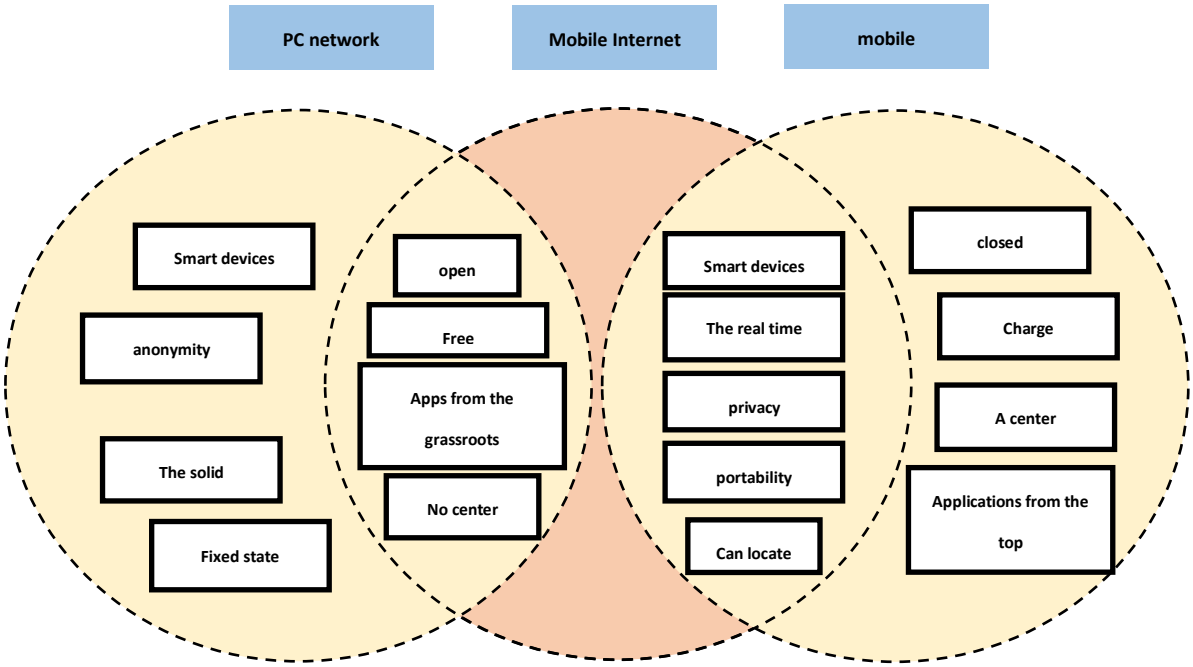

Figure 1. Characteristics of mobile internet.

Impact on students' thinking and value leadership

After decades of continuous development, the Internet has great influence on people's daily life. Especially among young people, young people in the new era can't learn, live and work without the Internet every day. At this stage, college students are mainly concentrated in the post-90s generation, and there are also post-90s students. Living in the age when the Internet is relatively mature, the Internet has a great influence on their lifestyle and thinking mode. In the process of Internet development, the most representative ones are "mobile phone" and "computer". The position and role of mobile phones and computers in people's minds have deepened the connection between college students and the Internet. The development of the Internet has brought convenience to their lives. They can hardly live without the Internet now, so their dependence on the Internet is gradually increasing. College students can learn more through WeChat, Weibo and other mobile apps to get the latest information. The Internet has become a major channel for understanding the world. However, many people do not understand the importance of ideological and political theory courses in colleges and universities, so they do not pay attention to ideological and political theory courses, which leads to restrictions on their ideological and political thinking.

With the rapid development of mobile Internet, the boundaries between international and domestic, online and offline, virtual and real, external and internal of the system become increasingly blurred, and the field of public opinion becomes more and more complicated. Developed countries use the Internet to promote Western values, reduce political discrimination among college students and enhance their political identity. In the competition between mainstream value education and education in other countries in the course of ideological and political theory, the changes in methods of various hostile forces have caused the pluralism phenomenon of college students to a certain extent, which has affected the leadership posture of Marxism in the field of thinking mode and multidimensional value thought. In some areas, this situation should arouse our great attention. How to win the battle of ideas online, how to compete for online status more effectively, and how to innovate ideological and political theory courses online are important tasks to promote socialism with Chinese characteristics and college students' sense of identity.

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Overview of the reform methods of ideological and political courses in colleges and universities

Implement relevant policies and improve teachers' teaching ability

The progress of ideological and political theory courses in colleges and universities is a process from a new starting point to a new stage. At present, the construction of ideological and political theory courses in colleges and universities is facing a crisis period. As ideological and political educators in colleges and universities, we need to continue to strengthen the research on the frontier of ideological and political education, implement the relevant national policy spirit, and promote the reform of ideological and political theory education. Colleges and universities are important places to cultivate the talents of the national reserve army and shoulder important missions. Undertake the task of teaching scientific and cultural knowledge. Through the reform, the educational efficiency of ideological and political theory courses has been further improved, and Marxist theories and beliefs have been spread persistently and firmly, providing students with a more active and healthy life. The teaching mode structure of ideological and political theory courses in colleges and universities is shown in Figure 2.

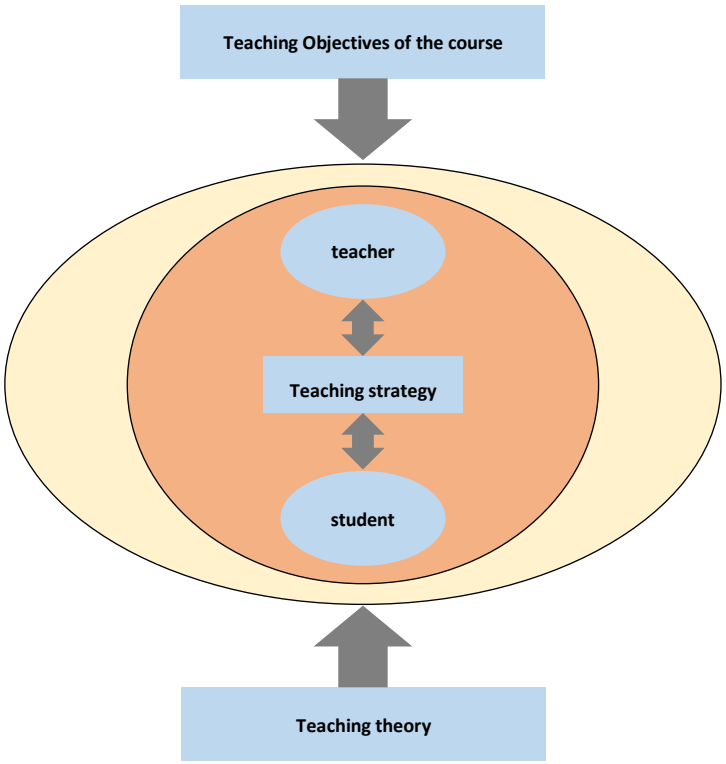

Figure 2. Structure of teaching mode of ideological and political theory courses in colleges and universities.

The key to improving the effectiveness of ideological and political theory courses in colleges and universities lies in teachers. Colleges and universities gradually realize the importance of ideological and political theory courses and increase the training of ideological and political theory course teachers. At present, the distribution of ideological and political theory teachers in colleges and universities is uneven. With the continuous development of the Internet, some teachers can't keep up with the pace of "internet plus", and some teachers can't adapt to the guidance of ideological and political theory. For example, some teachers focus on teaching and neglect scientific research. These teachers think that there is not a big gap in theoretical knowledge, and theoretical knowledge can't be updated in a short time. However, teaching methods should keep up with the development of the Internet and constantly innovate. Therefore, the

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balance between theory and teaching is collapsing. Some teachers attach importance to scientific research, but their teaching innovation ability is weak, and the classroom is boring. These teachers only pay attention to the value of learning, but do not pay attention to new things, and do not accept new teaching methods. Pay no attention to strengthening teaching methods and learning and training of new skills. The traditional "Internet +" teaching model is difficult to integrate into the student group because there is no student group, and classroom teaching cannot resonate with students, which is not conducive to student learning, especially some older teachers have conservative ideas, in the face of such a rapidly changing Internet world, it is powerless to improve their own teaching ability.

Create a good ideological and political classroom atmosphere

At present, almost all ideological and political theory courses in colleges and universities are taught in a single mode. However, the content of ideological and political theory courses is mainly national policy theory. Because of its particularity, many teachers will try to combine "internet plus" with ideological and political theory courses, but the actual effect is not good, and there will be many difficulties compared with other fields. Although many teachers use multimedia methods in the teaching process, they are basically limited to a few PPT with accumulated texts and images, which is not very attractive to most students. The rapid development and popularization of global Internet technology have brought about the continuous improvement of Internet penetration rate. According to relevant data, the global Internet penetration rate was 56.727% in 2019. According to the data of Internet World Statistics, the global Internet penetration rate was 59.600% in 2020. As of March 31, 2021, the global Internet penetration rate reached 65.600%, which was 40.111 percentage points higher than that in 2009. The global Internet penetration rate/penetration rate from 2009 to 2021 is shown in Figure 3.

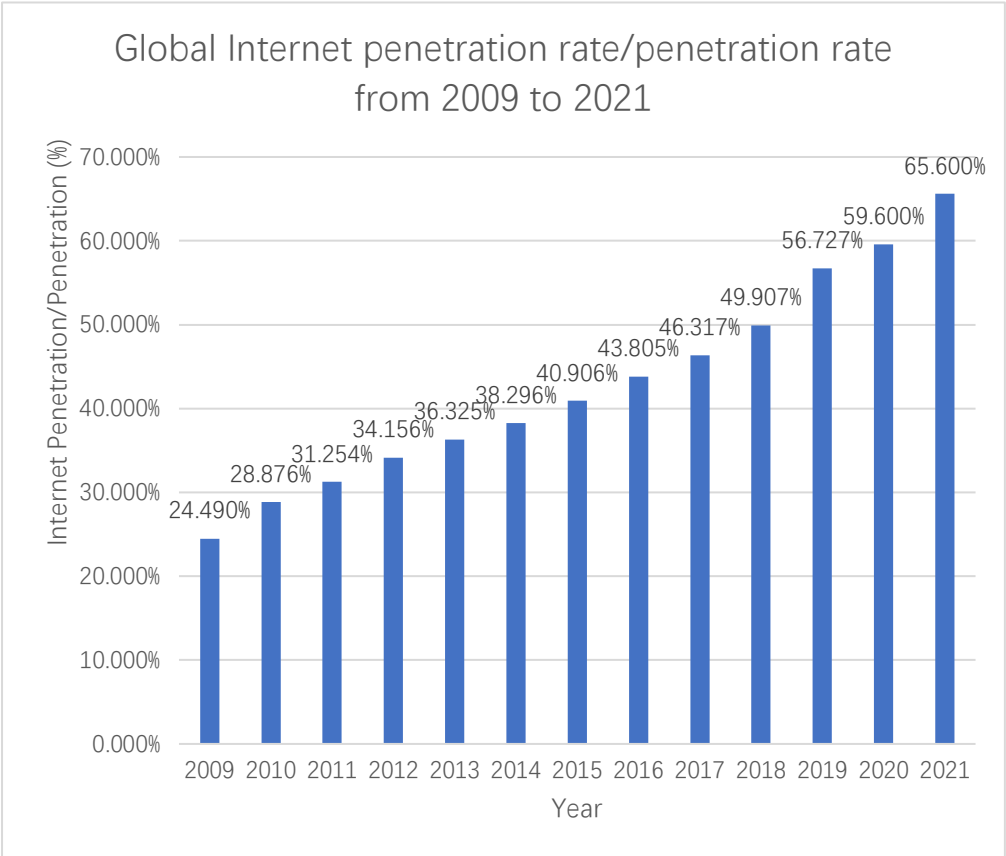

Figure 3. Global internet penetration rate/penetration rate from 2009 to 2021.

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Nowadays, there is still much room for improvement in developing the Internet into an "internet plus". Without further reform and innovation in content and form, we only rely on multimedia to play videos, texts and photos, which is not fundamentally different from traditional teaching. There is almost no interaction between teachers and students, and it will not stimulate students to concentrate on the study of ideological and political theory courses. Many students use the time of ideological and political theory courses to do homework in other subjects, or do something unrelated to the classroom, which leads to a very low learning efficiency of ideological and political courses, which is also a big problem for teachers. Therefore, teachers should teach theories correctly and in detail while increasing students' recognition. However, in order to create a good classroom atmosphere, many teachers neglect to teach the basic theories, logic and ideological aspects of ideological and political theory courses. The basic purpose of ideological and political theory teaching is to enable teachers to use the basic theory of Marxism in a solid and skilled way to help students answer and solve realistic social problems. Therefore, improving the attractiveness of ideological and political theory courses to students through the new teaching mode of "Internet +" is an important means to improve the quality of classroom teaching, and also a keyway to achieve the basic purpose of ideological and political theory courses. China's college network teaching or auxiliary teaching platform construction is shown in Figure 4.

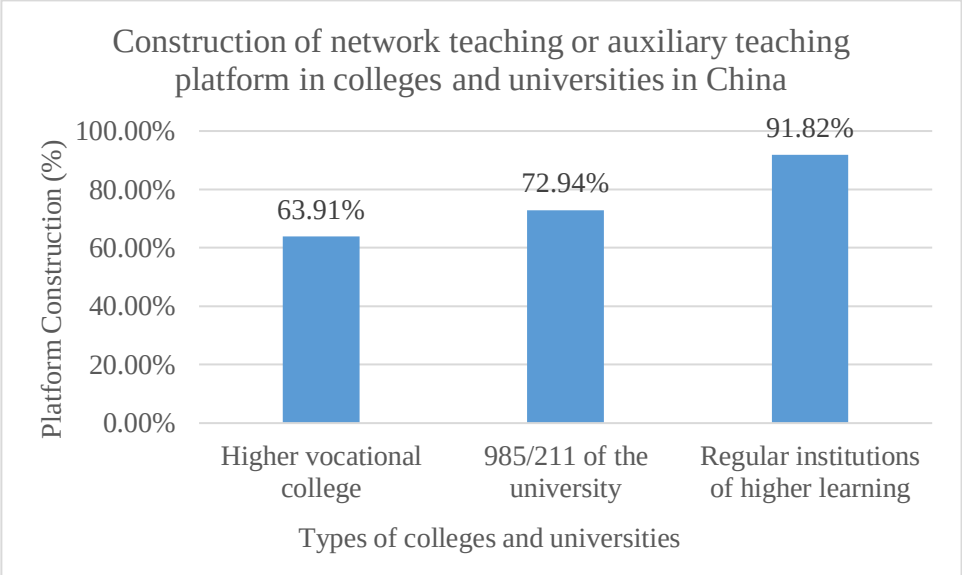

Figure 4. Construction of network teaching or auxiliary teaching platform in colleges and universities in China.

Reform of teaching mode of ideological and political theory course

Actively adapt to the times and change educational concepts

As we all know, the Internet is a "double-edged sword". Because of its inherent advantages, the Internet keeps making progress in the tide of social development. Nowadays, we have ushered in the "internet plus" era, so teachers of ideological and political theory courses should not always be passive. First of all, teachers should gradually change their inherent concepts with the development of the times, take the lead in conforming to the trend of the times, and actively use the advantages of "internet plus" to improve the overall education level. Actively integrating the Internet into the teaching of students will not only enable them to acquire theoretical knowledge, but also improve their learning efficiency in class. Secondly, teachers should fully understand the characteristics and advantages of the Internet and make full use of "internet plus" to improve students' interest in ideological and political theory courses and change their

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thinking mode, that is, to change the traditional "teacher-centered" teaching philosophy and fully consider students' needs. The consciousness of "student-centered" should be integrated into the daily courses of university teaching. And to understand the real concerns of college students, in the clear theoretical knowledge at the same time, but also to give consideration to the students for the use of political thought in daily life. Only in this way can the reform of ideological and political theory courses be realized in colleges and universities.

In order to improve the effect of classroom teaching, we need to improve the teaching mode. In the traditional teaching mode of ideological and political theory course, the teacher neglected the initiative of the students to some extent, resulting in the lack of communication between teachers and students. When theoretical knowledge is blindly taught, students will feel bored, thus resisting ideological and political theory courses. Moreover, most colleges and universities arrange ideological and political theory courses in large classrooms with hundreds of students. It is difficult for teachers to take all students' learning status and knowledge into account, and students can't communicate with teachers in time.

Reform and innovation of classroom teaching mode

In today's information and globalization era. In the teaching of ideological and political theory courses in colleges and universities, we should seize this opportunity, keep up with the pace of the times, organically combine Internet technology with ideological and political theory courses, and fully reflect the powerful role of "internet plus". Classroom courses are a part of theoretical education. If classroom teaching can fully combine "internet plus" with ideological and political theoretical courses, it will break the time and place restrictions and realize theoretical teaching. Students can learn ideological and political theory in class and online after class. This strengthens the interaction between teachers and students and improves the learning effect of students. For example, the continuous development of "internet plus" allows teachers to check class attendance without calling. In addition, students in the class can also send "barrage" to communicate with teachers in real time, which can not only attract students' attention and stimulate their interest in learning, but also strengthen the contact and communication between teachers and students.

According to the age composition and characteristics of college students, ideological and political theory should be taught in a more acceptable form for college students. In the 2018-2019 academic year, we specially designed and selected the introductory course chapters on the online platform. In the platform guidance, we found that as long as simple conversation and questioning can make the classroom atmosphere full of vitality, it can also guide students to quickly enter the learning state. Therefore, as long as teachers can carefully design and use the "internet plus" platform, the teaching efficiency will be greatly improved. In daily life, teachers can use the Internet to keep close contact with students. For example, QQ group and WeChat group established with students are very popular, and teachers can send high-quality learning materials and resources anytime and anywhere. The types of current teaching modes of ideological and political theory courses in colleges and universities are shown in Table 1.

Table 1. Types of current teaching modes of ideological and political theory courses in colleges and universities.

category	Teaching mode of representative ideological and political theory courses in colleges and universities
Teaching-oriented teaching mode	Indoctrination teaching mode, case teaching mode, Thematic teaching mode, task-based teaching mode, etc.

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Student-centered teaching mode	Problem-based teaching mode, heuristic teaching mode, research-based teaching mode, autonomous learning teaching mode, experiential teaching mode, hierarchical teaching mode, menu teaching mode, scaffolding teaching mode, Practical teaching mode, anchored teaching mode, etc.
Teaching mode based on teacher-student interaction	Discussion teaching mode, participation teaching mode, interactive and cooperative teaching mode, situational teaching mode, open teaching mode, dialogue teaching mode, three-dimensional teaching mode, game teaching mode, Harmonious classroom teaching mode, flipped classroom, etc
Teaching mode based on information technology	Multimedia teaching mode, mobile classroom, M00Cs, WebQuest teaching mode, WBI teaching mode, JiTT teaching mode, etc.

Improve the theoretical level and professional ability of ideological and political theory teachers

The role of teachers in the teaching process is very important, which has a great influence on the quality of students' learning. Under the background of "internet plus", in order to realize the innovation and development of ideological and political theory courses in colleges and universities, teachers must keep pace with the times. For most teachers, the traditional teaching mode is deeply rooted and has a strong influence on their own teaching methods. However, under the background of "internet plus", teachers need to improve their teaching ability, theoretical level and professional ability, and adapt to the requirements of the new era as soon as possible. Teachers of ideological and political theory courses in colleges and universities should grasp the pulse of the times, fully understand the needs of students in the learning process, create a positive classroom atmosphere, and make the teaching content deeply rooted in the hearts of the people.

In the era of "internet plus", teachers of ideological and political theory courses in colleges and universities need to learn high-tech and expand the teaching channels of ideological and political courses. Besides, in the actual process, we found that these excellent teaching platforms have a lot to learn. Students can not only be closely linked with teachers, but also allow teachers to share teaching resources while learning and progressing. Therefore, as ideological and political theory workers in colleges and universities, we must keep pace with the times, keep learning, seize the "double-edged sword" of the Internet and make the best use of its advantages.

Conclusion

Strengthening the reform of the teaching mode of ideological and political courses in colleges and universities is a far-reaching and important subject, and it is the key to improving college students' ideological level and cultivating their core socialist values. Only when college students improve their ideals and beliefs can the values of the whole society move in the right direction.

Through the investigation and analysis of the related concepts of ideological and political education in colleges and universities, this paper finds that the current ideological and political education in colleges and universities has made some achievements, but there are also various problems. The existence of these problems will affect the effect of ideological and political theory education in colleges and universities. Based on this, this paper puts forward the basic ideas of teaching mode reform of ideological and political theory courses in colleges and universities. By analyzing the current teaching mode of ideological and political courses in colleges and universities, the teaching mode of political courses is optimized and

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adjusted, so that students can be truly liberated in the teaching process. Students can think freely through the new teaching mode and broaden their horizons.

The education of ideological and political courses in colleges and universities is regarded as a comprehensive project. Although there are related educational methods, there are no fixed rules. The reform of the teaching form of ideological and political courses in colleges and universities is the result of a phased development and progress. In addition, there are still many problems in the teaching mode of ideological and political theory courses in colleges and universities, and the investigation on the teaching mode of ideological and political theory courses in colleges and universities will continue, to enrich and accumulate teaching practice experience and gradually improve the teaching mode of ideological and political courses in colleges and universities.

Acknowledgements

This work was not supported by any funds. The authors would like to show sincere thanks to those techniques who have contributed to this research.

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https://doi.org/10.71052/geb2025/SIKF9010 https://www.wonford.com/

Evaluation and Analysis of University Education Quality Based on Internet Artificial Intelligence Big Data Algorithm

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Abstract

With the rapid rise of China's artificial intelligence industry, with the rapid development of the Internet industry, a huge amount of data has been accumulated and the progress of data mining and utilization technology has been made. The effects of data, technology and policies are superimposed on each other, which has spawned a large number of new artificial intelligence enterprises. With the rapid arrival of the network information society, using the advantages of big data to break the limitations of traditional education evaluation has become the reality and technical logic of the integrated development of information technology and education evaluation. In the specific application, it is mainly presented as education and teaching quality evaluation, learning behavior effect evaluation, management service quality evaluation, government education policy performance evaluation, etc. The development of modern science and technology provides all-round support for the establishment of scientific education evaluation. The deep integration of artificial intelligence, big data and education plays an important technical supporting role in the reform of education evaluation. With the in-depth development of information technology, technologies such as the Internet, Internet of Things, and cloud computing have successively become commonly used technologies in people's daily work and life. In the education industry, informatization construction promotes education construction from application-driven to data-driven, and campus construction moves from "digital campus" to "smart campus". And all this has brought about a change, that is, the explosive growth of the amount of data. The arrival of the era of big data brings not only opportunities but also challenges to the development of all walks of life. Postgraduate education is the highest level of higher education and plays a vital role in the social development, technological and economic development of China. Under the current trend of rapid development of the Internet and the diversification of evaluation subjects, how to evaluate the quality of postgraduate education has become the focus of scholars. This study uses big data to construct a quality evaluation index system for postgraduate education by using AHP and proposes strategies to improve the quality of postgraduate education in China.

Keywords

Big data, Postgraduate, Education quality, Education quality evaluation, Analytic hierarchy process, Secure algorithms, Methodologies for mobile application security

Introduction

The deep integration of big data technology and regional education evaluation is the key to accelerating the transformation and development of data-driven teaching paradigm. In order to make the data platform more perfect, we need to combine the depth and breadth of data to build a regional education evaluation system. In the report of the 19th National Congress of the Communist Party of China, it is clearly stated that

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"prioritizing the development of education". In the continuous construction and application of information, the education industry has accumulated a large amount of rich data. These data sets cover all aspects of teaching, resources, management, scientific research, and services. Data collection and recording have become the norm [1]. Educational data provides a solid multi-dimensional data foundation for the extensive development and in-depth research of education. "Data" has become a quantitative tool for education and teaching research, and breakthroughs in storage technology have made data a scientific force for innovative education and teaching methods. Under the call of national policies, the research and application of educational data has reached an unprecedented level. Educational data has great potential in promoting scientific decision-making in education, promoting educational innovation, and optimizing educational quality management [2-4].

However, due to the fragmentation of business systems, the lack of top-level planning, and the lack of unified standards in the education industry in the early stage of informatization construction, the massive educational data cannot be integrated and shared due to irregularities and inconsistencies in its use. Data quality issues need to be resolved urgently. Improving data quality is an important measure to promote the current educational data to play its value. The purpose of data governance is to remove the false and preserve the true, to integrate the chaotic and disordered data analysis, to reduce the complexity and simplify it, to improve the quality of data, and to give full play to the potential value of data. Through education data governance, extensive and in-depth mining of data value can promote scientific decision-making in education, precise education management, and personalized teaching activities. Data governance is a necessary means to realize the value-added of educational data assets. Through data governance, educational governance capabilities can be improved, the development of the education industry can be promoted, and a new ecology of smart education can be built [5-7]. Data governance can integrate data of different types, properties, and sources, mine the correlation between data, and give full play to the potential value of data.

Internet education is participating in the reform of future education and has become an important educational form to promote educational reform. Since the end of the 20th century, informatization, represented by the rapid development of computer technology, network technology, and communication technology, is causing profound changes in the world, reshaping the new pattern of world politics, economy, culture and society, and also triggering the field of education. This is not only reflected in the changes in human learning methods and thinking methods, but also in the manifestations of courses, classroom teaching organization forms, school management methods, teaching evaluation methods and educational management models. Internet technology, as the key technology of education informatization, is revisiting education. Internet education is a new form of education and is participating in the transformation of future education. The process is long and requires the continuous integration of technology and education. Looking back at the history of the integration of the Internet and education, we can find that the impact of Internet technology on the education industry is gradual. In 1984, the traditional asynchronous online course in the United States opened the precedent of Internet education. Subsequently, countries around the world recorded the application and practice of the Internet in education from the perspectives of "open education", "network education", "distance education" and "online education". In 2012, the rapid rise of Internet online courses represented by MOOCs has become a new beginning of Internet education. The emergence of new technologies and new education methods such as Khan Academy, big data, micro-classroom, micro-credit, micro-degree, flipped classroom, and gamification teaching has subverted the application of the Internet in "traditional" education. The reshaping of education by the Internet and the mobile Internet is not only reflected in the expansion of educational resources and

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the provision of new teaching models and methods for education, but also in the changes in the way humans think about education. The most important thing is the relationship between the Internet and education. Integration brings new ideas and motivation: Internet education is participating in the future educational reform, and Internet education has become one of the main educational forms of educational reform.

The postgraduate education evaluation system in China first began in the era of planned economy. With the continuous development and reform of the social economy, culture and politics, the development scale and type of postgraduate education and the quality concept have also undergone important changes. In recent years, the influence of the Internet on education has been deepening. The previous education evaluation system was in urgent need of improvement or even reform because it does not adapt to the development of the current society. In particular, the current postgraduate education has begun to develop beyond the norm, and it is very important to cultivate high-level innovative talents to ensure a high quality of education while developing. Because of the influence of COVID-19, many universities have opened online graduate teaching courses. Building the system to evaluate these kinds of graduate teaching is urgent and necessary. This study deeply analyzes the influencing factors and areas for improvement of postgraduate education quality evaluation under the background of “Internet +” and constructs and improves the education quality evaluation system in China [8-10].

Method and theory

System indicators deleted

On the one hand, big data can completely record the education process and realize value-added evaluation and comprehensive evaluation. Big data has the characteristics of massive data scale, diverse data types, fast data processing and real high-quality data. It provides various data collection, cleaning, classification and analysis for education, teaching and management services, so as to realize the data recording, interactive participation and effect bearing of process education teaching and online learning, and objectively and truly record education, teaching and learning The whole process of learning process and management service as well as the analysis of "evidence-based education and teaching", and the educational evaluation model and effect oriented to diverse needs can be empirically tested for many times. Based on the data of teaching and learning process, it can realize the value-added evaluation that reflects the efforts and progress of teachers or students, as well as the comprehensive evaluation of students' all-round development in moral, intellectual, physical, artistic and labor, and provide scientific and technological support for educational evaluation; On the other hand, big data can provide more comprehensive and systematic education evaluation and promote students' growth. In terms of problems or objects, education big data evaluation can overcome the shortcomings of traditional education evaluation in quantitative research, such as incomplete data collection, unrepresentative or authentic sample selection, and systematically record, depict and present the operation of the education system with full samples and the whole process, covering the multi-dimensional behavior data of students' interests, hobbies and aspirations as the main body of education, so as to build a digital The new empirical education system and the intelligent evaluation system that perceives the all-round development of students have become new cognitive tools to discover, demonstrate and grasp the education laws and students' growth laws in the era of big data.

This study refers to the opinions of education experts at home and abroad and summarizes and integrates the evaluation index system of postgraduate education quality. Among them, the postgraduate factors include five indicators: the quality and ability of students, the proportion of papers published, the quality of

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graduation thesis, the level of scientific research projects and the level of foreign languages. Tutor factors include the tutor's age and professional title, tutor's educational background, teacher-student ratio, tutor's academic level, work attitude and sense of responsibility, and teacher-student relationship. School factors include the scientific nature of teaching management mechanism, subject quality, per capita experimental equipment, per capita books and subject funding. The social factor indicators include the employment rate within three months of graduation, the weighted average salary of graduates for three years and employer satisfaction.

In this study, the questionnaire survey method is used to collect data, and a postgraduate education quality index system is constructed. Based on the questionnaire, the postgraduate education quality evaluation index system and the importance of indicators at all levels are modified, referring to the scoring method 1-9 and its reciprocal standard. This survey uses a combination of online and offline questionnaires, and distributes the questionnaires through the domestic questionnaire platform, and organizes school graduate students, tutors, graduates, postgraduate education leaders, and employers to participate in the questionnaire. A total of 400 questionnaires are distributed, including 200 for graduate students, 50 for graduates, 50 for supervisors, and 100 for employers. Finally, 350 valid questionnaires are obtained, and the recovery rate is 87.5%, among them 180 for graduate students, 40 for graduates, 40 for supervisors, and 90 for employers.

After considering postgraduate factor indicators, tutor factor indicators, school factor indicators, social factor indicators and big data indicators, we have established an education system based on big data algorithms. The specific evaluation index system of postgraduate education quality is shown in Table 1.

Table 1. The evaluation index system of postgraduate education quality.

First-level indicator	Secondary indicators	Third-level indicator	Nature
Quality of graduate education	Graduate factors	Ability and quality	Including students' innovation ability, communication ability, teamwork ability, ideological and morality, theoretical basis, work ability, etc.
		Published paper level	The number and proportion of papers indexed by SCI, EI and ISTP per capita, and the number of papers published in domestic core journals per capita
		Dissertation quality	Number of outstanding papers/total number of dissertations
		Research project level	The number of scientific research projects per capita and the number of academic conferences per capita
		Foreign language level	The number of English exams passed/total number of students
	Mentor Factor	Mentor age and title	Proportion of young teachers to teachers = young teachers/total number of teachers. Teachers with senior professional titles = number of teachers above associate high school / total number of

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			teachers
		Tutor degree	The ratio of teachers with doctoral degrees to teachers = number of teachers with doctoral degrees / total number of teachers
		Teacher-student ratio	Number of tutors/numbers of graduate students
		Tutor's Academic Ability	Research achievements, research projects, and research funding scale
		Work Attitude and Responsibility	Guidance size, manner and frequency
		Teacher-student relationship	Satisfaction between teachers and students
	School factor	The scientific nature of teaching management mechanism	Sound teaching management organization, sound teaching rules and regulations, curriculum setting, training plan
		Subject level	Number of disciplines and majors, number of key disciplines and key laboratories
		Scientific research equipment per capita	Value of teaching and scientific research equipment per capita = total value of teaching and scientific research equipment / number of students
		Books per capita	The total number of books per capita / the number of students
		Per capita education expenditure	Education expenditure per capita = (total expenditure for the whole year minus those that have nothing to do with cultivating students
	Social factors	Three-month employment rate after graduation	Three-month employment rate after graduation = number of employees three months after graduation / total number of graduates
		Three-year weighted average salary after graduation	Three-year weighted average salary after graduation = total weighted salary / total number of graduates
		Employer satisfaction	Employers' evaluation of graduates' job performance, practical ability, and moral level
	Big data factor	Type of data collection	Learning information: learning process, educational resources, etc.; student personality

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			information: physiological data, cognitive emotional state
		data collection technology	The construction of intelligent universities, data dynamics and quality
		Data Mining and Analysis Technology	The use of data mining technology, visual analysis

System weight analysis

The concept of AHP

AHP is a multi-criteria decision-making method that deeply analyzes nature, influencing factors and internal relationships of complex decision-making problems. This method builds a multi-level structure model by combining qualitative and quantitative information and quantifies the thinking process of information acquisition through a certain limit of quantitative information, so that some complex decision-making problems such as multi-objective and multi-criteria problems can be solved. In this paper, the AHP is applied to the construction of the postgraduate education quality evaluation system, which is helpful to obtain more accurate evaluation results to reflect the postgraduate education quality. The postgraduate education quality index system is a multi-layer staggered evaluation index, and the target value in the system is relatively difficult to describe quantitatively. The use of AHP is to construct a judgment matrix and find the maximum eigenvalue to solve its decision-making problem.

Steps of analytic hierarchy process.

Build a hierarchical model. Based on in-depth analysis of practical problems, relevant influencing factors are subdivided into several levels from abstract to concrete according to their connotations and characteristics. From low to high, each level of factor has a subordinate upper-level factor, which affects the upper-level factor and affects the lower-level factor. The highest-level factor is the target layer, generally there is only one factor, there will be one or several levels of factors in the middle to further subdivide the target factor, and the bottom layer is the program layer or the object layer.

Construct a contrast matrix. For each level of factors between the target level and the program level, the method of pairwise comparison is used to compare the factors at the same level and the factors that are subordinate to each other, by using a comparison scale to determine the pairwise comparison matrix down to the lowest level, as shown in Table 2.

Table 2. Quantitative standard of judgment matrix.

Number	Explanation
1	The two factors are equally important in comparison
3	Compared with the two factors, the former factor is slightly more important
5	Compared with the two factors, the former factor is obviously more important
7	Compared with the two factors, the former is strongly important
9	Compared with the two factors, the former is extremely important

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2,4,6,8	Represents the median value of adjacent judgments

According to the sum method, we first sum up each column of the judgment matrix $\sum_{i=1}^{m} a_{ij}$, let $b_{ij} = \frac{a_{ij}}{\sum_{i=1}^{m} a_{ij}}$, so as to calculate $w_i = \frac{\sum_{i=1}^{n} b_{ij}}{n}$, so that $= (w_1, w_2, w_3 \cdots w_n)^T$is calculated, and normalized to get:

$$w_i = \frac{w_i}{w_J} \quad (1)$$

We calculate the maximum eigenvalue $'\lambda_{max}$of each matrix. In order to reduce the influence of subjective judgment on the accuracy of a_{ij} value and reduce the error, this paper adopts the method of calculating the consistency ratio CR to test the consistency of the matrix, and the consistency index CI needs to be calculated.

$$CI = \frac{\lambda_{max} - n}{n-1} \quad (2)$$

The average random consistency index RI is obtained from Table 3.

Table 3. Values of the average random consistency index ri.

n	3	4	5	6	7	8	9
RI	0.58	0.9	1.12	1.2	1.32	1.41	1.45

Consistency ratio is:

$$CR = \frac{CI}{RI} \quad (3)$$

When CR<0.10, it means that the judgment matrix is consistent, and when CR>0.1, it is necessary to adjust the judgment matrix to be appropriate.

Hierarchical total ranking generally refers to the ranking value obtained by calculating the relative importance of each factor at a certain level relative to all factors at the previous level. The process of checking the consistency of the total ranking of the hierarchy is the same as the total ranking of the hierarchy, and it is also carried out layer by layer from the highest level to the lowest level. If the single ranking consistency test index of several influencing factors in the C level relative to a certain influencing factor B_j in the previous level is C_{ij}, then the corresponding average random consistency index is R_{ij}, so the total ranking random consistency ratio of the C level is:

$$CR = \frac{\sum_{j=1}^{m} b_j CI_j}{\sum_{j=1}^{m} b_j RI_j} \quad (4)$$

By analogy, when CR<0.10, it can be considered that the results of the total ranking of the hierarchy have satisfactory consistency, otherwise it is necessary to readjust the judgment matrix to make it have satisfactory consistency.

Results and Discussion

The quality evaluation indicators of postgraduate education include quantitative and qualitative indicators. The organic combination of the two indicators can comprehensively and preparable evaluate the quality of postgraduate education. According to the conceptual connotation, influencing factors and relevant research results of postgraduate education quality, this paper selects the evaluation indicators of postgraduate education quality, and establishes a hierarchical model of postgraduate education quality through questionnaires. By taking a certain element in the postgraduate education quality evaluation system as the comparison criterion, the comparison between the two elements is carried out. According to the influence of different elements on the quality of postgraduate education, relevant experts in postgraduate education

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are invited to determine each indicator and its weight, and then according to the degree of influence of different elements on the quality of postgraduate education. These evaluation indicators are used to determine the judgment matrix.

Yaahp software is used to calculate the maximum eigenvalue and eigenvector of the comparative discriminant matrix, and the eigenvectors are normalized to obtain the relative importance weight coefficient and consistency ratio of the hierarchical single ordering. The weight coefficients of each factor of the secondary-level indicators are shown in Figure 1. Among them, the personal factor of postgraduate's accounts for the largest proportion of more than 0.4. The influence of graduate tutors is second, accounting for about 0.2. Figure 1 shows that in the context of the Internet, big data has a relatively large impact on postgraduate education, exceeding 0.1. It proves that it is necessary to integrate big data into the education system.

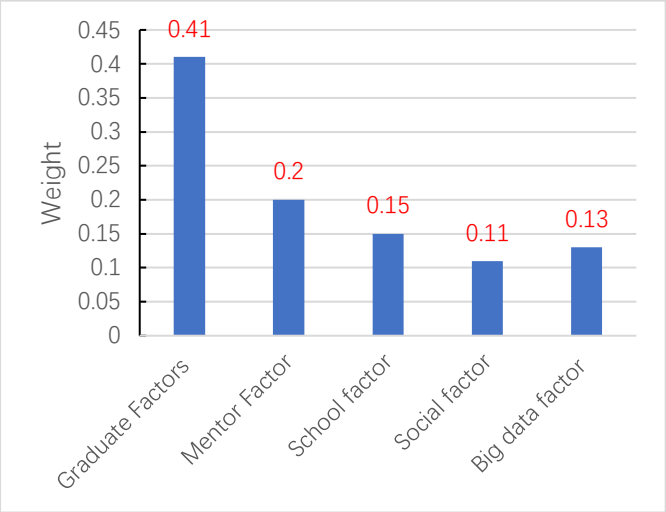

Figure 1. The weight of each secondary index factor.

We continue the analysis of the second-level indicators below each level of indicators, and the weights of the second-level indicators can be obtained. The results can be seen in Figures 2-6. Figures 2 to 6 show that the quality of papers, the academic level of teachers, the subject level of schools, the employment rate within three months of graduation, and data mining and analysis techniques are the most important factors that affect graduate students, tutor factors, school factors, social factor and big data factor, respectively.

In terms of graduate factors, the weight of dissertation quality is 0.27, which is higher than other factors, as shown in Figure 2.

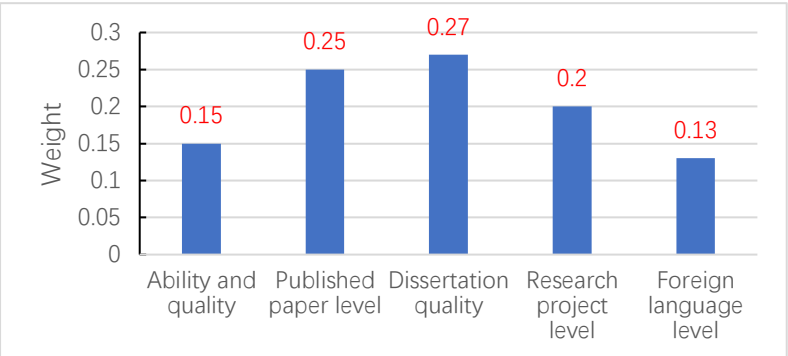

Figure 2. Weights of third-level indicators (graduate factors).

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As for the tutor factor, the weight of academic levels is 0.4, which is higher than other factors, as shown in Figure 3.

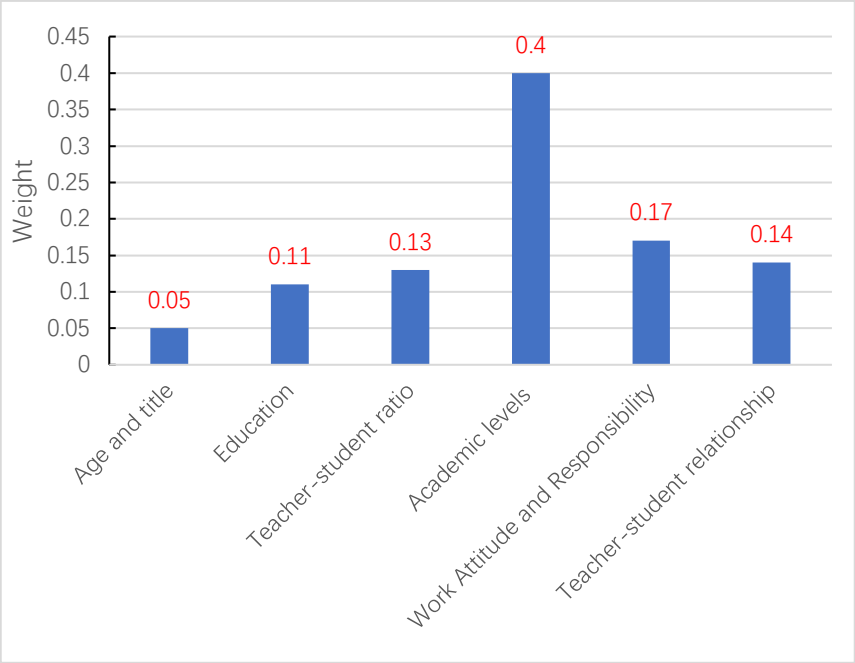

Figure 3. Weights of third-level indicators (tutor factor).

As far as the school factor is concerned, the weight of the subject level is 0.4, far exceeding other factors, indicating that the subject level is very important in the graduate student's system. As far as the big data factor is concerned, data mining and analysis technology accounts for the largest share, which is 0.45. As shown in Figure 4.

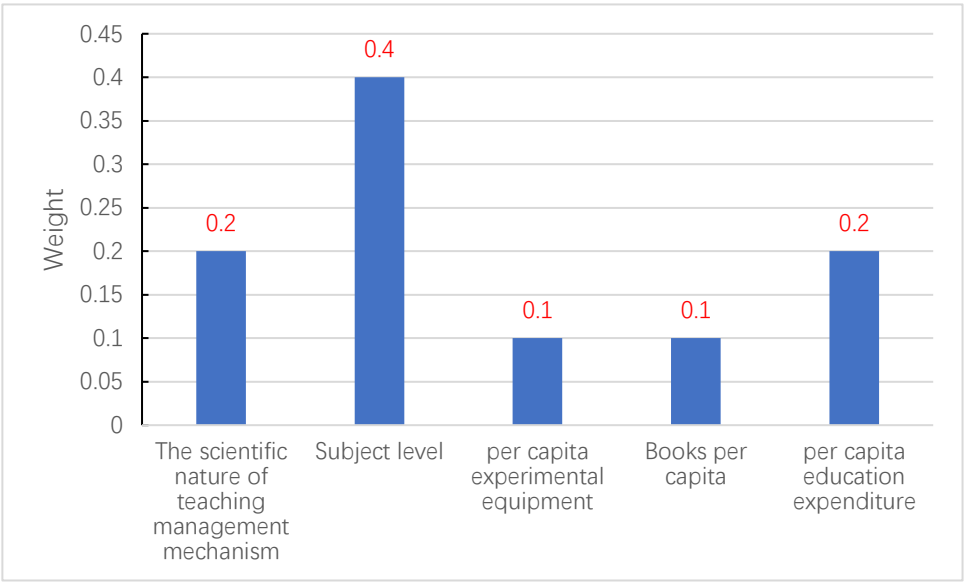

Figure 4. Weights of third-level indicators (school factor).

In terms of social factors, the weight of employment within three months after graduation is 0.55, which is higher than other factors, as shown in Figure 5.

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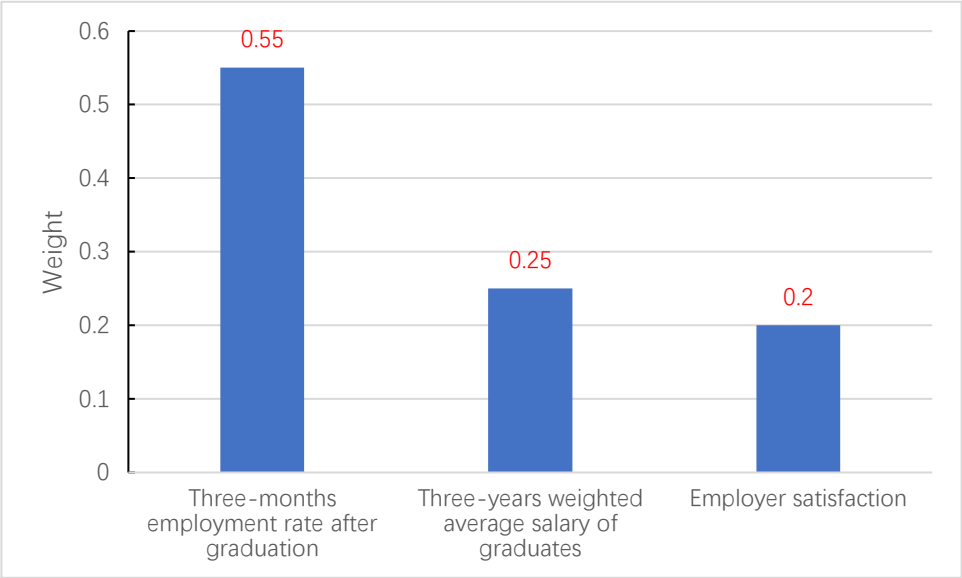

Figure 5. Weights of third-level indicators (social factor).

In terms of big data factors, the weight of data mining and analysis technology is 0.45, which is higher than other factors, as shown in Figure 6.

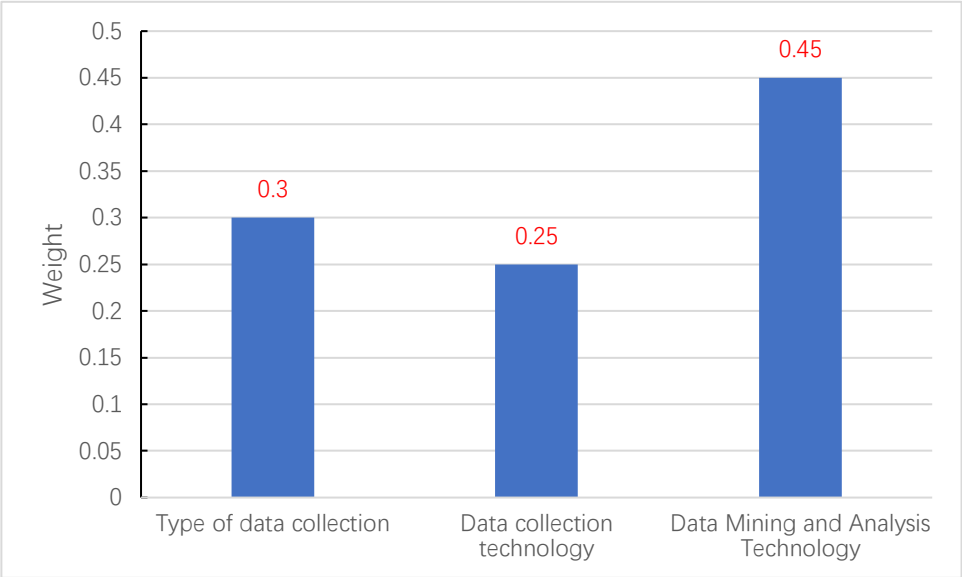

Figure 6. Weights of third-level indicators (big data factor).

According to the above-mentioned single ranking of the judgment matrix and the results of the weight coefficient assignment, the quality of postgraduate education can be calculated respectively.

The weight coefficient of the third-level index for the overall target in the weight coefficient of the quantitative comprehensive evaluation index is shown in Table 4. Table 4 shows that among all the influencing factors, the quality of graduate papers has the largest proportion.

Table 4. Weight system of comprehensive evaluation index of postgraduate education quality.

Criterion layer	Weight	Indicator level	Indicator weight
Graduate factor	0.41	Ability and quality	0.0615
		Published paper level	0.1025

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		Dissertation quality	0.1107
		Research project level	0.0820
		Foreign language level	0.0533
Mentor factory	0.2	Mentor age and title	0.0100
		Tutor degree	0.0220
		Teacher-student ratio	0.0260
		Tutor's Academic Ability	0.0800
		Work Attitude and Responsibility	0.0340
		Teacher-student relationship	0.0280
School factor	0.15	The scientific nature of teaching management mechanism	0.0300
		Subject level	0.0600
		Scientific research equipment per capita	0.0150
		Books per capita	0.0150
		Per capita education expenditure	0.0300
Social factors	0.11	Three-month employment rate after graduation	0.0605
		Three-year weighted average salary after graduation	0.0275
		Employer satisfaction	0.0220
Big data factor	0.13	Type of data collection	0.0390
		data collection technology	0.0325
		Data Mining and Analysis Technology	0.0585

Students not only play the role of the main body of postgraduate education services, but also an important main body of quality assurance. In fact, education is a service industry, and students play the dominant position of consumers and customers that cannot be ignored. Universities need to maintain their survival through the improvement of educational service level and service quality. Simply expanding the scale of education and ignoring the quality of education cannot survive. Students as education consumers need

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high-quality teaching services in return for tuition fees, which means that graduate education quality assurance and evaluation need to pay attention to students' opinions. However, in the actual education quality evaluation system, the students' subject position is not well concerned and reflected. This study shows that the factors of postgraduates themselves account for the largest proportion in the entire system, indicating that we need to increase the cultivation of postgraduates' own qualities.

Conclusion

With the rapid rise of China's artificial intelligence industry, with the rapid development of the Internet industry, a huge amount of data has been accumulated and the progress of data mining and utilization technology has been made.

Based on AHP, this paper constructs a comprehensive evaluation index weight system for postgraduate education quality. The evaluation index is an organic combination of quantitative and qualitative indicators, which can comprehensively and prepare to evaluate the level of postgraduate education quality under the Internet background.

The quality of papers, the academic level of teachers, the subject level of schools, the employment rate within three months of graduation, and data mining and analysis techniques are the most important factors that affect graduate students, tutor factors, school factor, social factor and big data factor, respectively.

Acknowledgements

This work was supported by the financial supports from Humanities and Social Science Planning Project of Universities in Jiangxi Province of the year 2020《Research on virtual and practical teaching methods of Ideological and Political Theory courses on the basis of VR in universities》(Grant No:JC20111); and Planning Project of University Party Construction in Jiangxi Province of the year 2020《Research on Pattern Construction of VR+ Intelligent Party Building Positions》(Grant No: 20DJYB049)

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https://doi.org/10.71052/geb2025/XTRC7964 https://www.wonford.com/

Artificial Intelligence-Based Teaching Practice of College Art and Design

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Abstract

The new situation of social and economic development in China today is increasingly demanding the ability of art and design, and the connotation of art and design education practice in colleges and universities has been extended and expanded. Since art and design in colleges and universities is a comprehensive discipline based on the collaboration of art, humanities and science and technology, it requires practitioners to have innovative and complex qualities. Nowadays, artificial intelligence has been involved in many disciplines, and artificial intelligence itself has a lot in common with art and design, while the field of education is also undergoing a profound innovation under the influence of artificial intelligence. In view of this, this paper takes the teaching practice of art and design in colleges and universities under the background of artificial intelligence as the research topic and analyzes the deep impact of artificial intelligence on the teaching practice of art and design from the paradigm level. It not only breaks the historical and progressive research on teaching practice, but also provides a new research perspective for the development of teaching practice, and thus promotes the deep integration of AI technology and college art education practice. This study integrates literature research method and case study method to investigate the impact of AI on various elements of art and design teaching practice in colleges and universities, and whether this impact will reach the paradigm level. The paradigm of art and design teaching practice and its migration are studied and analyzed, and a paradigm migration model from multimedia teaching practice to information teaching practice and finally to intelligent teaching practice is constructed, and typical application cases under the guidance of intelligent art and design teaching practice paradigm are detailed. This initiative can provide new ideas and reference implications for future intelligent teaching practice.

Keywords

Artificial intelligence, Universities, Art and design, Teaching practice, Paradigm shift

Introduction

The rapid development of artificial intelligence leads human beings to enter the intelligent era in advance, and a series of policy documents related to artificial intelligence education provide strategic support for the development and reform of the field of art design teaching practice in colleges and universities [1,2]. In the field of teaching practice, teaching practice can effectively link theory and practice [3], and in view of this, this paper takes the teaching practice of art design in colleges and universities in the context of artificial intelligence as the research topic. In addition, paradigms have epistemological and methodological dimensions, and the analysis from the paradigm level can provide a deep research perspective on the impact

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of AI on art and design teaching practice, in order to further promote the deep integration of AI technology and art and design teaching practice and realize the concept of education informatization 2.0.

Leading of the times

Artificial intelligence provides a lot of opportunities for the development of many fields, and its important role has attracted great attention at home and abroad, and many countries have formulated policies and plans to upgrade artificial intelligence into national strategies. The United States has promulgated the "Preparing for the Future of Artificial Intelligence" and the "National Strategic Plan for Artificial Intelligence Research and Development" [4,5]; the European Commission has formulated the SPARC Robotics Innovation Program; the British and German governments have formulated the "Modern Industrial Strategy" and the "Industry 4.0 Plan" [6]; the Korean government established AI Star Lab in 2015, and AI became one of the five key areas of national research [7]; the Japanese government planned the route of AI industrialization and deployed a super-intelligent society [8]. Our government has also intensively issued relevant plans, such as the Three-Year Action Plan for Promoting the Development of a New Generation of AI Industry (2018-2020), the Three-Year Action Plan for Implementing Internet + AI, the Development Plan for a New Generation of AI, and the Action Plan for Promoting the Development of Big Data [9,10]. The promulgation of a series of policies at home and abroad signifies that humanity is about to move towards the era of intelligence. Along with the opportunities brought by AI, researchers of art and design teaching practice in colleges and universities also need to promote changes and innovations in this field to achieve the integrated development of technology and art and design teaching practice.

Development of art and design teaching practice

In March 2012, the Ministry of Education issued the "National Medium and Long-term Art Education Reform and Development Plan (2010-2020)", which proposed that information technology has a revolutionary impact on the development of art and design teaching practices and must be given high priority, while artificial intelligence belongs to the new generation of information technology. "Intelligent education" became an important part of the national strategy of AI. The Action Plan for Education Informatization 2.0 issued by the Ministry of Education in April 2018 clearly proposes to promote the change of art and design teaching practice model and ecological reconstruction with the support of artificial intelligence, big data, Internet of Things and other emerging technologies, officially and comprehensively initiating the modernization of education. In terms of talent cultivation in the field of artificial intelligence in colleges and universities, the Ministry of Education formulated the Action Plan for Artificial Intelligence Innovation in Higher Education in April 2018. These policies related to the field of college art and design teaching practice not only provide strategic support for the development of AI education in China, but also urgently require art and design teaching practice to make changes, actively explore the application of AI technology in promoting innovation in art and design teaching practice and optimize the talent cultivation mechanism.

On the other hand, social transformations and technological developments in the context of artificial intelligence require new perspectives to understand art and design and facilitate the migration of pedagogical practices. Pedagogical practice is an important component of the educational system. These transformations have led to significant changes in both the connotation and the extension of teaching practice, potentially leading to a paradigm shift in teaching practice. Second, instructional practices have their origins in the experiences of a group of educational psychologists who conducted training design during World War II, following the claims of systems engineering and behaviorist learning theory. However,

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as nonlinear learning and new technology-supported learning styles continue to emerge, the systematic design of instructional practices, which has always been highly sensitive to technological developments, also requires new content, new perspectives, and new research directions. Therefore, it is necessary to focus on the application of technology in teaching practice and how to create teaching practice system design supported by artificial intelligence technology, so as to meet the needs of times and human development and show the picture of teaching practice innovation that technology may bring.

This paper elaborates the connotation of artificial intelligence and art design teaching practice from the perspective of artificial intelligence, analyzes the correlation between both artificial intelligence and art design teaching practice, and explores the specific migration process of art design teaching practice paradigm in the context of artificial intelligence. It should be noted that, in this study, artificial intelligence is mainly understood as a technological factor, i.e., the teaching design of the intelligent stage is studied from the perspective of technological change migration process. On this basis, the key features of this intelligent art and design teaching practice at the paradigm level are explored, and the paradigm migration model of art and design teaching practice from the technological perspective is summarized. Finally, a typical case of intelligent teaching practice paradigm for art design instruction is elaborated.

Research materials and methods

Literature research method

The literature research method mainly refers to the method of forming a scientific understanding of facts through the collection, identification, classification, and study of literature. This paper uses the literature research method to sort out the relevant research literature on the teaching practice of AI art and design at home and abroad and affirms the necessity of research from the perspective of paradigm and teaching practice. On this basis, through the interpretation of literature, the impact of AI on art and design teaching practice, the paradigm and its migration analysis framework, the connotation of the migration of teaching practice paradigm and the specific migration process of art and design teaching practice paradigm under this technological change perspective in the context of AI are determined.

Case study method

Combining the typical cases of AI art design teaching practice application and the influence of AI on teaching practice, the study analyzes the influence of AI technology on each element of art design teaching practice, followed by detailing the typical cases of AI teaching practice application in the context of teaching design paradigm migration, and discussing the guiding significance of intelligent teaching design paradigm for art design in the context of AI.

Results and Discussion

Connotation of related concepts

(1) The connotation of artificial intelligence

Artificial intelligence is a comprehensive discipline that studies the use of computers to mimic and extend the functions of the human brain. The study of artificial intelligence has its roots in the vision of Turing, the father of computing, in 1950: Can machines really think? The widely recognized origin of AI is the Dartmouth Conference in 1956. More recently, artificial intelligence re-emerged in 2006 due to the success of deep learning algorithms. According to the strength of AI can be divided into three categories: weak AI, strong AI, and super AI. Weak AI refers to AI that is only good at a particular aspect, mainly human explicit

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intelligence. And the current research of AI is gathered in that type. Strong AI is human-level AI that is comparable to humans and possesses and manifests manifest intelligence. Super AI is the intelligence that is ahead of humans and can cover almost all fields of intelligence.

In the field of teaching practice, AI has its unique applications and promising prospects, in addition to assisting teachers in their teaching work through traditional techniques such as image and speech recognition and semantic analysis. Artificial intelligence has different application forms in the field of teaching practice, and there are differences in the division of AI systems in this field by different researchers. One view is that AI systems in the field of teaching practice mainly include intelligent teaching systems, intelligent agents, intelligent question-answering systems, and intelligent decision support systems. Some scholars also classify AI into four major application forms: intelligent tutor systems, automated assessment systems, educational games and educational robots. Combining the above application morphology classification, the author divides the application morphology of AI in teaching practice into two application morphologies, subjective and supportive, based on Kunying Zhang's model on the integration of AI technology and education and Zhixian Zhong's support morphology of technology in the framework of teaching practice, as shown in Figure 1.

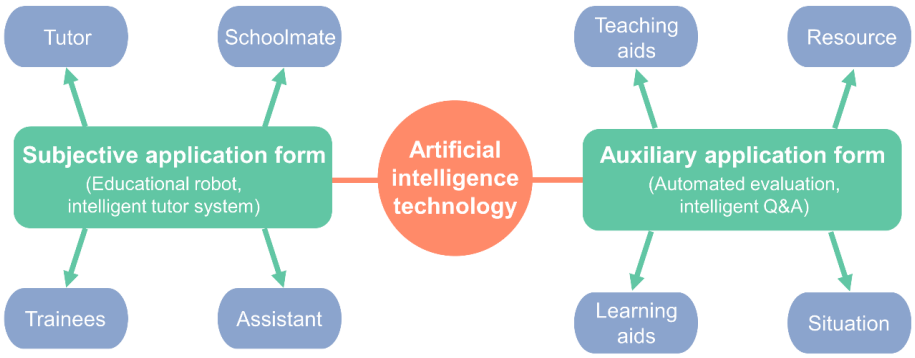

Figure 1. Application form of artificial intelligence in art and design teaching practice.

(2) The connotation of art and design teaching practice

There are mainly four different understandings of the connotation of art and design teaching practice. One understanding is that art and design teaching practice is the process of systematically planning or preparing art and design teaching, represented by Gagne, Kemp, Regan, Umena, and Heke Resist. The second understanding is represented by Merrill, who believes that art and design teaching practice is a secondary development technique for the learning experience and objective environment in previous art and design. The third understanding regards art and design teaching practice as an art and design science of teaching practice, the most representative of which is Paton's What is Teaching Practice. Some other scholars understand art and design teaching practice as a performance optimization technique. In general, the most essential and necessary aspect of art and design teaching practice is the continuity of teaching practice, that is, teaching practice is a continuous "action" or "process" rather than just an outcome or effect.

This study adopts the definition of art and design teaching practice by He Ke-kou, which has a high recognition in China. Art and design teaching practice is the application of a systematic approach to convert the principles of learning and teaching theories into specific plans for teaching objectives, teaching contents, teaching methods, teaching strategies and teaching evaluation in art and design, creating a systematic "process" or "procedure" for teaching and learning. ". Art design teaching practice is different from pedagogy. The disciplinary theory that directly guides pedagogy plays an indirect role in art design teaching

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practice, while technical rationality plays a direct role. In addition, it is aimed at art and design activities in the teaching process, rather than mainly studying the nature of teaching and learning and the laws of teaching.

The impact on art and design teaching practice in the context of artificial intelligence

To explore the impact of art and design teaching practice in the context of artificial intelligence, the efficacy of technology on teaching practice is largely achieved by transforming it into teaching resources, tools, media or environments. Based on the seven elements of instructional design, including students, teachers, purposes, curriculum, methods, environment and feedback, this study analyzes the impact of artificial intelligence on art and design teaching practice in the context of the impact and typical applications of artificial intelligence, mainly from two aspects: teaching subjects and objects (students and teachers) and teaching media. The influence of artificial intelligence acts indirectly on teaching objectives and directly on the other five elements, as shown in Figure 2.

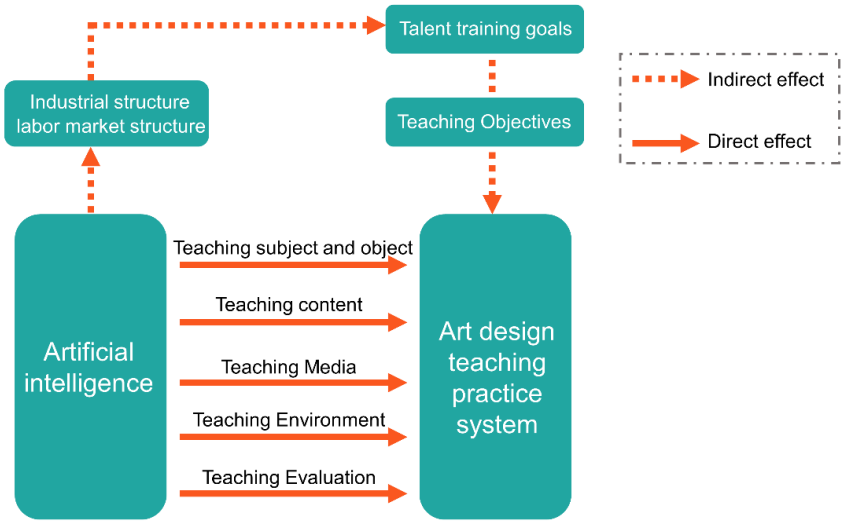

Figure 2. Impact of artificial intelligence on art and design teaching practice system.

Impact on teaching subjects and objects

The development of the teaching subject has gone through the teacher-only subject, student-only subject, double subject theory, dominant subject theory, three-body theory, subject-object transformation theory, and composite subject-object theory, as shown in Table 1. But no matter which theory, the core elements in the teaching system are still teachers and students. The advent of artificial intelligence not only changes the participation of traditional teaching subjects and objects and the ownership of information resources, but also replaces teachers and students with some application forms to a certain extent and plays a key role in the teaching system, so that the traditional teachers and students as the core teaching subjects and objects turn to the teaching subjects and objects with artificial intelligence, teachers and students as the core.

Table 1. Categories of teaching subjects.

Type	Content
The only subject of the teacher	Teacher is the subject, students, teaching content, etc. are the objects
Students only subject	Students are the subject of the teaching process

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Dual-body theory	Both teachers and students are the subjects in the teaching process
Dominant subject says	Teacher is the leader; students are the main body
Trinitarianism	It is emphasized that the teaching process should not only consider teachers and students, but also other factors. The triadic theory focuses on the interaction between the teacher, the student, and the environment.
Host-guest transformation says	There is a subject-object relationship in teaching, and this relationship is not set in stone, but can be interchanged.
Compound subject-object theory	The subject and object in teaching are intertwined and composite in nature.

The impact of AI on the teaching subject-object is in the form of the role assumed by the applied form of AI subjectivity in the teaching system. The following is the structure between the subject-object of teaching and learning in the context of AI.

Scenario 1: The role of artificial intelligence for teachers

The first analysis of AI as a teacher's assistant, the teaching subject structure diagram is shown in Figure 3. The teacher uses the AI assistant, and it can take the initiative to assign teaching contents according to the personalization of teaching subjects. Learners get the learning content adapted to their cognitive ability through the AI assistant. As students learn, the AI assistant provides feedback to the teacher on the problems of each student and the learning situation of the whole class. For the learning content at the next cognitive level, the AI assistant can also take on the task activities of decision support, answering questions and solving problems, and correcting assignments, thus allowing teachers to devote more energy to designing innovative teaching activities, focusing on students' development, and cultivating students' learning abilities at higher cognitive levels. In the process of developing higher-order competencies, direct interactive behaviors occur between teachers and students.

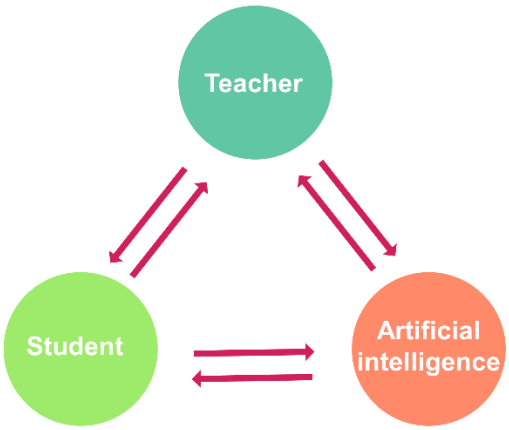

Figure 3. Structure diagram of teaching subject and object.

In addition, when AI acts as a teacher's learning companion, it can help teachers achieve peer-to-peer teaching problem identification and mutual improvement so that teachers can understand their problems in teaching and research; as a teacher's trainee, AI robots can also play the role of students. The structure diagram of the teaching host and guest is shown in Figure 4.

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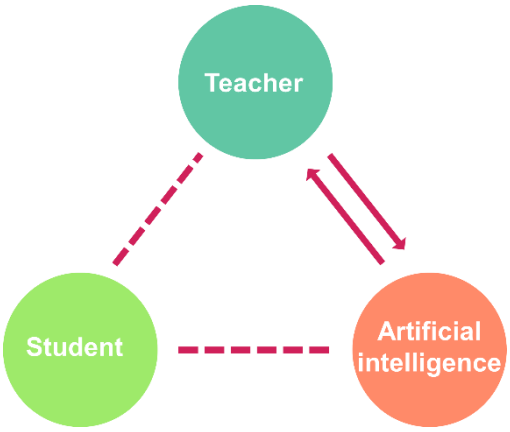

Figure 4. Structure of teaching subject and object.

Scenario 2: Artificial intelligence for students

For students, AI can act as an intelligent tutor to track, record and analyze learners' learning process in real time, so as to understand each student's learning characteristics, push personalized learning resources for each learner and make a learning plan in line with their own development; in addition, AI can also act as an assistant for students' learning, helping them plan their learning tasks and time effectively, and promote students' learning through the friendly cooperation to promote students' learning. The structure diagram of the teaching body is shown in Figure 5.

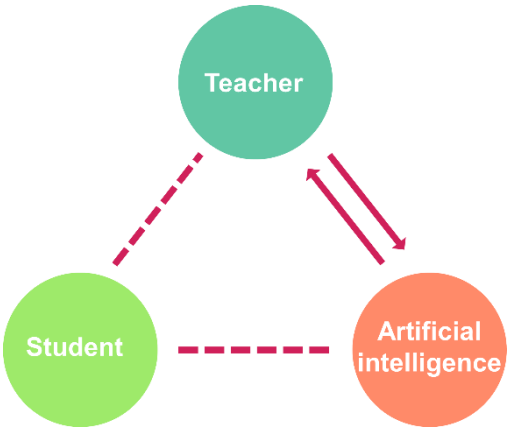

Figure 5. Structure of teaching subject and object.

Impact on teaching media

The teaching process is a process of collecting, processing, handling and using information, and the media used in this process are called teaching media. Instructional media carry not only the most basic educational information but also the most basic teaching resources, and as one of the components of the teaching practice system, they symbolize the degree of development of educational modernization. The creation of textbooks, the use of visual aids, the emergence of audiovisual materials, and the invention of multimedia computers and integer trees are four important leaps in instructional media, all of which are significantly related to the development of technology. And human intelligence, as a revolutionary technology, is bound to influence the instructional media.

Information technology in a broad sense includes coding technologies such as language and writing (including digital) as well as printing technology, media technology (film, recording, radio, television, etc.), computer network technology (conventional digital information processing and transmission technology),

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and artificial intelligence technology (knowledge processing technology). The development of various technologies has also had an impact on teaching media, making the variety of teaching media increasingly rich, as shown in Table 2.

Table 2. Impact of technology on instructional media.

Technology	Teaching Media	Teaching Form
Printing Technology	Textbooks, blackboards, chalk	Traditional Teaching
Media Technology	Slides, TV, film, video, radio	E-learning
Computer Communication Technology	Computer, Internet, mobile terminal, virtual reality, augmented reality	Digital Teaching
Artificial Intelligence Technology	Intelligent teaching system, educational robot	Intelligent Teaching

Nowadays, neither printing technology nor media technology has changed the subject position of human beings in knowledge practices, and computer communication technology has only achieved shallow automation of knowledge practices. Future artificial intelligence technologies are likely to replace the subject position of individual human beings in knowledge practices, prompt deep automation of certain knowledge practices, reduce the burden of teachers, and, at the same time, effectively control the learning process of individualized students with respect to their learning situations.

Migration of art and design teaching practice paradigm

This study proposes using Thomas Kuhn's four components of paradigm, symbolic generalization, beliefs committed by community members, values, and paradigms, as an analytical tool for determining paradigm shift, as shown in Figure 6, to provide a basis for determining whether paradigm shift has occurred in art and design teaching practice. It should also be noted that although the descriptive scientific theory does not include the theory of teaching practice, the theory of teaching practice itself has the characteristics of science, so it is also an effective means to examine whether the migration of the paradigm of instructional design is logically justified by Kuhn's "paradigm migration theory" which is proposed for the content of scientific theory.

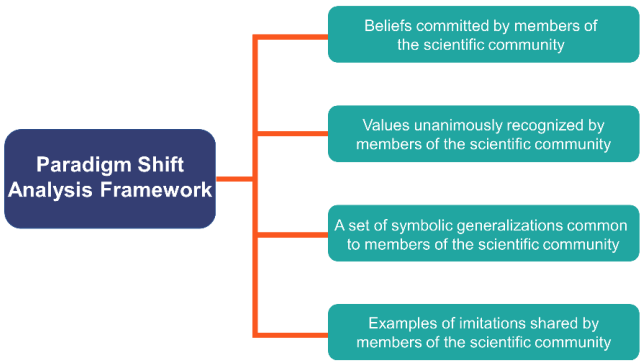

Figure 6. Paradigm shift analysis framework.

Migration of art and design teaching practice paradigm in the context of artificial intelligence

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This paper summarizes the key features of the four elements of paradigm composition to analyze the paradigm migration of art and design teaching practice in the context of artificial intelligence.

Beliefs to which Community members have committed

As can be seen from the previous section, AI technology has a profound impact on all elements of the instructional system, integrating and transcending the previous role of technology in the design of instructional systems to assume the roles of instructional media and instructional tools. Therefore, the belief of the new art design teaching practice paradigm integrates the characteristics of the media view of multimedia teaching practice and the tool view of information technology teaching design, which is called the ecological view in this study. The essence of the ecological view in this paper is to extend the theory of system ecology to art teaching practice and educational artificial intelligence collage, hoping that artificial intelligence technology has an all-round influence on the teaching practice system in the form of subjective and auxiliary applications, forming an ecological environment conducive to the integration of artificial intelligence technology for teachers to implement efficient teaching methods and learners to obtain personalized learning services and good development experiences, so as to realize technology This will enable the deep integration of technology and education, and achieve the purpose of cultivating the talents required by the times.

Values agreed upon by the members of the community

The core value shared by the members of the community of multimedia teaching practice paradigm is to maximize the effectiveness of teaching and learning by using art and design teaching practice as a delivery technique to transfer objective knowledge and skills to learners with maximum effectiveness. The value of information-based instructional design is to put the learner at the center, encourage active participation, and optimize the teaching and learning process. Specifically in the context of artificial intelligence, the greatest advantage of art and design teaching practice lies in making full use of the advantages of big data, cloud computing, artificial intelligence and other intelligent technologies to build an ecological teaching system that integrates technology, thus improving the personalization and precision of education and teaching.

A set of "symbolic generalizations" shared by the members of the community

The paradigm shift in art and design teaching practice in the context of artificial intelligence will have implications for the theoretical foundations of teaching practice. This study combines an examination of the meaning of paradigms and two major learning theories, connectionism and neo-constructivism, in an attempt to abstract symbolic generalizations shared by members of a community in the context of artificial intelligence. Neo-constructivism suggests that learners need to learn to choose and filter knowledge information based on their personal needs or personal interests. Strong connections and meaningful constructions are established for that soft knowledge that is closely linked to personal needs or interests. Learners acquire knowledge based to some extent on subjective judgments, i.e., connected learning of knowledge that is useful to them. At the same time, learners still need to continuously engage in the construction and refinement of knowledge in the context of artificial intelligence. By fusing the connotations of the two theoretical foundations, the symbolic generalization of the new art and design teaching practice paradigm is transformed from the previous static and stable representation to a dynamic, multipoint-to-multipoint networked nonlinear form.

Examples common to community members that can be imitated

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Paradigm-wise, many scholars have discussed the art design teaching practice model under this paradigm, for example, the Robotics Center of Zhengqing Institute of Green Intelligent Technology, Chinese Academy of Sciences, developed the humanoid service robot being developed as an art design teaching robot to initially build a constructivist-based robot-assisted teaching model and proved the effectiveness of this teaching design model. NETP20l0 proposes a technology-based Connected Teaching Model (CTM), which aims to reconstruct an effective teaching model, hoping that with the power of technology, anyone, anytime, anywhere, can connect learners, educators, learning tools, learning resources, and learning environments to obtain the most effective, simple, and powerful learning support and services. And artificial intelligence technology is the technological foundation for this purpose.The above analysis shows that the four components of the paradigm of art design teaching practice in the context of artificial intelligence are already significantly different from the paradigm of multimedia art design teaching practice and the paradigm of information art design teaching practice in the intelligent stage, as shown in Table 3. Therefore, this study believes that artificial intelligence has produced paradigm migration for art design teaching practice. However, the paradigm migration does not mean replacement, nor does it mean that the previous art design teaching practice paradigm has no advantage. Each art and design teaching practice paradigm has different emphasis in terms of value, and it is enough to choose the most suitable one for the development of education and teaching according to teaching needs, teaching resources and students' characteristics

Table 3. Migration model of art and design teaching practice paradigm.

Mode	Technical Features	Paradigm			
		Beliefs	Value	Symbols	Paradigm
Multimedia teaching practice	Appear in teaching media	Media View Use of technology	Maximize the efficiency of knowledge transfer	Stable linearity	Multimedia portfolio design
Information-based teaching practice	Not only in the teaching media, but also to some extent in the teaching methods and pedagogy	Tool View Utilization of technology	Encourage learners to actively participate in knowledge construction	Stable nonlinearity	Blended learning, flipped classroom
Intelligent Teaching Practice	The productivity form of technology acts on the subject and object of teaching practice, trying to	Ecological view Human-machine	Improve personalization and	Dynamic nonlinearity	Technology-based Connected Teaching Model,

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	achieve the full penetration and integration of teaching objectives, teaching content, teaching environment and other system elements with information technology.	integration	precision of education and teaching		Constructivist-based Robotics Assisted Teaching Model

Typical cases of intelligent art design teaching practice

In this section, we explore the implications of the typical application of the "paradigm" of intelligent art and design teaching practice. Since the influence of AI on teaching objectives, teaching media and teaching contents is often integrated with other teaching practice elements, the exemplary application scenarios are not obvious. Therefore, we mainly explore the typical cases of the influence of AI technology on the subject and object elements of art and design teaching practice under the guidance of intelligent teaching practice paradigm, as shown in Table 4.

Table 4. Typical cases guided by the intelligent instructional design paradigm.

Artificial intelligence application form	Elements of teaching practice	Typical cases	Features
Subjective application forms	Mentor (Teaching subject-object change)	Arizona State University's Art and Design and Knewton Adaptive Learning System	Personalized teaching and individualized instruction
	Trainees (Teaching subject-object change)	Betty's Brain, created by Vanderbilt University's Teacher Agents Group	
		Nao developed by Aldebaran Robotics	
	Learning Companion (Teaching subject-object change)	Austin Peay State University's Degree Compass personalized art and design program recommendation system	
	Assistants (Teaching subject-object change)	Artistic Alex AI chatbot teaching assistant at Technical University of Berlin	Personalized services to improve the efficiency of education and teaching
		Robotics Assistant Professor in Art and Design at Georgia Tech	
		Open Science Lab at the Open University in the UK	

The above briefly discusses the case of AI art and design teaching practice from the subjectivity application form, followed by an in-depth analysis of the case of Arizona State University's active learning and

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Knewton adaptive learning system.

Since 2011, Arizona State University faculty have used a model of teaching practice based on B1oom classification to subvert the traditional lecture-dependent learning approach and introduce an intelligent teaching application that combines adaptive technology with art and design, as shown in Figure 7. At the bottom of the pyramid, the machine is the main body, mainly using artificial intelligence technology and adaptive technology to help students complete some art and design challenges. In the upper part of the pyramid, the teacher is the main body, mainly carrying out learning communication with students on higher-order abilities.

In this teaching process, technology in its productivity form has an impact on the subject and object of teaching design elements, and the teaching subject and object are changed from teachers and students to teachers, students and artificial intelligence, and through the interaction form of human-computer integration, teachers have ample energy to implement efficient teaching methods and learners can get personalized learning services. By building an ecological environment of human-computer integration, the personalization and precision of education and teaching are enhanced, and the deep integration of technology and education is gradually realized.

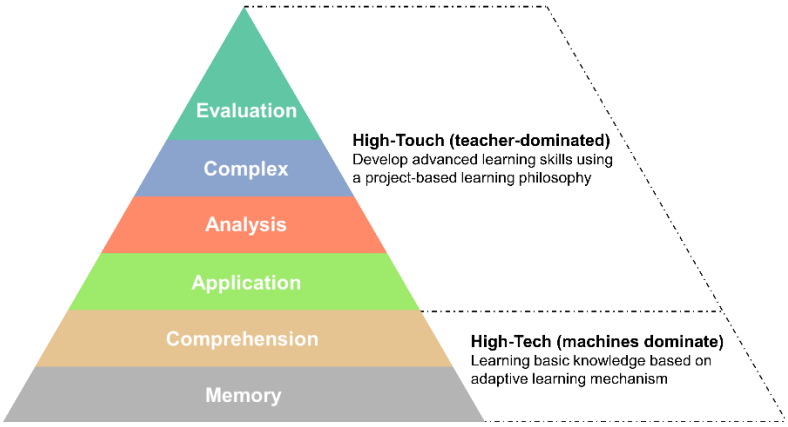

Figure 7. Hierarchy of smart education applications at Arizona State University.

More than 65,000 students at Arizona State University all use the adaptive learning system, and 12 courses use the adaptive system to some extent. In the university's Introduction to Art and Design class specifically, instruction used to take place in a lecture format, with dropout rates hovering around 10% and about 77% of students achieving a C or better. Now, however, through adaptive technology and the synergy of faculty in teaching activities, student motivation has generally increased, with the drop rate dropping to 5% in spring 2016 and 91% of students scoring a grade of C or better.

Through the above case study, the large-scale application of AI technology in the field of art and design teaching practice has brought new life to traditional school teaching practice. In the future, schools will shift from large-scale teaching models to more innovative and student-centered personalized teaching. With the support of AI technology, we can realize the educational ideal of personalized education and teaching according to students' abilities that we have been pursuing.

Conclusion

(1) This paper discusses the meaning of artificial intelligence and its subjective and auxiliary application forms in art and design teaching practice. Next, the basic meaning of art and design teaching practice and the elements of teaching practice are stated. On the basis of these two parts, the impact of AI on teaching

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subject and object and teaching media is analyzed. Among them, the impact of AI on the teaching subject and object is the role played in the teaching system by the role assumed by the subjectivity application form of AI. In addition, AI may replace the subjectivity of individual human beings in knowledge practices and contribute to the deep automation of certain knowledge practices.

(2) This paper adopts Thomas Kuhn's four components of paradigm, symbolic generalization, beliefs committed by community members, values and paradigms, as an analytical tool to determine whether paradigm shift has occurred in art and design teaching practice. The paradigm of art and design teaching practice has different emphasis in terms of values, and it is necessary to choose the most suitable model for the development of education and teaching based on teaching needs, teaching resources and students' characteristics.

(3) Through the typical case of intelligent art and design teaching practice, it can be seen that the large-scale application of artificial intelligence technology in the field of art and design teaching practice can bring new vitality to traditional school teaching practice. Realize the education concept of personalized education and teaching according to the material.

Acknowledgements

This work was not supported by any funds. The authors would like to show sincere thanks to those techniques who have contributed to this research.

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