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Teaching Practices for the Cultivation of "AI + X" Composite Talents in Higher Education: Challenges and Strategies

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Abstract: The rapid advancement of artificial intelligence (AI) technology has significantly impacted the higher education sector, creating an urgent demand for composite talents equipped with interdisciplinary knowledge. The cultivation of "AI + X" talents, combining AI expertise with various domain-specific skills, has been increasingly recognized as a critical educational goal. This study explores the development and implementation of teaching practices aimed at fostering such composite talents in higher education institutions. The growing integration of AI into diverse fields necessitates the construction of a robust curriculum that combines AI technology with other disciplines, thereby enhancing students' interdisciplinary capabilities. A comprehensive literature review and experimental research methods were employed to analyze both domestic and international trends in AI-related talent development. Additionally, a predictive model of student learning performance was developed through exploratory data analysis (EDA) and machine learning (ML), with results validating the efficacy of linear regression models in performance prediction. The research identifies key strategies for enhancing teaching practices, including reinforcing theoretical and technological knowledge, promoting personalized and practical teaching approaches, strengthening foundational disciplinary learning, and encouraging cross-disciplinary synergies. These strategies were designed to enhance students' critical thinking and practical competencies, with the aim of preparing them for the complex challenges of a rapidly evolving workforce. Furthermore, the paper discusses how AI-driven educational reforms can support the development of key industries, such as smart cities, smart finance, and the broader digital economy. The findings suggest that integrating AI technology into educational practices is essential for the effective cultivation of "AI + X" talents. However, significant challenges remain, including the scarcity of educational resources and the need for more contemporary teaching methodologies. Further research is required to refine talent training systems and to optimize institutional mechanisms, ensuring that higher education institutions can meet the demands of future technological and economic transformations. Through sustained educational innovation, it is envisaged that a new generation of innovative and versatile professionals will be equipped to contribute to societal advancement.

Keywords: AI + X; Teaching practice; Composite talents; Educational reform and innovation; Higher education institutions; Interdisciplinary learning

1. Introduction

1.1 Background of the Study

1.1.1 Research trends

The rapid development of AI is profoundly changing the field of education with a wide range of applications from smart driving to smart healthcare to smart homes. AI technology is gradually integrating into all aspects of social life. Especially in the field of education, the application of AI technology has a broad prospect, which not only improves the quality and efficiency of education but also provides students with a more personalized learning experience (Wang et al., 2024). In terms of policy orientation, governments are actively promoting the application

of AI technology in education. For instance, the Chinese government has incorporated AI education into its national strategy and promoted the application and development of AI technology in education by formulating relevant policies and plans. The United States has also released the "National Strategic Plan for AI Research and Development," which emphasizes the importance of AI education and puts forward corresponding strategies for talent cultivation (Wang, 2023).

In terms of teaching practice, the application of AI technology is expanding. To be specific, through intelligent teaching systems, teachers can carry out teaching design and management more effectively, while students can obtain personalized learning resources and paths through intelligent learning platforms (Hu, 2023). In addition, AI technology can also be used for teaching evaluation, providing feedback to teachers by analyzing students' learning data and helping teachers adjust their teaching strategies in a timely manner. The application of AI technology also faces challenges in talent cultivation. With the rapid development of technology, the demand for AI professionals is also increasing. Therefore, the education system needs to be constantly updated and improved to cultivate talents who can adapt to the future development of society. This includes introducing AI-related courses at the basic education level and offering AI specialties at the higher education level to cultivate high-end AI talents (Zawacki-Richter et al., 2019).

Overall, the application of AI technology in education is promising, and it will bring profound changes to education. However, it also requires the education system to constantly reform and innovate to adapt to this change. At the same time, attention needs to be paid to the ethical and social issues that may arise during the application of AI technology to ensure the healthy development of the technology. In the future, with the continuous progress of AI technology, it is expected that it can play a greater role in the field of education and make a greater contribution to the cultivation of talents in the new era.

1.1.2 Status of research

China attaches great importance to the construction and development of AI, and is actively seizing this major strategic opportunity in an attempt to establish a first-mover advantage in the field of AI. According to the "New Generation AI Development Plan" issued by the State Council, AI has gradually become a national strategy, and the domestic AI industry has therefore ushered in a period of rapid development. The plan clearly puts forward a three-step strategic goal, aiming to promote the theory, technology and application of AI to reach the world's leading level by 2030 and to make China one of the world's major AI innovation centers.

In 2024, for the first time, the "AI+" initiative was proposed in the Chinese government's work report, indicating that the Chinese government views the digital industry as a key driver of economic and social development, and that this initiative will help promote the innovative development of the digital economy. In recent years, China has issued a series of related policy documents, such as "AI and Education: A Guide for Policymakers" in 2021, "Guiding Opinions on Accelerating Scenario Innovation to Promote High-Quality Development of the Economy with High-Level Application of AI" issued by the Ministry of Science and Technology (MOST) and six other ministries in 2022, and the "Beijing Municipal Action Plan for Promoting AI Plus" (2024-2025) issued by Beijing in 2024, all of which focus on promoting the deep integration of AI with various industries, accelerating industrial transformation and upgrading, promoting the formation and development of new quality productivity, and opening up a new era of intelligent and high-quality development.

A series of measures have also been taken in terms of AI teaching practices. Minister of Education Huai Jinpeng said at the 2024 World Conference on Digital Education that China will implement AI-enabling actions to promote the deep integration of smart technologies with education teaching and scientific research. For example, the National Intelligent Education Platform has covered all stages of education, providing a large number of high-quality digital resources. In addition, it has launched the "Mucous Classes in the West Plan 2.0," which provides a large number of catechism courses and customized courses for students in western colleges and universities, serving 540 million students. The Ministry of Education also plans to promote educational change through AI technology, including expanding the coverage of high-quality educational resources, promoting the intelligent upgrading of the education system, developing education-specific AI models, and regulating the scientific ethics of the use of AI.

These policies and measures show China's strategic layout in the field of AI and the importance it attaches to deeper integration in the field of education, aiming to promote the modernization of education through AI technology, cultivate the innovative talents needed in the new era, and provide new momentum for economic development.

1.2 Purpose of the Study

In the context of the rapid development of AI technology, its interdisciplinary nature poses new challenges to the field of education. Students are faced with the challenge of mastering multidisciplinary knowledge and applying it to practical industries. This study, through in-depth analysis of the profound impact of AI on the field of education, emphasizes the importance of building interdisciplinary knowledge construction capabilities and

discusses the necessity of a curriculum system centered on AI technology. Using literature review and experimental research methods, the study compiles the research progress in the cultivation of "AI + X" interdisciplinary talents both domestically and internationally, providing a theoretical basis and empirical support for teaching practice.

Furthermore, based on EDA and ML, the study constructs a predictive model for academic performance, validating the effectiveness of linear regression models in predicting student grades. This helps educators better understand the key factors affecting student learning outcomes and optimize teaching methods and strategies accordingly. In the exploration of teaching practice methods, the study proposes a series of specific implementation strategies, including enhancing theoretical and technical knowledge, promoting practical and personalized teaching, strengthening professional foundational learning, and cross-fertilizing the strengths of various disciplines. The aim is to improve students' interdisciplinary thinking and practical skills through innovative teaching methods and optimized educational resources.

Meanwhile, the study discusses how higher education can further enhance teaching practice in the direction of AI and emphasizes the crucial role of higher education in the development of smart cities, finance, and economies. The results indicate that integrating AI technology with educational teaching can effectively cultivate "AI + X" interdisciplinary talents. The study points out the challenges faced by the current educational system, such as insufficient educational resources and outdated teaching methods, and calls for further exploration in future research on how to optimize the talent cultivation system and improve institutional mechanisms to solidify the foundation of "AI + education" talent training.

Through continuous educational reform and innovation, the aim is to cultivate more innovative and practically skilled interdisciplinary talents to provide strong support for societal development, especially in key areas driving the process of societal intelligence. By conducting research on the basis of the student curriculum system, the study aims to identify and resolve a series of issues in the current educational model and propose effective training programs. This holds significant theoretical and practical importance for the cultivation of AI talents and teaching practice. As shown in Figure 1, this study begins with an introduction to the education of composite talents in the era of AI. In conjunction with educational circumstances, this study then presents a model for analyzing factors that affect academic performance. Finally, the study explores how AI-related algorithmic models can be applied in teaching practices, and concludes with proposals for teaching strategies and practical methods.

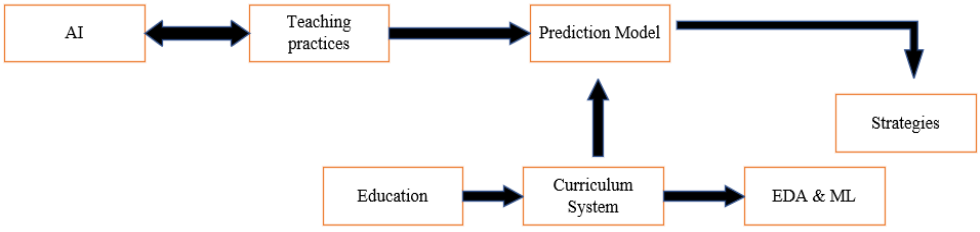

Figure 1. Research process

1.3 Significance of the Study

1.3.1 Theory reference

The teaching practice of AI composite talents theoretically implies a revolution of the traditional education model and a profound expansion of the teaching concept. This pedagogical practice emphasizes the integration and application of interdisciplinary knowledge, which pushes the educational system to adapt to the rapidly changing technological environment and market demands (Kim et al., 2021). Innovations in teaching content and methods can also promote the development of students' professional technical abilities and practical hands-on skills.

The study provides an in-depth theoretical framework for understanding and advancing the teaching practice of "AI + X" interdisciplinary talents. It emphasizes the importance of integrating interdisciplinary knowledge and points out that in a rapidly changing technological environment, the educational system needs to adapt to new market demands and cultivate the ability to solve complex problems. This involves understanding not only the fundamental principles of AI technology but also how to apply these technologies in different fields and to various issues, thereby enhancing students' innovative capabilities and adaptability. The cultivation of such literacy is crucial for students' future career development.

In addition, the teaching practice of AI composite talents involves the cultivation of intelligent literacy, which is a key indicator of the quality of future talent training. Through such teaching practices, students can not only understand the basic principles of AI technologies but also learn how to apply these technologies to different domains and problems, thus enhancing their innovation and adaptability. On a broader level, this teaching practice also helps to promote educational equity by helping to narrow the educational gap between students from different

backgrounds through personalized learning support and resource allocation. At the same time, it also provides new perspectives on education evaluation, using data analysis and learning behavior tracking to enable more accurate and comprehensive assessment of teaching effectiveness (Lin et al., 2022).

Overall, the practice of teaching AI composite talents demonstrates theoretically how education can adapt to and lead the trend of technological development, which not only has far-reaching implications for the field of education but also provides impetus for the continued progress and innovation of society.

1.3.2 Practice application

In the era of AI, the practical significance of teaching practice is reflected in its ability to adapt to and promote the modernization of education. By integrating AI technology into teaching, educators are able to innovate teaching modes and provide a more personalized learning experience, as well as use intelligent systems for teaching evaluation and resource allocation in order to improve teaching efficiency and quality. Such teaching practices can not only enhance students' motivation to learn and promote their core literacy but also help them better adapt to the needs of the future society (Son et al., 2023).

The application of AI technology has provided strong support for the construction of the teaching team. With the help of intelligent teaching assistants and teaching analysis tools, teachers can focus more on improving teaching quality and deepening professional learning. Additionally, AI promotes interdisciplinary talent cultivation. Through actual project research and practical application, students can develop innovative thinking and the ability to solve complex problems within multiple fields, which is crucial for their future success in a dynamic work environment. For instance, as proposed in Chapter 3 in this study, analyzing the factors influencing student performance through an EDA-based method can accurately determine the influencing factors for each student's grade changes at different stages. Teachers and students can gain a better understanding of a series of issues they face. In response to these issues, certain improvement methods can be adopted to enhance students' overall performance. Some universities have proposed a talent cultivation model of "ability cultivation traction + data-driven process evaluation + blended education and teaching." Relying on the creation of intelligent learning spaces and through the analysis platform of learning behavior data, this model achieves two-way empowerment of scientific research and teaching. These practical applications demonstrate the application of "AI + X" interdisciplinary talent teaching practices in different educational stages and fields, aiming to boost the innovative development of AI education through deep interdisciplinary integration and cultivate innovative talents adapted to the future intelligent society.

Overall, the teaching practice of AI composite talents is reshaping the face of education, which not only has an important impact on improving the quality of current education but also cultivates a group of innovative talents who can adapt to and lead the future development of society. The practical application of this teaching practice is bringing about a profound change in the field of education, providing strong support for the comprehensive development of students and the sustainable progress of society.

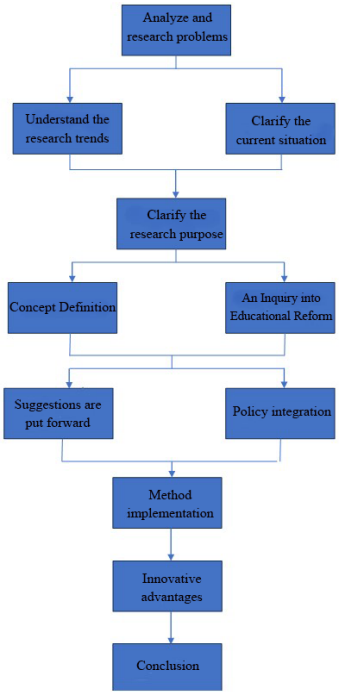

Figure 2. Research ideas

1.4 Program Design

As shown in Figure 2, the main idea of the research in this study is as follows:

Step 1: Literature review and location of the research problem, including analyzing the related literature, sorting out the research progress of "AI+X" talent cultivation, assessing the feasibility and necessity of the research, and defining the research problem.

Step 2: Definition of the concept and analysis of the educational change, including defining the concept of "AI + X" talent cultivation, exploring the educational change and its impact on teaching practice, and using EDA to demonstrate the application of AI in education.

Step 3: Questionnaire data analysis and research on influencing factors, including analyzing the questionnaire data and exploring the factors affecting the cultivation of AI composite talents, such as teaching resources and methods.

Step 4: Suggestions and policy combination, including, combined with the policy, putting forward suggestions to optimize the talent cultivation program and guiding the practice of AI teaching in colleges and universities, based on the research results.

Step 5: Conclusion and prospect, including summarizing the conclusion of the study, pointing out the innovations and shortcomings, looking forward to the future direction of the study, and putting forward suggestions to deepen the study.

2. Literature Review

2.1 Relevant Concepts

2.1.1 AI + X

"AI+X" is a concept that integrates AI technology with knowledge from different subject areas, aiming to promote the application and innovation of AI in various industries through interdisciplinary cooperation. The concept emphasizes the use of AI's powerful computing and data processing capabilities combined with domain-specific expertise to solve complex problems, improve efficiency and create new value. In the field of education, "AI+X" can promote interdisciplinary teaching and develop students' innovation and practical skills through project-based learning and problem solving. In industrial applications, "AI+X" can promote technology adaptation and research and development through the selection of appropriate AI technologies, algorithm optimization and system integration for the data characteristics and needs of specific fields. At the same time, "AI+X" also involves policy support and guidance, which requires the government to introduce relevant policies to encourage and support the application of AI technology in different fields and cross-field integration. Overall, "AI+X" is a multidimensional and interdisciplinary cooperation model, which not only focuses on the integration of technology but also involves the synergistic development of education, policy, industry, and other dimensions, aiming to adapt to the needs of the future intelligent society.

2.1.2 Composite talents

In the cultivation of subject knowledge, the development of ability, and the quality structure associated with mastery of the subject, composite talents are defined as individuals possessing expertise in two or more distinct fields. Zhang (2020) believes that the composite talent has professional knowledge and ability in more than one discipline. The composite talent is commonly described as a "specialist with multi-disciplinary capabilities" or "a professional possessing extensive and versatile competencies." Composite talent training often emphasizes the interdisciplinary knowledge base and interdisciplinary learning ability. However, a critical challenge lies in determining the "degree" to which interdisciplinary knowledge and skills should be integrated. Consequently, AI composite talents are generally understood as individuals whose expertise is primarily rooted in AI-related fields but is supplemented by knowledge from various other disciplines. This broader knowledge base enhances the capacity for interdisciplinary thinking and equips individuals with diverse professional skills, knowledge structures, and competencies.

2.2 Theoretical Overview

2.2.1 Current status of research on teaching practice of "AI + X"

Professor Fei Wu, deputy dean of the School of Computer Science and director of the Institute of AI at Zhejiang University, has realized high-quality lectures for more than 1,000 students through the course "AI Algorithms and Systems." It solves the problem of physical space and teacher resources that may be difficult to bear in the face of a large number of students attending classes offline, and guides students to independent thinking and active discovery through an open and inclusive platform, making the classroom lively.

In research on electrification education, Liang et al. (2022) put forward the theoretical framework and practical

strategy of "AI + X" interdisciplinary integrated teaching in primary and secondary schools. Based on contextual learning and activity theory, they clarified the key components and characteristics of the "AI+X" interdisciplinary integrated teaching activity system and constructed a theoretical framework of teaching supported by the deep integration of AI and disciplines.

AI instruction should be student-centered, catering to individual students' characteristics and customizing a learning and development path that suits each student's unique traits (Wang & Li, 2021). Similarly, AI offers the possibility of predicting performance based on existing data. From a pedagogical perspective, this form of predictive analytics can help predict student performance and identify areas for further improvement (Huang, 2021). Table 1 shows the current status of AI teaching in some European and American countries.

Table 1. Current status of AI teaching in some European and American countries

Countries	The State of AI Teaching
United States of America	The government of the United States has elevated the development of AI to a national strategy and issued a series of policy documents focusing on supporting the cultivation of AI talents and the all-round cultivation of a group of diversified AI talent teams. The United States has improved the coordination and interaction mechanism of government, industry, academia and research, strengthened the training of interdisciplinary talents in AI, and established the National Institute of AI to strengthen cross-sectoral and interdisciplinary cooperation among top AI researchers.
United Kingdom of Great Britain and Northern Ireland (UK)	The UK occupies an important position in global AI education, with 8.0% of the world's colleges and universities. The UK's AI strategy advocates an educational model that integrates mathematical and physical sciences, data science and AI, and focuses on the cultivation of multilevel and composite talents.
Germany	With 10.4% of the world's colleges and universities, Germany also excels in AI education. Germany's AI strategy also emphasizes interdisciplinary talent training, promotes industry-university-research cooperation, and cultivates high-quality AI professionals.
Japan	Japan maintains a world-leading position in AI medical care, industrial robot intelligence, and AI chip manufacturing. Japan's AI strategy advocates an education model that integrates mathematical science, data science and AI, and focuses on the cultivation of multilevel and composite talents. The Japanese government released the AI Strategy 2019 to establish a multi-level talent training system, including literacy education, applied basic education, and expert talent training, and plans to train 250,000 professionals in the field of data science and AI every year.

2.2.2 Current status of research on composite talents

In Western countries, the cultivation of interdisciplinary talents is mainly achieved through interdisciplinary training, dual-degree programs, and major/minor degree systems. In order to cater to the diversified development needs of the society, the UK has published "A Framework for Higher Education" and "Education and Training for the 21st Century" and other education white papers, which have shifted the focus of education from the training of professionals to the cultivation of multidisciplinary talents in interdisciplinary and comprehensive disciplines. American higher education curriculum has a strong flexibility and autonomy to ensure that students can get the full range of development. For example, Duke University has broadened the width of knowledge and deepened the depth of learning as the goal of the course training. Japan's Hokkaido University specializes in combining several similar disciplines into "social science and technology" to specialize in the training of complex talents. The main way to cultivate complex talents in the European Union (EU) countries is cross-border integration, such as the modern apprenticeship system, which is a derivative of the school-enterprise cooperation type of joint cultivation of talents. Complex skills and technical talents can be mainly cultivated through the joint cultivation of enterprises and colleges and universities. Fadlelmula & Qadhi (2024) have investigated the characteristics of artificial intelligence (AI) research in certain regions, identified the advantages and disadvantages of AI applications in higher education, and discussed the main issues and potential future directions. Samuel et al. (2023) focused on incorporating artificial intelligence elements in a new framework called Cultural Adaptive Thinking in Education for Artificial Intelligence (CATE-AI), aiming to teach AI concepts to learners from different cultural backgrounds.

Domestic scholars have diverse views on the definition of compound talents, which can be broadly categorized into three types. The first type regards a compound talent as one with "disciplinary knowledge synthesis". For instance, Chen & Su (2019) argued that the development of educational technology talents should concentrate on disciplinary knowledge to cultivate individuals who are knowledgeable in education, skilled in technology, and adept at innovation. This definition visualizes the criteria for talent evaluation, focusing on a horizontal assessment of the talent's capability structure. The second type is based on the "T-shaped theory", where Xu & Fu (2019) advocated for the effective implementation of the "1+X" system in the cultivation of compound talents, characterized by "one specialty with multiple competencies". The "T-shaped theory" encapsulates the combination of the "depth" of professional expertise with the "breadth" of competencies. The third type is the "pluralistic quality" talent. Zhang (2020) posited that the development of compound talents necessitates breakthroughs across

three dimensions: educational philosophy, educational models, and teaching technology. This approach fosters the mastery of diverse knowledge areas, leading to versatile talents who can adapt to various job roles. Li et al. (2017) believed that composite talents are multi-functional talents, who are characterized by versatility, the ability to adapt to a variety of occupational positioning and technical role change, and the possession of a full range of three-dimensional skills in the industry. Liu (2023) discovered that understanding learners' needs and organizing instruction in real-life situations is a key factor in enhancing learning motivation and participation. The above research is about the connotation of composite talents, focusing on the span of knowledge structure and ability quality, while the content of composite talents studied in this study is based on the era of AI and within the scope of domestic colleges and universities.

3. EDA-Based Analysis of Factors Influencing Student Achievement

3.1 Relevant Theoretical Concepts

(a) Linear regression

Linear regression is a statistical method used to model a linear relationship between an independent variable and a dependent variable. The goal is to find the optimal coefficients such that the difference between the predicted and actual values is minimized, which is usually achieved by least squares.

In the context of linear regression analysis, several prerequisite assumptions have been put forward. Firstly, a linear relationship is assumed to exist among variables. Secondly, the error terms are required to meet the criterion of being independently and identically distributed. Moreover, these error terms are supposed to exhibit a normal distribution pattern. Model performance is assessed by metrics, such as R^2. The closer R^2 is to 1, the better the model fit. Linear regression is simple and easy to understand, and is a basic tool for data analysis, but more complex models may be needed when faced with nonlinear relationships or outliers. Figure 3 shows the diagram of the linear regression model.

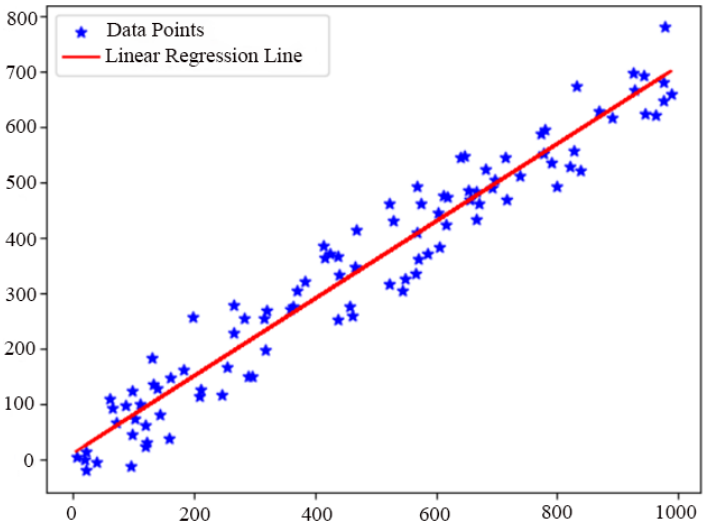

Figure 3. Diagram of the linear regression model

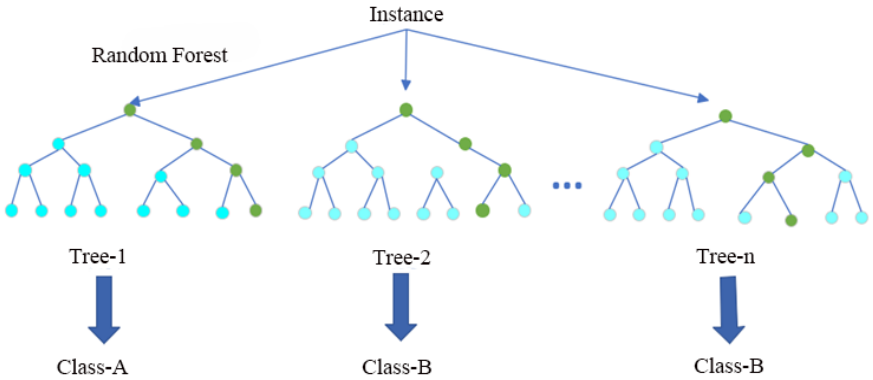

Figure 4. Diagram of the random forest model

(b) Random Forest Regressor (RFR)

RFR is an integrated learning algorithm that improves the performance and stability of a model by constructing multiple decision trees and integrating their predictions. In a random forest, each decision tree is trained independently on a randomly selected subsample, which effectively reduces the risk of overfitting. Random forests obtain the final regression results by averaging or weighted averaging the predictions of multiple decision trees.

The basic principle of random forest regression consists of the following steps: first, a portion of samples from the original training set is randomly selected to form a subsample set; second, for each node of each decision tree, only a portion of the randomly selected features are considered in selecting the best dividing features; then a decision tree is constructed using some decision tree algorithm on each subsample set; finally, for the new input samples, the final regression results are obtained by averaging or weighted averaging the predictions of multiple decision trees. Figure 4 shows the diagram of the random forest model.

(c) Gradient Boosting Regressor (GBR)

A GBR is a regression model based on the gradient boosting algorithm, which constructs a strong predictive model by iteratively adding a weak learner (usually a decision tree).

The core idea of a GBR is that each new weak learner focuses on data points that the previous model has failed to predict well. This approach can be thought of as an iterative optimization process in which each step tries to correct the shortcomings of the previous step. In this way, the GBR is able to capture complex patterns in the data and provide more accurate predictions than a single model. Figure 5 shows the schematic diagram of the GBR.

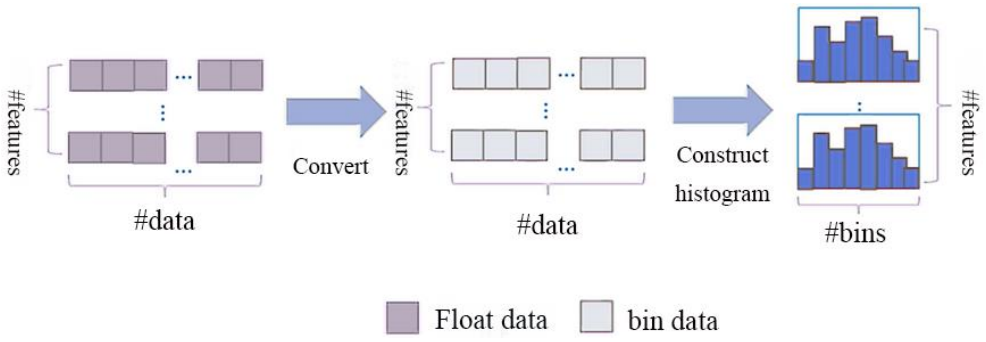

Figure 5. Schematic diagram of the GBR

(d) Support Vector Regression (SVR)

SVR is a regression method based on the Support Vector Machine (SVM) for predicting continuous numerical targets. The core idea of SVR is to find an "optimal hyperplane" among the data points, which is a regression function that is as close as possible to the data points and makes predictions within the allowed error margin. SVR improves the robustness of the model by maximizing the interval of the regression model while allowing some samples to violate a certain error margin.

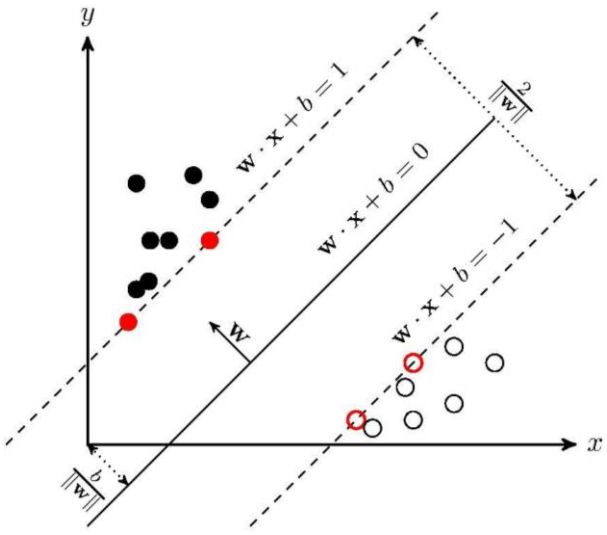

Figure 6. Schematic diagram of the SVR

SVR uses an ε-insensitive loss function, which means that losses are computed only when the error between the predicted and true values exceeds a predefined threshold ε. The loss function is designed to allow the model to be more robust than the predicted values. This design of the loss function helps to reduce sensitivity to outliers and tolerates a certain degree of prediction error, thus improving the robustness of the model. Another key component of the SVR model is the kernel function, which allows the model to be mapped nonlinearly in high-dimensional space without having to explicitly compute the coordinates of the data points in the higher-dimensional space. The choice of kernel function has a significant impact on the performance of the model, and thus arises as a choice that needs to be made according to the specific problem in practical applications. Figure 6 shows the schematic diagram of the SVR.

(e) KNeighbors Regressor (KNR)

KNR is an instance-based ML algorithm designed for regression problems, which predict continuous numerical values. It is a variant of the KNearest Neighbors (KNN) algorithm, which is typically used for classification tasks but can be adapted for regression analysis with some modifications. In essence, KNR identifies the K most similar instances in the dataset to a new data point and uses the output values of these neighboring points to predict the output value for the new data point.

In KNN regression, for a given test data point, the algorithm finds its K closest neighbors in the training dataset. "Nearest" is usually defined based on Euclidean distance or other distance metrics. The KNN regression then predicts the value of the test point based on the actual values of these K neighbors. Specifically, the predicted value is the average of the target values of the K nearest neighbors. Figure 7 shows the representation of the KNN regression.

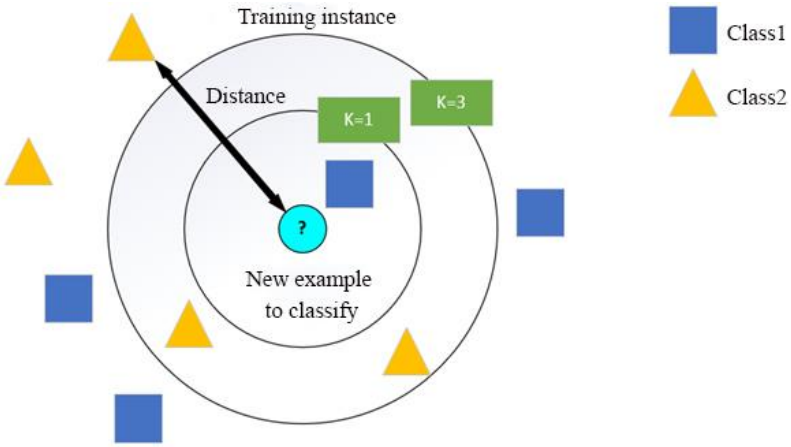

Figure 7. Representation of the KNN regression

3.2 Dataset Introduction and Data Preprocessing

The dataset used in this study was derived from the Open University Learning Analytics dataset, which is part of the Open University's online learning platform, referred to as the Virtual Learning Environment (VLE), used by external students to access course content, engage in forum discussions, submit assessments, and review assignment feedback, among other activities. The dataset encompasses a wide range of information about students, including study time, levels of engagement, prior academic performance, sleep duration, and peer influence, among other comprehensive details. The study encompasses a comprehensive range of student information, including learning duration, engagement, past academic performance, sleep duration, and peer influence. The goal is to identify the most significant factors affecting students' exam scores and provide them with appropriate support to enhance their academic achievements. By identifying the factors with a higher level of importance through the appropriate ML-related models, teachers can find a direction to focus their teaching based on the appropriate metrics. By analyzing the grades and various types of data, the ML models can identify the characteristics of underperformance. This leads to timely identification and enables teachers to provide targeted support and guidance to improve student performance.

Before analyzing the data, it is necessary to preprocess the data so as to collect the valid information in the data. After checking whether there are any null values appearing in the data file, the individual features and the valid values in it were identified. It was found that there is a large amount of missing data in family income, learning disabilities, parents' education level, and distance from home. Therefore, the columns with different values were retained only and others were deleted. Then the missing values were added by interpolation operation. Finally, the valid features were obtained.

3.3 Experimental Analysis of Results

(a) Check the correlation between individual features

Analyzing the correlation between features is crucial for understanding the intrinsic structure of the dataset. It reveals the interactions and dependencies between variables, which can be very helpful in constructing accurate predictive models, optimizing the decision-making process, and gaining a deeper understanding of the behavioral patterns of complex systems (Xie, 2023). By identifying which variables are correlated, it is possible to avoid the use of redundant information in a model, thereby reducing its complexity while improving its predictive power.

Firstly, the correlation between each feature was analyzed through this heat map (Figure 8). It can be seen from Figure 9 that there is a significant positive correlation (0.45) between *Hours_Studied* and *Exam_Score*. This indicates that *Hours_Studied* has a significant effect on *Exam_Score*. *Attendance* and *Exam_Score* are also moderately correlated (0.58), which implies that attendance is an important factor in obtaining better exam scores. The correlation between *Sleep_Hours*, *Physical_Activity*, *Internet_Access_encoded* and *Exam_Score* is very low (value close to 0) suggesting that there is no direct relationship between these factors and exam scores. There is no direct relationship between *Distance_from_Home_encoded*, *Gender_encoded*, and *Learning_Disabilities_encoded*, which also shows low correlations with *Exam_Score*, indicating that these factors have little or no effect on the results.

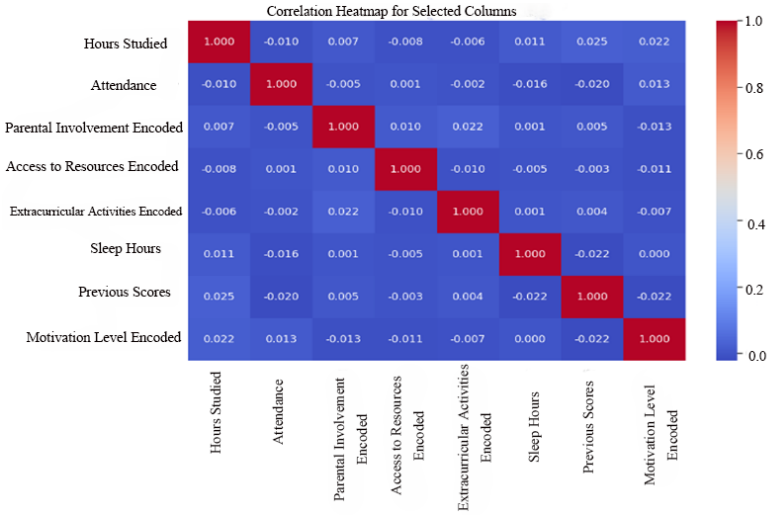

Figure 8. Heat map between features

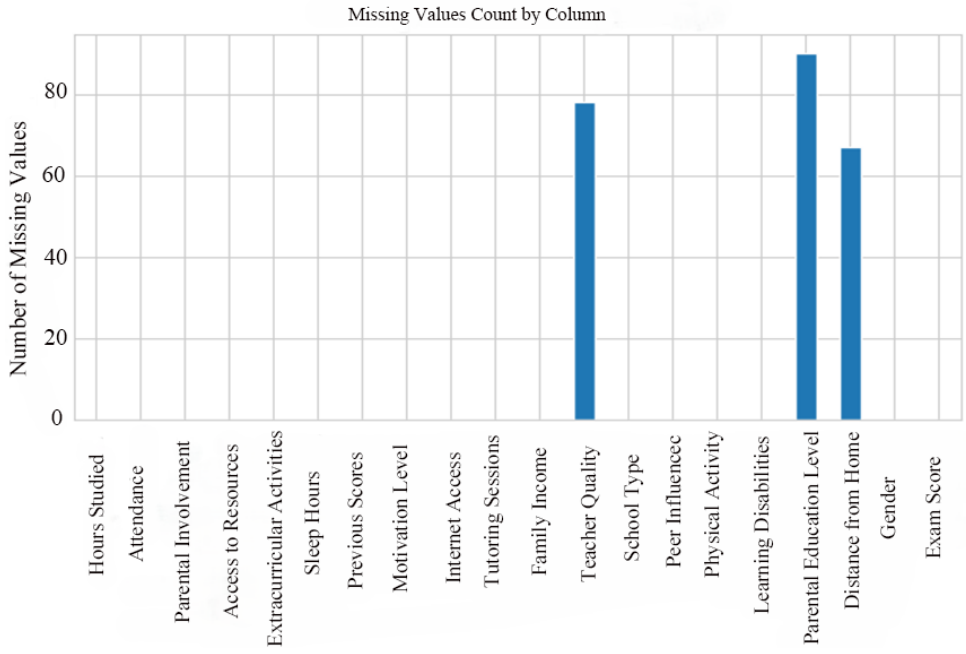

Figure 9. Bar chart of missing values in the dataset

(b) Feature selection

After obtaining the feature correlation of the training data, linear regression, random forest, gradient boosting regression, SVR, and KNN regression were used to analyze the dataset. In this study, 16 features, such as students' engagement, study hours, previous grades, and sleep time, were selected to analyze the importance of the impact of different features on students' performance through each model.

It can be found from Figure 10 that the two characteristics of study duration and engagement are consistently the most important in all models and their highest normalized importance scores surface their strongest relationship with the target variable (student performance). However, sleep duration, tutoring sessions and prior grades have moderate importance and they are less prominent in the linear models. The other characteristics, on the other hand, have weak importance across the models, suggesting that they have a limited impact on the predicted outcomes.

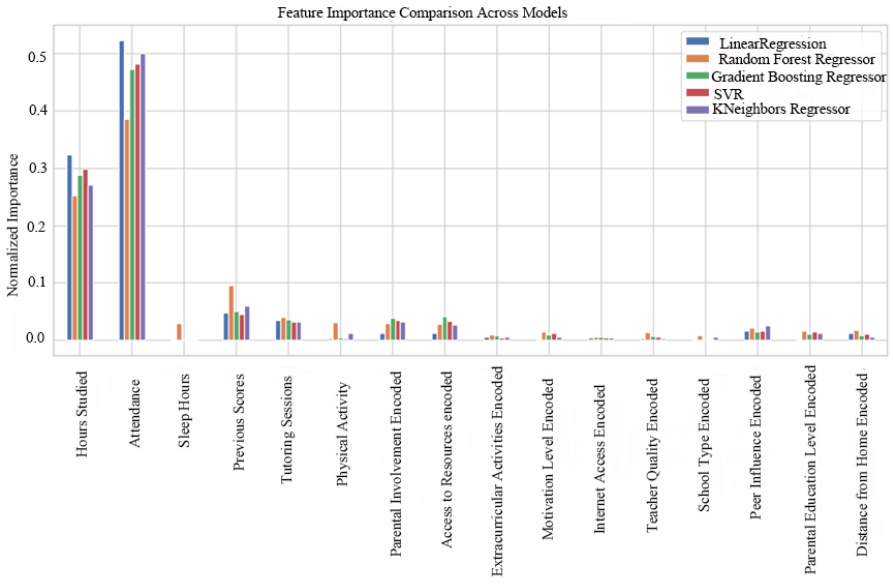

Figure 10. Importance of each characteristic in relation to student performance

(c) Comparative analysis of models

In order to analyze the performance comparison of each model so as to determine which model is better in student performance prediction, Cross-Validation (CV) R^2, Test R^2, Mean Absolute Error (MAE), and Mean Squared Error (MSE) were chosen as the main indicators for performance evaluation. Table 2 shows the comparison results.

Table 2. Comparison of model indicators

Model	CV R^2	Test R^2	MAE	MSE
Linear regression	0.6427	0.6841	1.0570	4.4652
RFR	0.6145	0.6458	1.1526	5.0068
GBR	0.6726	0.7237	0.8597	3.9050
SVR	0.6844	0.7355	0.7440	3.7384
KNR	0.4496	0.4972	1.6793	7.1077

The data in the table shows that SVR has the highest test R^2 and the lowest MAE and MSE, which indicates that SVR has a better fitting performance and less prediction error. This means that SVR makes more accurate predictions among the five models.

3.4 Summary of the Chapter

In this chapter, the theoretical concepts of various models were introduced, along with the sources and main content of the datasets, and the preprocessing operations were performed on the datasets. Issues, such as missing data and data anomalies, were addressed. Subsequently, an analysis of the experimental results was conducted, with the primary criterion being the importance of factors influencing student performance. After checking the feature correlation, extracting different features, and analyzing the models, it becomes clear to know how various factors affect student test scores and the correlation relationships among these factors. Among them, course participation and study time have the greatest impact on student test scores, while other factors have a relatively

smaller impact. After analyzing the different factors, the various models were compared, and their performance was judged based on the evaluation metrics.

This provides a method for analyzing student performance in the "AI + X" interdisciplinary talent teaching practice. In the future, models with better evaluation performance can be used to analyze and determine the factors influencing student grades, identifying several features of high importance. By focusing on these features or factors in education, the aim is to maximize the improvement of students' learning outcomes. For students, this method can also help them understand a series of issues they face in different aspects, allowing them to make directed improvements and enhance their overall abilities.

4. AI Exploration of Teaching Practice Methods for Composite Talents

4.1 Implementation Methodology and Data Collation

In the era of AI, the goal of higher education is to cultivate "AI+X" composite talents who can adapt to the rapidly changing world. These talents not only need to master the core technologies of AI but also be able to integrate these technologies with different disciplines to solve complex problems in innovative ways (Liu & Wang, 2021).

(a) Developing interdisciplinary knowledge-building skills

As an interdisciplinary discipline, the development of AI relies on the fusion of knowledge from a number of disciplines, such as computer science, mathematics, psychology and linguistics. In smart terminal devices, such as smartphones, the perfect combination of communication technology and AI functions can be seen. In this context, students need to develop the ability to adapt to future changes in an environment where disciplines intersect. Learning knowledge itself is no longer the only goal of education, and it is more important to develop students' ability to construct new knowledge based on what they have learned in their disciplines (Eaton, 2017).

At its core, AI is data-driven learning, which relies on large amounts of data and learning processes. However, many future situations may be emergent and there is not enough data and time for learning (Ghamrawi et al., 2024). Therefore, students need to acquire not only the knowledge itself but also, more importantly, the ability to apply knowledge and logic to solve problems in real time. The mission of higher education institutions is to train students in deep, fundamental theoretical knowledge and enable them to solve specific problems in cross-cutting areas through systematic theoretical learning and technical training (Ghamrawi et al., 2024). This ability to build knowledge across disciplines is the key to students' adaptation to an intelligent society and their potential to change the world.

(b) Construction of the "AI + X" composite talent curriculum system

The traditional model of higher education tends to focus on professional education in a single discipline, pursuing the specialization and systematic nature of the curriculum. However, in the era of AI, this model is no longer adapted to the needs of society. In order to cultivate "AI+X" composite talents, higher education institutions need to combine AI technology with various disciplines to solve professional problems and continuously improve the existing professional curriculum system. The following is a summary of the current program system.

The construction of such a curriculum should be based on several key points:

- Solid basic knowledge: students need to have a solid foundation in mathematics, natural sciences and humanities and social sciences, which is a prerequisite for understanding and applying AI technology.
- The core status of the AI module: the curriculum system should take AI as the core module, covering key technologies, such as ML, deep learning (DL) and natural language processing (NLP).
- Characteristic integration of disciplinary specialties: each disciplinary field has its own unique problems and challenges, and the curriculum system should encourage students to apply AI technologies to these fields in order to solve real-world problems.
- Elective courses for social job requirements: According to the needs of the society and industries, relevant elective courses can be set up to help students understand the application of AI in different industries.
- Comprehensive application of professional practice and innovation: through project practice and laboratory research, students can apply theoretical knowledge to practical problems and develop innovative thinking and practical ability.
- Emphasis on AI ethical education: In AI education, in addition to focusing on the education of technology, ethical education should be emphasized to cultivate students' sense of social responsibility and professional ethics.

Through such a curriculum, institutions of higher education can provide students with a comprehensive "AI+X" education that will help them succeed in their future careers and contribute to the development of society (Alghamdi et al., 2020). The program will help students to succeed in their future careers and contribute to the development of society.

In the wave of AI, institutions of higher education are working to leverage their multidisciplinary resources and strengths to create specialties with distinctive features and build an interdisciplinary, multidisciplinary curriculum

system that meets the needs of "AI+X" composite talents.

Institutions of higher education are creating specialties that integrate with AI through their rich disciplinary resources in order to build a curriculum system that can meet the needs of "AI+X" composite talent cultivation. As shown in Figure 11, there are opportunities to integrate with AI technology in various professional fields. By participating in practical activities, such as graduation design, thesis writing, comprehensive practical training, industry practical training and top internships, students can enhance their ability to master new knowledge and skills.

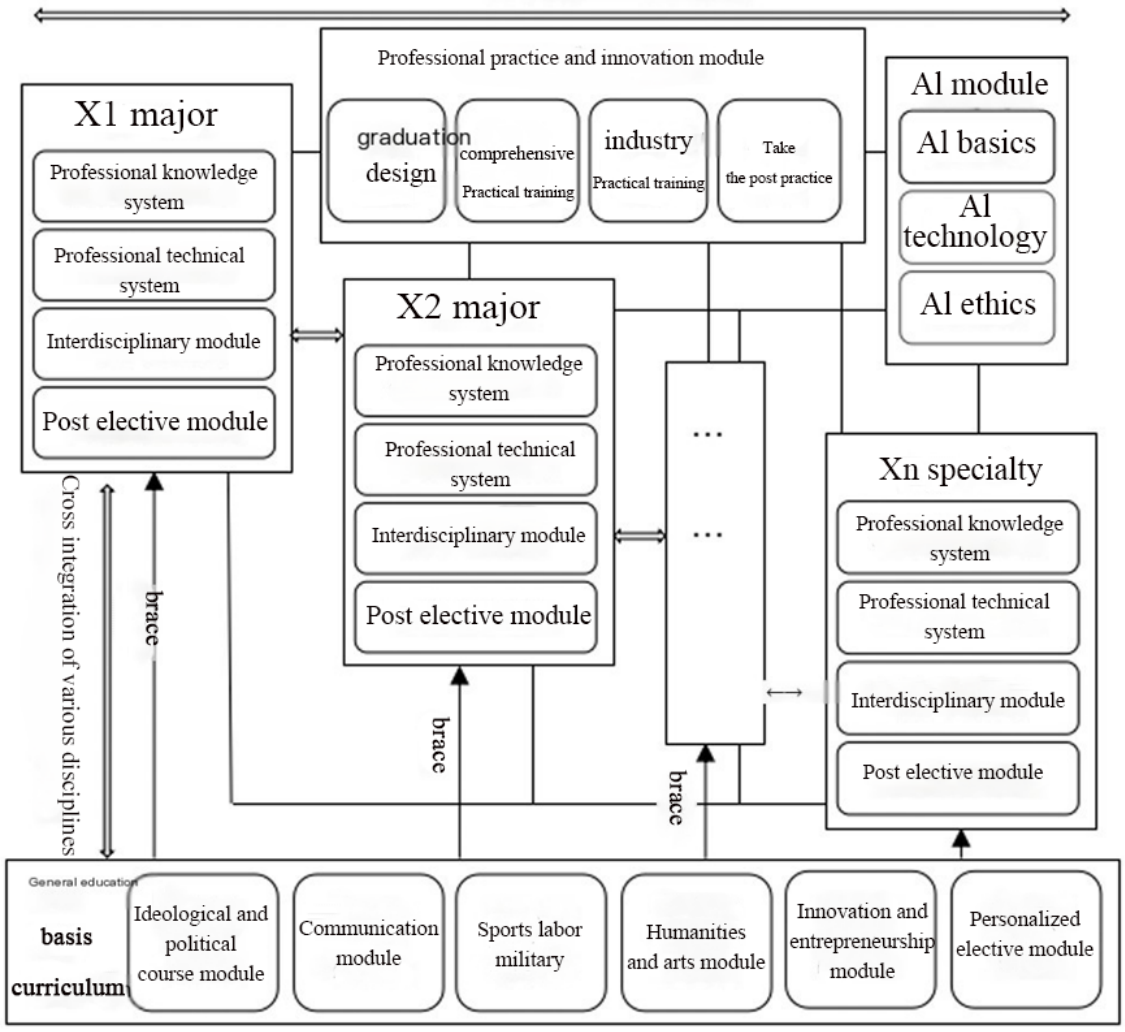

Figure 11. Integration module with AI for each specialization

In these practical and innovative modules, students can not only learn AI-related technologies but also develop logical analytical abilities and practical skills. These abilities are crucial for adapting to the ever-changing demands of new jobs in the context of AI. Through these practical activities, students are able to continuously improve their self-learning ability to adapt to the challenges of the future workplace and open up a broader scope for their career development.

In addition, higher education institutions should also focus on developing students' innovative thinking and problem-solving skills so that they can solve complex problems in interdisciplinary fields with the assistance of AI technology. Through this interdisciplinary curriculum system, students will be able to better understand and apply their professional knowledge with the assistance of AI, preparing them for their future careers (Lin, 2022).

(c) Teaching methods

In the era of AI, the proliferation of open educational resources has greatly broadened the access of teachers and students to knowledge, providing a solid foundation for higher education institutions to cultivate "AI+X" composite talents. The use of online classrooms and virtual reality technology is transforming traditional physical classrooms into cyberspace, enabling learners to acquire knowledge through blended, mobile, and ubiquitous learning, as well as other diverse online learning methods. In this process, the application of voice and image

recognition technologies has greatly improved the speed and efficiency of students in finding the knowledge they need.

Teachers play a crucial role in this change. They need to constantly absorb new ideas, knowledge and technologies, keep up with future trends in the AI industry, update their knowledge base and optimize their teaching methods. For example, online and offline hybrid classrooms and flipped classroom teaching methods can be used, which not only consolidate the foundation of disciplines and specialties but also focus on cultivating students' interdisciplinary thinking and innovation ability according to their individual learning abilities, qualities and knowledge base. Through the use of various collaborative education platforms and information technology (IT) means, teachers are able to enhance students' innovative literacy and reshape their professional literacy so as to better adapt to the educational needs of the AI era (Li & Su, 2020).

The professional development of teachers is equally important in this process. Teachers need to enhance their IT application skills to adapt to changes in emerging technologies and effectively integrate these technologies into interdisciplinary teaching and learning environments. At the same time, teachers also need to pay attention to the application of AI technologies in education, such as smart assessment, smart guided learning, smart classroom, smart online exams, etc. These are specific examples of the application of AI in education, which are changing the traditional way of teaching and learning, and providing students with a more personalized and intelligent learning experience.

At present, teachers in many colleges and universities still use traditional teaching methods, according to the teaching method survey of a college, as shown in Figure 12. In the teaching process, teachers mostly use the method of theoretical lectures, problematic exercises, and group discussions, and less use lectures on practical aspects, such as case studies, project internships, etc., which sometimes leads to fixed theoretical knowledge that is difficult to connect with today's fast-paced era of change (Chen et al., 2018). Theoretical knowledge is sometimes difficult to keep up with the fast-paced changes of today.

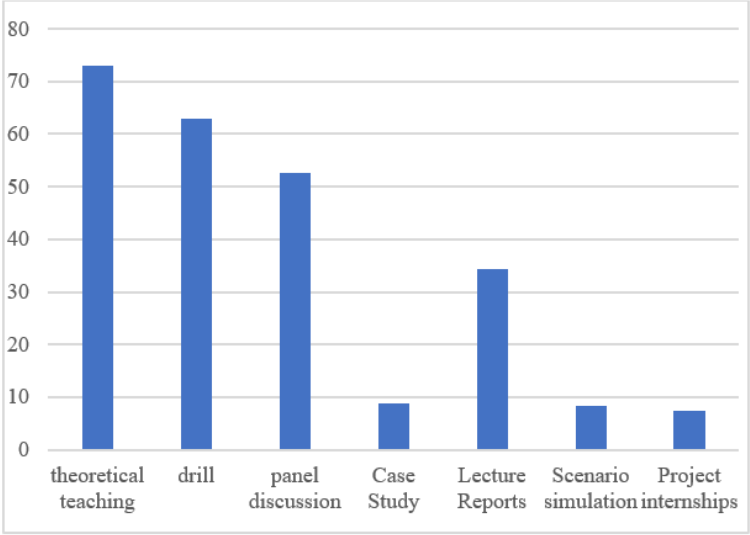

Figure 12. Teaching methods often used by teachers in specialized courses

(d) Educational resources

In the age of AI, cross-fertilization between specialties is becoming increasingly important. In the field of driverless driving, students need to acquire knowledge in not only computer science but also specialized fields, such as system control and automation. The research and development of driverless cars involves autonomous decision-making and vehicle-circuit coordination technologies, which enable the cars to drive automatically. The thinking and problem-solving capabilities of intelligent machines go beyond the limitations of traditional professional knowledge, and they become intelligent robots through continuous "learning" and upgrading the application of comprehensive knowledge (Guo et al., 2020).

Against this background, teaching in higher education institutions needs to break the traditional boundaries of specialization and reconstruct the knowledge system by focusing on solving problems in specific areas. This involves developing new teaching project cases and enriching the existing teaching resource base by continuously accumulating these cases. To illustrate, Chongqing University of Posts and Telecommunications has explored the cross-fertilization of AI and applied disciplines, forming a new model of "AI + information disciplines" talent cultivation, which includes system innovation, method innovation and path innovation to meet the needs of the intelligent era.

In addition, the application of educational robots is driving innovation in teaching models. They not only play

a role in STEM education but also show potential in language learning, special education, cognitive training for the elderly and other fields. Educational robots are used in a variety of application scenarios, including but not limited to programming education, social interaction, classroom teaching, etc., which enhance the interactivity and fun of teaching by providing personalized learning experiences. In this education model, the role of teachers is also changing. They need to work with AI teaching assistants and use AI technology to carry out accurate teaching and personalized learning path planning. This new "dual-teacher" classroom model requires teachers to continuously update their teaching capabilities to meet the demands of the AI era.

(e) Analysis of teaching evaluation

AI teaching evaluation is more intelligent and three-dimensional. In the network-based learning platform, real-time tracking of the learner's activities is facilitated, including the automatic scoring of quizzes and the evaluation of assignments or projects through both peer assessment and self-assessment. This approach encourages communication and self-reflection among students, extending the evaluation beyond mere outcomes. It has been demonstrated that, when learners are provided with timely feedback, they are able to adjust their learning pace and attitudes accordingly, which can significantly enhance their performance. Learning analytics based on AI provides the possibility of achieving more scientific personalized learning, diagnosis, and feedback as well as tailored teaching. After using analytics, students can adjust their strategies while learning in a targeted manner with fewer detours.

AI brings uncertainty to the future of education, and what kind of knowledge or skills will be needed by the society in the future cannot be predicted. Therefore, teachers and students should have the concept of lifelong learning and the ability to learn and update their knowledge independently; teachers should have a certain degree of ethical knowledge, and they should carry out the design, development and application of AI in a way that conforms to the ethical principles of the integration of educational AI into the practice of education to provide students with humanistic care and care. In recent years, the scope of interdisciplinary studies has spread to potential disciplines and fringe disciplines, and new cross-cutting areas will be generated in the future. The core element of the development of a new generation of AI is the cultivation of composite talents in the era of AI with a combination of generalization and specialization, erudition and refinement. In this way, institutions of higher education should create a new curriculum system suitable for their own schools, explore and improve the path of cultivating "AI + X" composite talents, and take the cultivation of "AI + X" composite talents as the core to push forward the in-depth fusion of higher education majors and AI, and to promote interdisciplinary fusion of higher education major construction.

4.2 Exploration of Cultivation Factors

The exploration and practice of the "AI + X" talent cultivation model for colleges and universities are deepening. By building a composite talent cultivation system, reforming the teaching mode, and strengthening cooperation with enterprises, colleges and universities are striving to combine social job requirements with on-campus practice, aiming to cultivate students with the application ability and quality of penetrating and integrating with the industry while mastering professional knowledge. This educational model aims to form a personalized and replicable talent training model, which provides a valuable reference for the cultivation of "AI + X" multifaceted and complex talents in colleges and universities.

In this process, students' interdisciplinary comprehensive ability, curriculum system, teaching methods, educational resources and teaching evaluation become the main cultivation factors. Different majors need to implement different cultivation programs and set up corresponding curriculum systems according to the characteristics of their specialties. In this way, students can master professional knowledge and, at the same time, keep up with the forward-looking skills of the AI era, thereby being highly integrated with the needs of the society and becoming professionals with comprehensive abilities.

Teachers and students are an inseparable whole. In the constant advancement of the times, teachers also need to actively learn new knowledge in order to better teach and educate their students and promote their holistic development. The establishment of Teachers' Collaborative Learning Community (TCLC) promotes collaboration and professional development among teachers through shared leadership and authentic problem-oriented learning, which provides students with more diversified learning experiences and deeper knowledge understanding (Li & Su, 2020).

At the same time, the promotion of the modes of industry-education integration, work-university integration, industry-academia cooperation and school-enterprise cooperation has provided students with more practical opportunities and a platform for contact with industry, which not only helps to improve students' skills and provides enterprises with opportunities to participate in the cultivation of talents but also jointly promotes the in-depth integration of education and industry. Through such cooperation, more high-quality technical and skilled talents, skilled craftsmen and great national craftsmen can be cultivated to meet the needs of socialist modernization.

5. Advice on Improving Teaching Practices in the AI Direction

5.1 Enhancing Theoretical and Technical Knowledge

Following the exploration of the factors influencing student performance and teaching practice methods in the previous chapters, it can be observed that to enhance students' learning capabilities in the direction of AI, it is necessary to first strengthen their theoretical and technical knowledge. By solidifying students' professional competence through the study of relevant theories and the teaching of technical knowledge, high-quality, top-tier talents in the field of AI can be cultivated.

5.1.1 Fostering relevant theoretical learning

In order to enable students to quickly adapt to the needs of the workplace in the AI era, universities need to incorporate the theoretical knowledge of AI into their teaching and be innovative enough to combine AI elements with specialized teaching in order to achieve synergistic effects. Some domestic universities, such as Shanghai Jiao Tong University, Tsinghua University and Nanjing University, have already seized the opportunity of AI development, which are actively promoting the development of AI education through the establishment of research institutes and cross-research centers.

All colleges and universities should pay attention to the teaching of AI and integrate it into all courses. First of all, universities need to build up a professional teaching team because excellent teachers are the key to talent training. As Mr. Duan Chongzhi, President of the Chinese University of Hong Kong, said, it is necessary to attract top talents in the AI industry to serve as visiting professors so as to change students' mindsets. Secondly, universities need to keep updating their teaching facilities and equipment, eliminating outdated information systems and curricula, and keeping up with the pace of technological development. Finally, colleges and universities should prepare specialized teaching materials according to the characteristics and teaching needs of different disciplines so that students can learn AI-related knowledge selectively and develop corresponding abilities through the use of intelligent software or program writing. In addition, students can be provided with the necessary guidance to help them navigate through the AI era.

5.1.2 Enhanced teaching of technical knowledge

In China, many colleges and universities still use the traditional teaching model for specialized courses, which is often out of touch with changing social needs, relies on outdated textbooks and scientific research results, and lacks the innovation to keep up with the speed of change in the marketplace, resulting in the cultivation of talents that cannot meet current needs. Wang Shuguo, President of Xi'an Jiaotong University, emphasized the need for universities to change their traditional, closed approach to teaching and learning, as many new ideas, concepts and technological innovations do not originate from within the campus but from the outside world. He warned that universities may be marginalized by society if they remain focused on rankings and paper publication.

Therefore, universities must urgently reform their professional curricula to meet the needs of the AI era. In modern society, instead of being limited to the traditional university environment, learning and education should be extended to a wider space. With the wide application of AI technology, the teaching of technical knowledge has become increasingly important in the talent training programs of universities. In the current complex and changing economic environment, if the teaching of professional practice is insufficient, students may be out of touch with society, affecting the development of their ability to cope with problems, analyze and judge, learn and innovate. This may result in students excelling in theoretical learning but failing to solve problems effectively when they encounter them in practice.

Colleges and universities need to realize that in the era of AI, society needs elite talents with high quality. Therefore, the colleges and universities should strengthen the teaching of technical knowledge and train students to not only master theoretical knowledge but also have practical skills in order to meet the expectations of society for professionals.

5.2 Enhancement of Specialized Basic Learning

As indicated in Chapter 3, students' study time and course participation have a significant impact on their academic performance, which is inextricably linked to their professional foundation. These two factors determine the extent to which students master the basics of their field. Therefore, reinforcing the learning of professional fundamentals is crucial, especially considering the varying levels of professional foundation among different students. A solid scientific literacy is key to students' acquisition of professional knowledge, and the study of mathematical and scientific knowledge is indispensable for AI, as all areas of AI involve the application of mathematical and scientific principles. Consequently, by enhancing students' scientific literacy and strengthening their learning of mathematical and scientific knowledge, their professional foundational abilities can be significantly improved.

5.2.1 Enhancing students' scientific literacy

Scientific literacy is very important for students, with good scientific literacy greatly improving learning efficiency. However, many institutions tend to pay attention to the students' theoretical knowledge learning, ignoring the importance of students developing scientific literacy. Therefore, some students tend to learn inefficiently at the university and are not able to give full play to their abilities. Therefore, before students enroll, institutions should carry out relevant scientific literacy lectures in order to enhance the scientific literacy of students to help them better engage in learning. The same is true for the cultivation of composite talents of AI. Teaching the basic knowledge of AI courses or lectures in advance not only improves students' interest in learning but also provides convenience for future training. Therefore, after the students' initial understanding of the relevant knowledge, it is expected to be more helpful to learn the theoretical knowledge in this area.

5.2.2 Enhancing mathematical and scientific learning

Before integrating specialized knowledge and the theory of AI, it is necessary to first cultivate students' ability to systematically master the basic theories of AI, professional knowledge, basic methods and technical principles, and cultivate their knowledge acquisition ability, understanding and analyzing ability. Only after mastering these basic methods, principles and so on, can they be applied, practiced, and integrated with professional knowledge. Otherwise, they can only master the skin, do not know how to apply the relevant knowledge for data analysis, or cannot really apply it to practice, ending up with just mastering a certain theory.

Compared with liberal arts majors, there is demand for a stronger understanding and analytical ability in science and engineering majors. Therefore, teachers of different majors should train students' learning ability according to the professional characteristics of the teaching and set up corresponding courses to help them better digest and absorb, thereby enabling them to effectively master the basic theories and principles of AI.

5.3 Cross-Fertilization of School Specialties

Different institutions have different advantageous specialties, and the faculty strength of each school is also different. Therefore, when integrating the curriculum system of AI, it is necessary to cross-fertilize the advantageous specialties of the school because each institution knows more about its own advantageous specialties. By integrating the advantageous specialties and their mutual integration, it can better highlight the characteristics of the institution and its specialties, give full play to the advantageous disciplinary capacity of the school itself, and create the ecology of disciplines that have their own unique characteristics. At the same time, for teachers and students, they can better understand the fusion of the curriculum system and give full play to their theoretical and practical ability, thereby enabling the institution to complete the upgrading of digital intelligence as soon as possible.

6. Concluding Remarks

6.1 Research Results

6.1.1 Developing students' theoretical skills

On the basis of theoretical knowledge transfer, relevant experimental and practical sessions were arranged to give students the opportunity to put the theories they had learned into practice. Students were invited to participate in the research work of their supervisors to deepen their understanding of theoretical knowledge and practice their hands-on ability in actual research. In teaching, the emphasis was placed on cultivating students' critical thinking, independent analysis and problem-solving ability, and stimulating the sense of innovation. Academic lectures and seminars were organized to allow students to have extensive exchanges with experts to broaden their horizons and inspire their thinking.

The teaching of theoretical knowledge provided the basis for practical operation, while practice helped to consolidate theoretical knowledge. The cultivation of both theory and technology significantly improved the learning effect. Flexible application of theoretical knowledge to solve problems in practice developed students' comprehensive analytical ability and practical application ability. Discovering problems in practice and trying to solve them creatively by applying theoretical knowledge helped to cultivate students' creative thinking and innovative spirit. By emphasizing both theoretical and technical cultivation, students not only mastered a solid knowledge foundation but also had hands-on practical ability, thereby enhancing their competitiveness in employment after graduation. This mode of training cultivated students' awareness and habit of active learning and lifelong learning, laying the foundation for future sustainable development.

6.1.2 Strengthening students' capacity to apply technology

On the basis of theoretical teaching, sufficient experimental and practical courses were set up for students to do hands-on operation and cultivate the ability of practical application of technology. Students were organized to

participate in various technological innovation projects on and off campus, such as science and technology competitions, innovation and entrepreneurship, etc., in order to practice the skills of solving practical problems in the field. In addition, students were encouraged to utilize on-campus and off-campus resources to participate in corporate internships and social practices, and to apply their knowledge and skills in a real environment. Teachers and students actively interacted with each other, and teachers provided targeted guidance and feedback according to the actual situation of students to help them improve continuously. It created a campus culture that emphasizes practice and hands-on work, and stimulated students' enthusiasm for learning and applying technology.

Through rich practical training, students better transformed their theoretical knowledge into practical skills and improved their comprehensive application ability. In practice, students took the initiative to find and solve problems, and cultivated their innovative thinking and problem-solving ability. Mastering rich practical application skills enhanced the competitiveness of students' employment and broadened the space of employment development. Apart from discovering new problems in practice, the students explored new knowledge and skills on their own initiative and developed good habits of lifelong learning. The close cooperation between schools and enterprises effectively met the employment needs of enterprises and promoted the deep integration of production, learning and research.

6.1.3 Stimulating creative thinking in students

Students' curiosity and desire were cultivated to explore unknown things in teaching, and their intrinsic motivation was stimulated to actively think and discover problems. In the classroom, students were given the opportunity to think independently, thereby encouraging them to boldly put forward their own questions and ideas and constantly stimulating innovative thinking. In the teaching process, a relaxed environment was created that encourages innovation and tolerates mistakes, enabling students to dare to try and innovate without fear of making mistakes. Students were organized to participate in various kinds of innovation and entrepreneurship competitions, scientific and technological invention competitions and other practical activities, and cultivate innovation ability in hands-on practice. In addition, students were encouraged to integrate knowledge of different disciplines in their studies, analyze and solve problems from multiple perspectives, and improve their sense of innovation. Teachers interacted closely with students, gave timely feedback and guidance, and helped students continuously improve their innovative ideas.

Stimulating innovative thinking cultivated students' ability to analyze problems independently, put forward hypotheses and find solutions. In innovative practice, students put theoretical knowledge into action and improved their ability to operate and solve practical problems. An interdisciplinary perspective was conducive to the flexible transfer of knowledge to different scenarios and the comprehensive value of knowledge. Focusing on the cultivation of innovative consciousness and practical ability in teaching helped students realize and transform their innovative achievements. Innovative thinking and practical ability are the key qualities highly valued by employers, which are conducive to students' future employment development. The cultivation of students' innovative consciousness and ability can contribute to the innovative vitality and development power of the whole society.

6.2 Limitations of the Study

With the arrival of the AI era, there are obvious differences in the curriculum system of each university in China, and the quality of students' training is different due to the uneven education methods. Therefore, a series of problems may occur in the implementation of the "AI + X" composite talent cultivation system, such as insufficient educational resources, backward education methods and other reasons. With the influence of exam-oriented education in recent years, many college students seriously lack interest in learning, and they learn just for graduation and learning. Being faced with AI-related courses may produce resistance to the psychology, especially some of the liberal arts majors that are far away from computers. Their scientific thinking is poor, and sometimes it is difficult for them to understand the theoretical knowledge of computers, which requires a lot of bonding to really cultivate a large number of composite talents.

6.3 Future Prospects

The research achievements of this project have significant generalizability potential, and it is expected to apply them to a wide range of research areas as teaching and learning strategies continue to evolve.

By promoting undergraduate students' participation in research activities, this study aims to nurture their innovative thinking and research skills while optimizing process management. This not only stimulates the innovative spirit and ability of more students but also creates a positive research environment. Such an approach is in line with the goal of undergraduate education, which is to "strengthen fundamentals, emphasize practice, enhance quality, and encourage innovation," and lays a solid foundation for the university's goal of becoming a world-class university.

Promoting this teaching reform project can accumulate valuable working experience, which helps gain a deeper understanding of different student groups, program types, and training methods. It can promote collaboration among the team, facilitate summarizing the experience, refine effective methods and rules in a timely manner, and form a virtuous cycle of continuous improvement, thereby enhancing undergraduates' academic literacy more effectively.

Actively promoting all kinds of extracurricular scientific and technological innovation activities for college students can help to fully utilize related resources on campus. This not only makes it possible to successfully organize scientific and technological innovation activities but also cultivates more outstanding talents and realizes the double success of scientific research and talent cultivation.

6.4 Conclusion

In the field of education, this study encourages students to uphold the following developmental concepts: "Be courageous, explore potential, strengthen core competencies, pursue breakthrough growth, rewrite destinies, and create significant value." This means that students need to invest more time and energy, rationalize their study and life, and adopt effective learning methods in order to achieve self-transcendence and surpass others. Learning is the foundation of all achievements and the embodiment of core competitiveness, which must be emphasized and strengthened, and must not be wasted.

At the talent development stage, time is precious and students should pursue breakthrough growth each semester and achieve sustainable development through successive qualitative leaps, which will be an important step at the turning point of their lives. If these principles are followed, students will be able to truly become successful and shine wherever they are, bringing positive impact and value to others, society and the nation.

In the practice of education reform, valuable experience and lessons have accumulated, which provide reference for teachers' work. Future research should continue to explore and improve in order to maintain and enhance the quality of students, as well as to innovate educational methods to cultivate talents with innovative spirit and practical ability.

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Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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