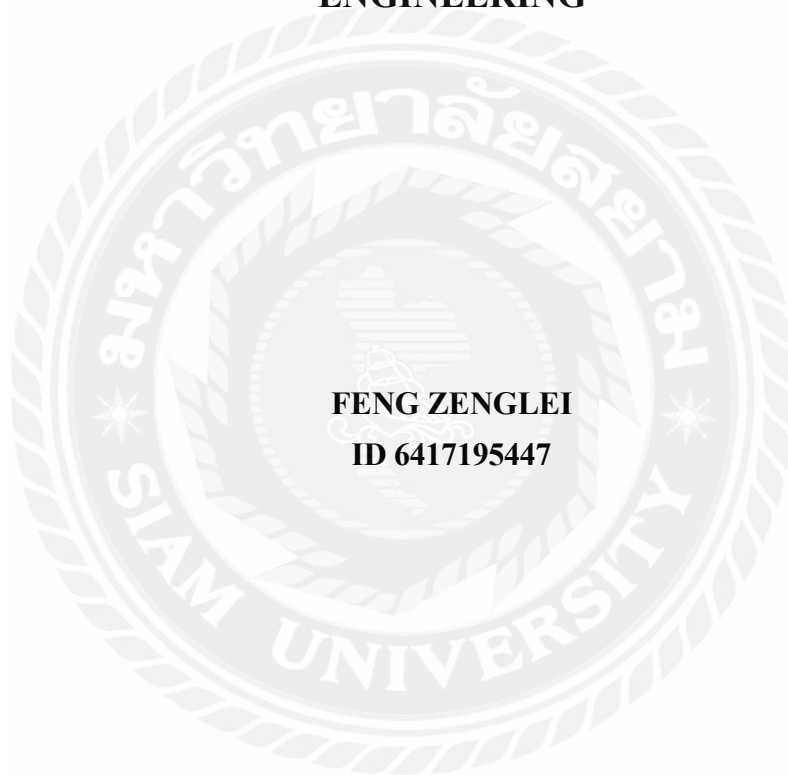# STUDY ON PROJECT-BASED TEACHING MODE FOR AUTOMOTIVE MAJORS AT SHANDONG UNIVERSITY OF ENGINEERING

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AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER'S DEGREE OF BUSINESS ADMINISTRATION GRADUATE SCHOOL OF BUSINESS SIAM UNIVERSITY

2023

STUDY ON PROJECT-BASED TEACHING MODE FOR AUTOMOTIVE MAJORS AT SHANDONG UNIVERSITY OF ENGINEERING

Thematic Certificate

To

FENG ZENGLEI

This Independent Study has been Approved as a Partial Fulfillment of the Requirement of International Master of Business Administration in International Business Management

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Siam University, Bangkok, Thailand

Title: Study on Project-Based Teaching Mode for Automotive Majors At Shandong University of Engineering

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Degree: Master of Business Administration

Major: Education Management

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ABSTRACT

The purpose of this article is to understand the evaluation of project-based teaching by automotive students in vocational skills training, provide a basis for the next step of project-based teaching reform, and investigate the changes in cognitive levels of different types of population factors. A quantitative study was conducted by conducting a survey questionnaire on 200 students who have passed the 2021 automotive major at Shandong University of Engineering in Shandong, Shandong Province. Analyzed the evaluation of project-based teaching mode by gender, family background, educational level, and academic performance of 2021 automotive major students at Shandong University of Engineering.

Through analysis, it was found that undergraduate students majoring in automotive have a higher evaluation of project-based teaching. Secondly, by examining the perspectives of project-based teaching based on gender, family background, educational level, and academic performance. There are significant differences between educational levels and academic performance beyond gender and family circumstances. Undergraduate students have a higher level of theoretical knowledge reserve, mastery and improvement of vocational skills in the project-based teaching process than junior college students and five-year consistent students. Those with excellent academic performance (in the top 20% of the class) have a higher level of learning enthusiasm and a lower awareness of self-directed learning compared to those with

average academic performance (in the bottom 80% of the class) in the project-based teaching process. Finally, reflections, discussions, and suggestions were made on the results of this study.

Keywords: vocational colleges, project-based teaching, Project-based teaching in vocational colleges and universities, perception level

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Time flies, we will say goodbye to study life. The completion of the thesis represents that I have completed the final task in my study and will start a better life. In the process of learning, I have gained a lot and experienced a lot. Thankyou for your careful instruction. I was deeply impressed by your rigorous academic spirit, teaching characteristics, enthusiasm and tolerance. Thank you for your support and encouragement, which has made my learning path so varied and unforgettable.

Thank the students accompany me to enjoy the happy campus life, accompany me to spend a good time, accompany me through the difficulties of life, always accompany me to advance and retreat. I am very grateful to my Alma mater. Although soon to graduate, but my feelings for the Alma mater is still very strong. Alma mater gave me the key to open the door of society, let me stand on a new starting point. The school gave me meticulous care, let me happy through the transition stage from campus to society, gave us a good start in the future work and life, but also gave me great confidence in the face of future social life challenges.
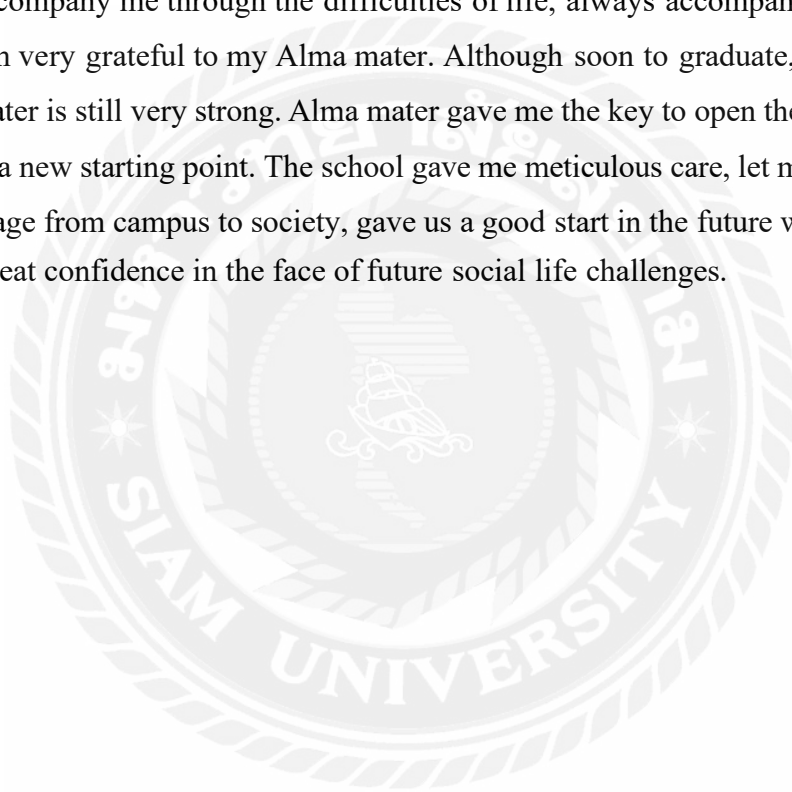
Declaration

I, FengZengLei, hereby certify that the work embodied in this independent study entitled " *Research on the Construction of Ideological and Political Education Network Resources in Colleges and Universities from the perspective of Personalized learning* "is result of original research and has not been submitted for a higher degree to any other university or institution.

(FENG ZENGLEI)

May 05, 2023

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1. Introduction

1.1 Research Background

Project based teaching is a teaching activity conducted by teachers and students through the joint implementation of a complete project work. The earliest date can be traced back to the second half of the 16th century, when architectural schools in Rome, Italy organized architectural design competitions, requiring students to use the relevant knowledge they learned to design architectural plans. In the early 18th century, it gradually developed into a work-study education in the European region, with good results. In the late 18th century, various countries in Europe and America successively established industrial and vocational schools, and the use of "projects" for teaching gradually expanded to multiple fields. At that time, such project-based activities were mainly used as graduation assessments for vocational school students, laying an early practical foundation for the formation of project-based teaching methods. In the 19th century, cooperative education in the United States usually divided students into two parts. One part of the students learned knowledge on campus, and the other part worked in a local factory. After a week, the two groups of students exchanged ideas, forming a cycle of "work study alternation". In the middle and late 20th century, in the context of the industrial society and the information society, the global teaching reform set off an upsurge, and the project teaching method received extensive attention, tending to be mature and perfect. (Cheng& Sang, 2021). The project-based teaching model is very suitable for the relevant technical level of engineering students, and is constantly favored by engineering majors in universities, especially vocational colleges.

Shandong University of Engineering was established in 2004, and the School of Automotive Engineering was established in 2007. It is one of the characteristic majors of Shandong Vocational College. In 2019, under the background of the national "three education reform", Shandong University of Engineering introduced a project-based teaching model to the School of Automotive Engineering to improve teaching quality, enhance students' learning enthusiasm, enhance their professional and technical level, and increase their employment rate. However, due to the relatively short introduction time of project-based teaching mode, there is currently no comprehensive and complete understanding of whether project-based teaching meets the vocational skills training requirements of automotive students at Shandong University of Engineering, and whether students are satisfied with the practical application of project- based teaching.

1.2 Research question

In order to gain a more comprehensive and complete understanding of whether the project-based teaching model is in line with the teaching of the automotive major at Shandong University of Engineering, the following questions are raised:

1. Is there have significant differences in the recognition and evaluation of project-based teaching models among students of different genders?

2. Is there have significant differences in the evaluation of project-based teaching models among students from different family backgrounds?

3. Is there have significant differences in the evaluation of project-based teaching models among students with different educational levels?

4. Is there have significant differences in the recognition and evaluation of project-based teaching models among students with different academic achievements?

1.3 Objective of the study

Through the study of the above issues, the ultimate goal is to achieve the following, in order to obtain the reform situation of project-based teaching mode in Shandong University of Engineering.

1. To determine significant differences in the recognition and evaluation of project-based teaching models among students of different genders.

2. To determine significant differences in the evaluation of project-based teaching models among students from different family backgrounds.

3. To determine significant differences in the evaluation of project-based teaching models among students with different educational levels.

4. To determine significant differences in the recognition and evaluation of project-based teaching models among students with different academic achievements.

1.4 Scope of the study

Through reviewing relevant literature on project-based teaching in vocational colleges, it was found that there are a total of 47 articles and references on overly project-based teaching, including 22 articles on project-based teaching in automotive majors in vocational colleges, 13 articles on project-based teaching, and 9 articles on automotive majors. Based on the analysis and research process and results of the above article, it is decided to adopt constructivist theory

and educational communication theory as the theoretical basis for this study.

This study used a paper questionnaire format, targeting 200 second year college students in 2021. With the help of staff from Shandong University of Engineering, a total of 200 questionnaires were distributed to students from March 2023 to May 2023, and all questionnaires were successfully returned with a 100% effective rate.

1.5 Research Significance

The research on the connection between automotive students and project-based teaching models has to some extent enriched the theory of vocational skills training in automotive majors and also helped shape the concepts of university managers. It has a positive effect on promoting the employment of automotive students.

1.6 Theoretical framework

This article starts from the actual situation of project-based teaching mode in the automotive industry, and studies the cognitive level of project-based teaching among college students of different genders, family backgrounds, educational levels, and academic achievements in the automotive industry through the construction of idea theory and educational dissemination idea theory.
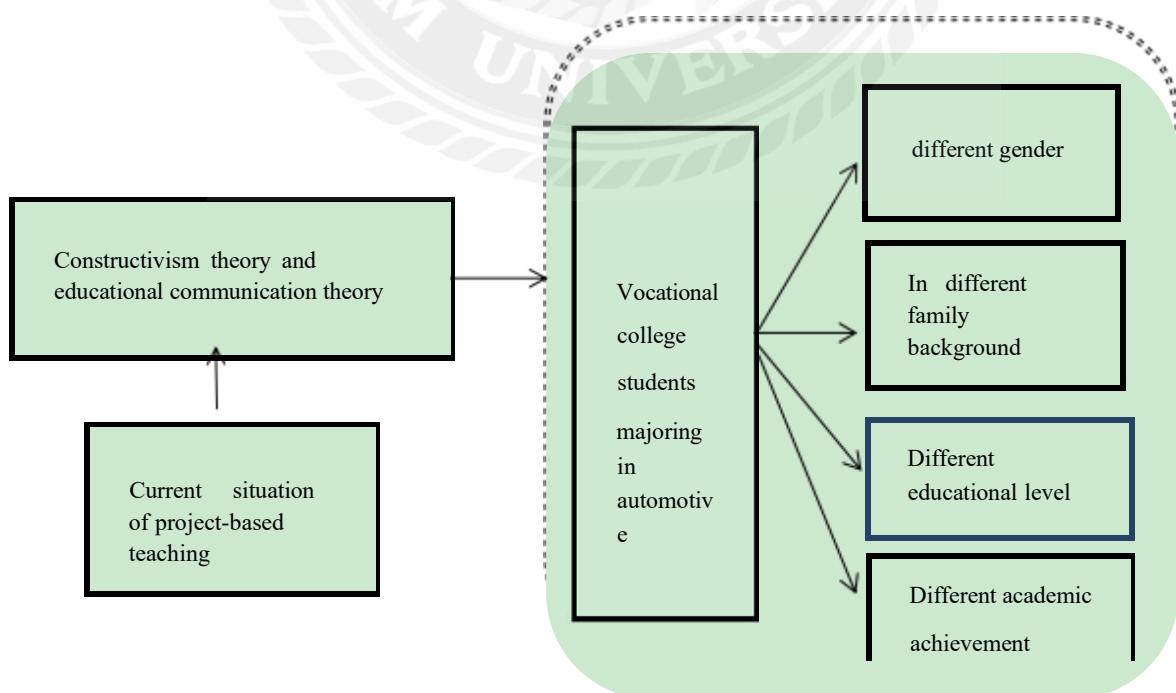
1.7 Hypotheses

H1: There are significant differences in the recognition and evaluation of project-based teaching models among students of different genders.

H2: There are significant differences in the evaluation of project-based teaching models among students from different family backgrounds.

H3: There are significant differences in the evaluation of project-based teaching models among students with different educational levels.

H4: There are significant differences in the recognition and evaluation of project-based teaching models among students with different academic achievements.

2. Literatures Review

2.1 Vocational colleges

After socialism with Chinese characteristics entered a new era, the characteristics of higher vocational colleges and universities became increasingly prominent. Under the requirements of cultivating virtue and cultivating people, vocational colleges and universities should not only cultivate special technical talents for the society, but also cultivate talents with excellent moral quality for the society, and it has become an important form to play the role of campus culture to improve the quality of students. By analyzing the current situation of campus culture development of Zhengzhou Information Engineering Vocational College and combining the characteristics of higher vocational colleges, suggestions for the development of campus culture in higher vocational colleges in the new era are put forward (Liu, 2020).

With the sustainable development of the economy and society, the demand for high-skilled talents has gradually increased, and how to create excellent and high-quality talents in a shorter time and more effective space requires the coordination of the government, enterprises and schools, establish industrialized vocational colleges in line with the trend of social development. However, at present, there is a widespread problem in domestic vocational education that the industry-specificity of vocational colleges and universities is not obvious and the advantages are not outstanding. To this end, reinterpret the connotation of industrialized vocational education, explore the principles of industrialized vocational education construction on the basis of fully understanding its characteristics, and summarize the practical experience

of industrialized vocational education with the help of successful cases. It is conducive to guiding the development of vocational education in China in a more scientific and reasonable direction, and effectively improving the discourse power and social status of vocational education (Cheng, 2016).

The comprehensive docking of talent training and talent demand in vocational colleges includes two main aspects, one is the docking of professional knowledge and skill training and talent demand, and the other is the docking of professional attitude and ideological quality education and talent demand. The latter is the weak linkin talent training in vocational colleges at present, and its main manifestation is that students cannot adapt and recognize the corporate culture in time,which affects the comprehensive docking of talent training and talent demand. Vocational colleges must take multiple measures according to their own characteristics of running schools, vigorously introduce and publicize corporate culture, and truly realize the comprehensive docking of talent training and talent needs (Liu, 2007). It can be seen that vocational colleges pay more attention to the current development of related industries, hope that the teaching content is consistent with the industry content, the teaching goals are in line with the industry requirements, and hope that their own development can keep up with the development of the industry.

For a long time, the state has attached great importance to the cultivation of skilled talents and issued a series of policies. With the upgrading of the industry, enterprises have put forward diversified needs for technical talents, and graduates trained by vocational colleges need to adapt to the new requirements of enterprises. Under the background of the integration of industry and education, vocational colleges and enterprises have begun to strengthen cooperation, and have set up various types of characteristic classes to carry out order-based talent training. This training model is guided by the needs of enterprises, fully gives full play to the advantages of both schools and enterprises, clarifies training goals, rights and obligations, and cultivates talents closely around the needs of enterprises, so as to achieve the talent training results of "1+1> 2". Based on years of practical experience in accounting teaching and the orientation of enterprise talent demand, the author takes the accounting major of a vocational college in Huai'an City as an example, analyzes the order-based talent training mode of accounting in vocational colleges, summarizes the results, analyzes the existing problems, and puts forward the optimization plan of the talent training model from the four levels of government, school, enterprise and student (Zhao, 2022).

Nowadays, the level of informatization has developed greatly, intelligent transportation has been continuously developed, and modern comprehensive transportation modes are taking shape, which requires a large number of professional and dedicated skilled personnel. By discussing the connotation of "craftsman spirit" in the field of transportation vocational education, this paper discusses the characteristics of students, from the formulation of talent training programs, the improvement of teaching methods, the optimization of assessment methods, the construction of campus culture, The integration of innovation and entrepreneurship education optimizes the talent training model, and proposes a talent training system based on the "craftsman spirit", aiming to cultivate talents with both skills and professionalism, to provide reference and reference for the development of transportation vocational colleges (Cheng, 2019).

It is of great significance to regularly organize and carryout national skills competitions of water conservancy vocational colleges. The skills competition of water conservancy vocational colleges has the characteristics of "wide coverage, early opening time, excellent system design, and strong social effect", and can achieve "promoting teaching by competition, learning by competition, training by competition, construction by competition, and alliance by competition" function, and then achieve the educational goal of "educating people with competition" (Zhang, 2018). Similarly, the teaching model of vocational colleges is more inclined to practical application, and the goal is to cultivate high-quality skilled talents in demand by the industry.

2.2 Project-based teaching

Project-based pedagogy is a teaching activity in which teachers and students work together to implement a complete project work. It is a type of "behavior-oriented" pedagogy. A project is a planned work with a fixed start time and end time (Xiang, 2012). As a new teaching mode, the essence of project-based teaching method is a learning method based on work tasks, and the ultimate goal is to improve the comprehensive vocational ability of students in vocational colleges.

According to the national plan for the long-term development of education, in order to comprehensively improve the comprehensive quality of students in vocational colleges and universities, and provide the society with first-line mechanical construction technology specialized talents, vocational colleges and universities should take the initiative to apply

project-based teaching in the curriculum to meet the needs of the profession for career development while carrying out effective teaching reform (Chen, 2022).

Project-based pedagogy is fundamentally different from traditional pedagogy, The traditional teaching method is based on textbooks as the carrier, teachers as the basis, theoretical knowledge as the focus of teaching, in teaching, emphasis on theory over practice, rationality over sensibility, and results over process, always teach students knowledge first, and then let students learn knowledge. This passive knowledge-receptive teaching makes it difficult to get students interested in the content. The project-based teaching method is different, which is based on the project,student-oriented, and task-oriented, so that students can realize knowledge in action Suction. This teaching method not only stimulates students' intellectual curiosity and interest in building regulations Moreover, it can cultivate students'vocational ability according to professional needs, so that they can apply the theoretical knowledge of construction laws and regulations to practical tasks, which is also very beneficial to improve students'comprehensive ability. It can be said that the adoption of project-based teaching methods is of great significance for improving the comprehensive vocational ability of students in vocational colleges, so it is very necessary to use project-based teaching methods to teach construction laws and regulations (Yun, 2014). It can be seen that the project teaching mode has been valued by vocational colleges with its superior teaching methods and means, and vocational colleges are also actively discussing the ways and methods of project-based teaching mode reform, hoping to apply the project-based teaching mode to teaching as soon as possible.

First, project-based teaching, as a new teaching curriculum implementation method, increases the investigation of teachers' ability and energy, and improves the ability to apply comprehensive knowledge to classroom teachers, and also requires them to have rich practical guidance capabilities, and have sufficient understanding of the existing project-based design of enterprises, so as to formulate tasks that are more inline with the teaching direction for students. Second, students' ability to accept increased practical tasks also needs to be rigorously examined (Chen, 2022). In the practice of project-based teaching, if all projects adopt constructivist learning theory to design and implement, there will be some problems. For example, in teaching, teachers often let students start to do it after giving some guidance to students, but for students who are new to the first project of a course, it is difficult to have a completely correct understanding of the knowledge points involved, so that there will be many problems in the hands-on process, and it takes a lot of time to correct some misunderstandings,

resulting in learners in a state of heavy cognitive load when using their cognitive processing ability. It is easy to cause students' boredom and increase the time for teachers to repeat guidance (Dai, 2012).

At present, the teaching equipment of many vocational colleges cannot meet the needs of group teaching The training room is not built according to the needs of completing the work project, the practical training place dedicated to the graphic design course cannot complete the comprehensive design training, does not have the function of productive practical training, and cannot complete the project in the classroom according to the process of doing the project in the enterprise, so it is difficult to ensure the quality of project-based teaching, and it is difficult to closely connect with the needs of enterprises and society (Pu, 2011). Project-based teaching methods are relatively single, the corresponding teaching equipment is relatively backward, and the equipment guarantee work is not in place. This has seriously affected the smooth development and advancement of the reform of numerical control practical training project-based teaching. Due to the limited economic strength of vocational colleges, it is difficult to invest too much money in updating and improving equipment, and some models of practical training equipment are old and the aging phenomenon is serious. In the specific practical training teaching work, students have insufficient understanding of the equipment and insufficient practice, and cannot combine theoretical knowledge with practical experience (Lei & Su, 2021). Also in the process of reforming the project-based teaching model, some problems have arisen, such as teacher ability, assessment methods, and experimental training environment.

2.3 Project-based teaching in vocational colleges and universities

Project-based teaching in vocational colleges and universities is conducive to improving students' ability and quality, promoting teachers' professional development, improving the quality of classroom teaching, highlighting the characteristics of practical school-running, and driving the overall reform of schools. At present, there are problems such as unreasonable project design, imperfect support system, weak professional ability of teachers, low student participation, and imperfect assessment and evaluation mechanism in carrying out project-based teaching in vocational colleges Practical teaching platform, improve teachers' professional ability, develop new forms of teaching materials, strengthen the in-depth participation of enterprises, and innovate assessment ad evaluation methods (Du, 2022). As a

relatively new teaching method, project-based teaching method is more effective if used properly.

Otherwise, little is achieved. Therefore, it is necessary to carefully summarize the various problems encountered by project-based teaching methods in the teaching of numerical analysis courses, study the main factors affecting its teaching effect, and then continuously improve teaching (Xiao, 2016). The introduction of enterprise talents to participate in professional practice teaching, in view of the current situation of many students and few professional teachers in some colleges, you can introduce skilled craftsmen of enterprises to participate in practical teaching in school, shorten the distance between schools and enterprises, and the extensive professional implementation and skilled practical skills of enterprise technicians can also greatly improve students' curiosity and concentration, so as to effectively promote the effect of classroom teaching (Gao, 2014). In recent years, the employment-oriented project-based teaching model and curriculum system have been gradually revised and improved with the efforts of vocational education workers across the country, and a variety of assessment methods, methods, and assessment systems from different perspectives have been proposed accordingly. This topic mainly studies how to evaluate students' learning effect in employment-oriented project-based teaching from the perspectives of knowledge and skills, vocational quality, graduation guidance and employability (Hao, 2015).

2.4 perception level

Stimulating students' behavioral aspirations and developing students' behavioural abilities are the core objectives of the project.   Learn to deal with various positions incorporate financial management (e.g. cost management positions, budget management positions, finance Practical tasks, including students, are the core objectives of the programme Willingness to do financial work and being competent for the post are the two major elements, and they are also the teaching significance and value of the projectin (Cao, 2019).

Project-based learning is a kind of learning that places learning in complex, meaningful, and real problem situations, allowing students to cooperate through cooperation a teaching model in which real problems aresolved to learn the scientific knowledge behind the problems, to form problem-solving skills, and to develop self-directed learning ability. It can not only solve the shortcomings in the current teaching, but also an effective way to cultivate students' literacy. Schools can implement project-based learning through four creative restructuring

strategies: transforming subject courses into problem-driven subject inquiry courses, deepening inquiry-based courses into problem-solving inquiry courses, optimizing integrated practical activities into inquiry-based activity design, and integrating different types of courses (Lv, 2019).

STEM education solves practical problems with interdisciplinary learning, which can break the singularity and closure of project-based teaching, promote the occurrence of deep learning, and improve the quality of training of middle-vocational compound skills. This paper first analyzes the feasibility of STEM education for promoting deep learning, then constructs a teaching model of STEM projects based on deep learning, and finally takes the secondary vocational e-commerce profession as an example, the implementation path of this teaching model is constructed. The implementation of this teaching model is in line with the country's positioning of vocational education and the demand for talent literacy under the new economic format (Chen, 2021). PLC the course is one of the important courses in the higher vocational electrical engineering major, which not only has an important impact on improving students' vocational skills and students'job search, but also is a basic course in the direction of electrical engineering, and is a key step for students' further development and research. With the continuous reform of higher vocational education, PLC courses also need to be comprehensively transformed and upgraded to adapt to the current educational environment and meet the needs of society and enterprises for electrical engineering talents. Taking this as the research background, the implementation path of PLC course teaching reform is explored from the three directions of implementation preparation, implementation of multiple teaching methods, and application skills competition (Han & Liao, 2021).

3. Research Methodology

This article adopts a quantitative research method. Research on the cognitive level of university students towards project-based teaching under different backgrounds during the promotion process of project-based teaching, in order to provide valuable basis and experience for the next step of project-based teaching.

Firstly, based on the research background and content, past research and principle analysis on project-based teaching, vocational colleges, teaching effectiveness, and the teaching situation of project-based teaching in vocational colleges were collected and classified through literature analysis methods.

Secondly, a survey was conducted on the cognitive level of project-based teaching mode among vocational college students of different genders, educational levels, family backgrounds, and academic performance backgrounds through a questionnaire, and conclusions were drawn. The content of the survey questionnaire includes: Table 1 Student Information of Shandong Engineering Vocational College 2021 Automotive College，Table 2 Student evaluation of project-based teaching，Table 3 Comparison of project-based teaching concepts among students from different family situations，Table 4 Cognition of project-based teaching at different educational levels，Table 5 Comparison of differences in project-based teaching evaluation among students with different academic achievements。

Specifically, the four scores are multiplied by 30% on a 100-point scale, multiplied by 40% on a 100-point scale for completing tasks, multiplied by 15% on a 100-point scale for class performance, and multiplied by 15% on a 100-point scale for assignment, and then subtracted from the subtraction score to get the score for the usual grade（Jiang，2020）. The research work must scientifically and objectively reflect the actual needs of the market, which is the basis for subsequent stages. If there are no accurate and objective research results, the training goals determined by this will be inaccurate and will affect students'employment（Zhang, 2008）.

Quantitative analysis method was select the automotive major students from Shandong University of Engineering, Shandong Province to conduct a survey questionnaire. A total of 200 questionnaires were collected and 200 valid questionnaires were completed, with a 100% effective rate. The survey questionnaire is divided into two parts: 1. Personal information of college students, including gender, family background, personal educational level, and academic performance. 2. Regarding the evaluation of project-based teaching by students in the actual process of vocational and technical learning, it mainly includes the storage of project-based theoretical knowledge, the evaluation of their own vocational skill level, and the evaluation of the degree of vocational skill improvement.

In terms of the effectiveness rate of the survey questionnaire, those with a recovery rate above 60% are considered valid, while those with a recovery rate below 40% are considered invalid. Meanwhile, the IOC value is 0.72. After calculation, the questionnaire's " The coefficient is 0.80. Meanwhile, the overall reliability coefficient of each question in this questionnaire is 0.90 " The values are significantly higher than 0.91, indicating that the overall credibility of the questionnaire in this study is extremely high.

The data collection was conducted through a survey questionnaire. After collection, the survey questionnaire was organized, and then the data was organized using Excel software and imported into SPSS for data analysis. By analyzing the frequency and percentage of data, the statistical variables of the number of students majoring in automotive at Shandong University of Engineering were obtained, including their gender, situation, educational level, and academic performance. The average and standard deviation obtained are used to determine the evaluation of project-based teaching in vocational skill learning, as well as the specific performance of project-based teaching evaluation. Use t-tests to determine the views of students of different genders, family situations, educational levels, and academic achievements on project-based teaching.

Finally, based on the results of the survey and research analysis, summarize and propose my own suggestions for this study.

4. Finding

From Table 1, it can be seen that there are 190 and 95% male students in the automotive major of Shandong Engineering Vocational College, with 10 and 5% female students. Through this survey, it was found that the number of male students is much higher than that of female students. The survey found that the family situation of automotive major students is mainly concentrated in urban areas, accounting for 80.5%, while rural areas account for 19.5%. The proportion of undergraduate, junior college, and five-year consistent students in the educational level is 41.5%, 37.5%, and 21%, respectively. The final academic performance was 54.3%.

Table 1 Student Information of Shandong Engineering Vocational College 2021 Automotive College

Background Variables	Group	Number	Percentage
Gender	Boy	190	95
	Girl	10	5
Family Backgrounds	Urban	161	80.5
	Rural	39	19.5
Educational level	undergraduate	83	41.5
	junior	75	37.5

|			
	a five-year consistent system	42	21
Academic Achievement	Good	43	21.5
	Ordinary	157	78.5

From Table 2, it can be seen that automotive students have a higher level of perception of vocational skills in the project-based teaching mode. From various dimensions, the average value is higher than 3.6. Therefore, students majoring in automotive at Shandong University of Engineering have a higher level of career perception in the project-based teaching mode.

Table 2 Student evaluation of project-based teaching

Items	N	Mean	SD	Interpretation
1. Before learning skills, project-based teaching content has already been learned.	200	3.4	0.70	high
2. Proficient in mastering the relevant experimental equipment of the project-based teaching laboratory	200	3.5	0.79	high
3. Before the overall training, I had already understood the shortcomings of my professional skills.	200	3.48	0.79	high
4. Before each project-based course learning, be able to understand the goals of vocational training courses in advance.	200	3.54	0.8	high
5. Able to complete vocational skills training tasks within the specified time frame.	200	3.70	0.73	high
6. I will use my spare time to complete vocational skills	200	3.22	0.80	high

training under project-based teaching mode.

7. Before starting project-based course learning, I will 200	3.53	0.83	high
prepare a study plan in advance.			
8. Before proceeding with project-based course learning, 200	3.81	0.71	high
my teacher will provide abundant learning resources.			
9. I believe that establishing a comprehensive project- 200	3.82	0.70	high
based teaching resource library is beneficial for improving vocational skills.			
During the project-based course learning process, teachers 200	3.81	0.71	high

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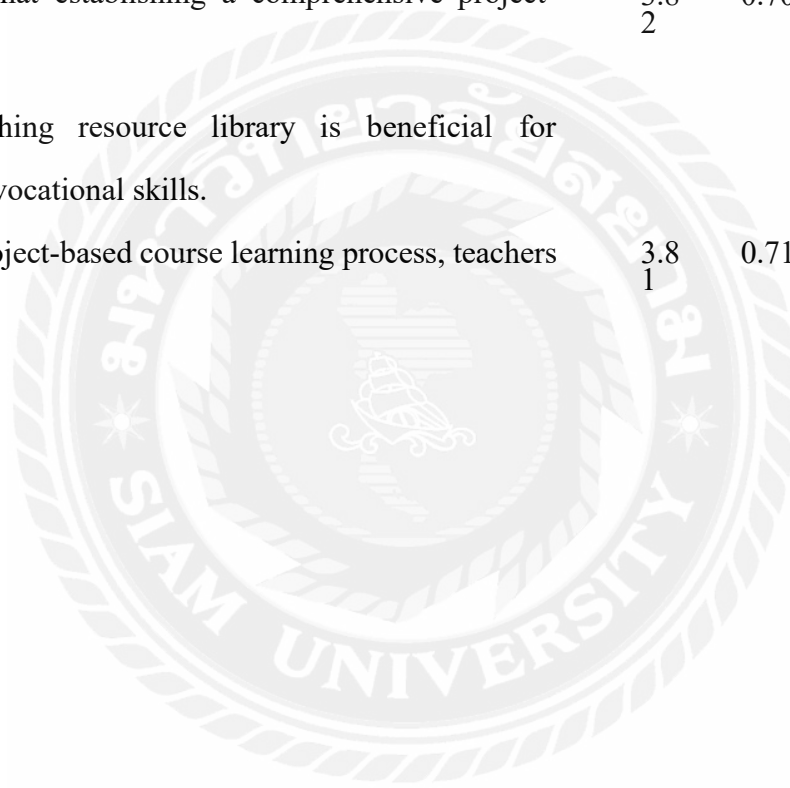
will observe and evaluate the learning process of each

student.

11. My teacher will evaluate students' learning outcomes 200	3.60	0.69	high
based on their learning process.			
12. My teacher will evaluate students based on their 200	3.91	0.68	high
learning outcomes			
13. My classmates will evaluate my learning process and 200	3.72	0.72	high
results.			
14. Adopting project-based teaching courses has greatly 200	3.73	0.71	high
helped me master professional skills.			
After studying project-based teaching courses, I have 200	3.73	0.60	high
paid more attention to the learning process.			

Total   high

The test results are shown in Table 3. Compared with different families, students' perception of project-based teaching is different. Because the total perception of Microteaching is 0.610, the other three items are 0.30, 0.48 and 0.51 respectively. Therefore, it is inevitable that this research hypothesis does not hold true. There is no significant difference in the views of students from different family backgrounds on Microteaching

Table 3 Comparison of project-based teaching concepts among students from different family situations

	Group	N	Mean	SD	t	sig
Project-based teaching	Urban	161	59.1	7.69	0.53	0.61
		39	58.03			

	Rural			8.21		
Knowledge reserve in project-based teaching	Urban	161	18.28	2.61	1.42	0.3
	Rural	39	17.75	2.90		
Perceived level of vocational skills	Urban	161	18.36	2.78	0.78	0.48
	Rural	39	19.19	2.67		
Degree of vocational skill improvement	Urban	161	22.13	2.94	0.53	0.51
	Rural	39	23.32	3.08		
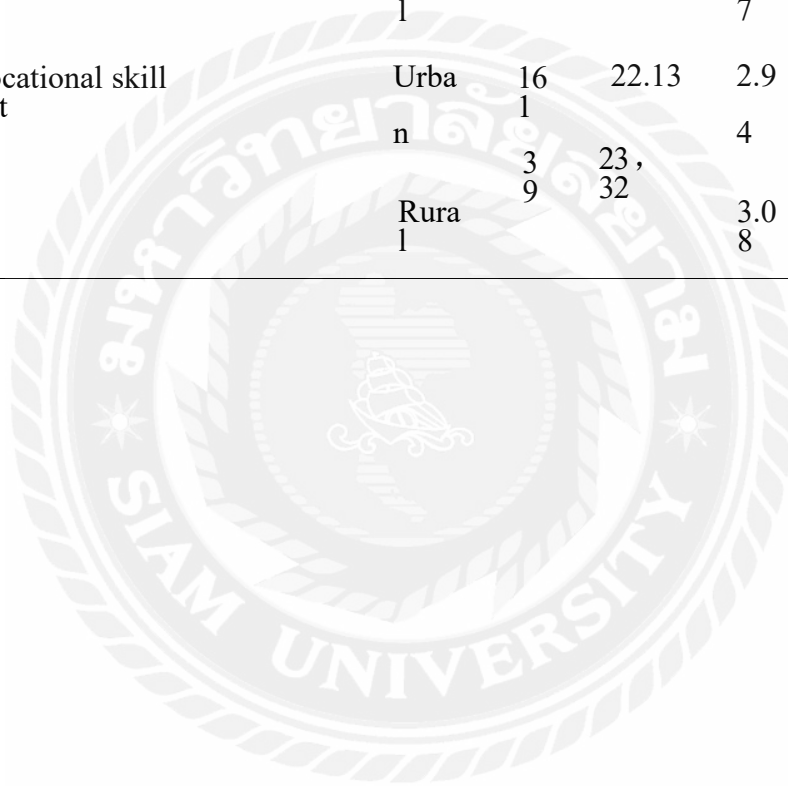
The test results are shown in Table 4. Among students with different educational levels, the sig values are 0.000, 0.000, 0.000, and 0.000, respectively, significantly less than 0.05. If H 1.3 is established, students with different educational levels have different perceptions of project-based teaching.

Table 4 Cognition of project-based teaching at different educational levels

	Group	N	Mean	SD	F	Sig
Project-based teaching	undergraduate	83	60.66	8.04	8.90	0.00
		75	55.58	6.53		
	junior	42	55.30	7.45		
Knowledge reserve in project-based teaching	undergraduate	83	19.80	2.83	6.20	0.00
		75	18.30	2.16		
	junior	42	17.30	2.96		
Perceived level of vocational skills	undergraduate	83	19.01	2.70	5.24	0.00
		75	18.60	2.45		
	junior	42	17.41	2.78		

Degree of vocational skill improvement	undergraduate	83	22.99	3.11		9.94	0.00
	graduate	75	22.22	1			
	junior	42	20.72	1 2.81 1 2.42			

As shown in Table 5 of the questionnaire results, students with different academic grades have different perceptual abilities towards project-based teaching. The signal in the perception of project-based teaching content reaches 0.00, so the sigs are 0.00, 0.00, and 0.00 respectively, all lower than the standard 0.05. Therefore, it is determined that there are differences in the perception of project-based teaching among different academic grades.

Table 5 Comparison of differences in project-based teaching evaluation among students with different academic achievements

	Options	N Sig.	M	SD	t	
Project-based teaching	Good	43	61.70	5.0	6.97	0.00
	Fair	157	55.12	9.06		
Knowledge storage in	Good	43	19.21	2.08	7.30	0.00

project-based teaching	Fair	1 5 7	16.85 2.88	
courses				
Perception of professional	Good	4 3	19.30 2.17	6.03 0.00
skills	Fair	1 5 7	17.30 2.82	
Knowledge storage in	Good	4 3	23.19 2.48	6.05 0.00
project-based teaching	Fair	1 5 7	20.96. 2.96.	
courses			9	9

The most important conclusion is as follows：

(1) There is a significant difference in the proportion of male and female students majoring in automotive.

(2) There is no significant difference in students' cognition of project-based teaching among different family situations

(3) Students with different educational levels have different levels of cognition towards project-based teaching, with the highest recognition at the undergraduate level.

(4) Students with beneficial academic performance have significantly better cognitive levels of project-based teaching than students with average academic performance.

5. Conclusion and recommendation

5.1 Conclusion

Through research, it was found that undergraduate students at Shandong University of Engineering have the highest level of cognition towards project-based teaching among students majoring in automobiles. Regarding variables related to different situations, gender differences were the research object, and there was a significant difference in the number of males and females during the survey process. This is related to the professional characteristics and current situation of the automobile major. Through analysis, there are significant differences in the

evaluation of project-based teaching among different educational levels. The higher the educational level, the higher the evaluation of project-based teaching effectiveness, which is a positive correlation.

Firstly, during the survey process, it was found that there was a significant difference in the male to female ratio in the automotive major at Shandong University of Engineering. Among the 200 students surveyed, it was found that there were 190 males and 95% females in the automotive major at Shandong University of Engineering, respectively, and 10% and 5% females. Through this survey, it was found that the number of boys is much higher than that of girls. This is determined by the professional characteristics of the automotive major, which leads to a huge deviation in the statistical understanding of project-based teaching among boys and girls.

Secondly, from the process of data statistics, it was found that there is not much difference in the cognitive level of project-based teaching among students from different family backgrounds at Shandong University of Engineering . This is closely related to the continuous improvement of modern society's education and teaching level, and the sharing of teaching resources is very important. From an essential perspective, the sharing of educational resources in higher education should be based on cultivating students, and through scientific scheduling and reasonable allocation of educational resources, Maximize resource utilization. Furthermore, the purpose of sharing educational resources is to educate students. Therefore, when promoting educational resource sharing, universities should prioritize students and adhere to the principle of student first, providing students with more opportunities to utilize high-quality educational resources and laying a solid foundation for their future growth.

Under different levels of education, vocational college students may experience biases in their perception and cognitive abilities towards project-based teaching. Among them, undergraduate students have the highest level of cognition towards project-based teaching, followed by vocational college students, and in the last five years, consistent students have the worst level of cognition. The main reason for this is that undergraduate students have relatively high educational levels, high learning enthusiasm, and the learning ability is the strongest among these three students with different educational levels. Therefore, in the process of project-based teaching, their perception of project-based teaching is also the strongest. Secondly, professional science students have relatively weaker cognitive levels of project-based teaching compared to undergraduate students, The main reason for this is that vocational students have weaker learning abilities and understanding of knowledge compared to undergraduate students, so their cognitive and understanding abilities of project-based teaching processes are not as good as those of undergraduate students. The cognitive level of project-based teaching among

students in the last five years is the lowest, mainly due to their poor learning ability, low learning enthusiasm, and low cooperation with teachers in the process of using project-based teaching mode to teach. They cannot closely follow the teaching ideas of teachers, resulting in the worst cognitive level of project-based teaching among students at these three educational levels.

Finally, at Shandong University of Engineering students with different academic achievements also have different levels of cognition towards project-based teaching. Students with excellent academic achievements have a relatively higher level of cognition towards project-based teaching, while students with average academic achievements have a relatively lower level of cognition towards project-based teaching. The reason for this is that students with excellent academic achievements have a higher level of learning enthusiasm and a stronger ability to master knowledge during the project-based teaching process, Being able to quickly grasp and understand the teacher's intentions during the project-based teaching process and actively cooperate with the teacher's teaching activities during the project-based teaching process, while receiving good learning results, students with excellent learning performance have a higher level of cognition towards project-based teaching, but students with average academic performance have a lower level of cognition towards project-based teaching, As long as the reason is also the inability to truly understand the teacher's thinking in the process of project-based teaching, unable to actively cooperate with the teacher to complete the project-based tasks of teaching knowledge, poor learning effectiveness, and low awareness of project-based teaching.

5.2 recommendation

Fully investigate the professional abilities and literacy required by the industry enterprises corresponding to the major, and jointly specify the standards based on the actual situation and requirements of both parties in full cooperation with the enterprise, Project-based teaching courses should be closer to real job work, so reasonable teaching course design is particularly important for teaching projects to meet the requirements of actual positions.

Linking the relevant courses in the major to form a complete course system with a complete knowledge structure, completing the formation of the course system will help students to have an overall understanding of the professional knowledge structure, and clearly understand the position of a professional course, so as to improve students' enthusiasm for learning.

Further strengthen the construction of experimental training bases to meet the needs of project-based courses, and at the same time realize the mutual communication and common prosperity of experimental training bases of different majors.

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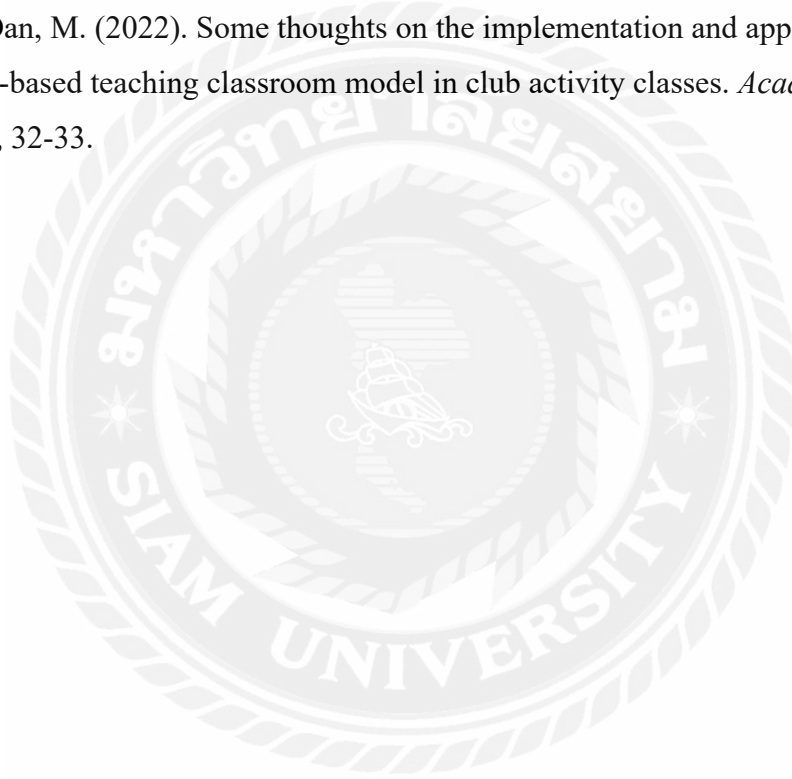
Appendix

Appendix 1: Questionnaire on the current situation of ideological and political education network resources construction in colleges and universities from the perspective of personalized learning -- Student paper

Dear students,

Hello! Thank you for filling in this questionnaire. I am a researcher from XX University. I hope to know the construction of ideological and political education network resources in Chinese colleges and universities from the perspective of personalized learning through the survey. You only need to fill in the questionnaire truthfully. Thank you for your support!

Part I Personal information

1. What is your gender?

   A. Male

   B. female

2. What grade are you in?

   A. Freshman

   B. Sophomore

   C. Junior

   D. Senior

   E. Graduate student

The second part is personalized learning

1. How do you understand personalized learning?

   A. have A thorough understanding

   B. have some understanding

   C. Haven't heard of it

2. Do you have personalized learning needs?

    A. There is always

    B. There is some level of demand

    C. there is no

3. How often do you personalize learning?

    A. Always do personalized learning

    B. Do some degree of personalized learning

    C. Never

4. What do you think is the embodiment of personalized learning? [multiple choice]

    A. Personalized learning resources

    B. Open learning platforms

    C. Diversified learning. Interactions

    D. Other

The third part is the construction of ideological and political education network resources

1. What ideological and political online courses have been offered by your university? [multiplechoice] nd moral cultivation and legal basis B. Outline of Modern Chinese History other

2. What kinds of network materials are included in the construction of ideological and political education network learning resources in your university? [multiple choice]

A. Media material B. Question Bank and question answer C. Paper material and resource directory guide D. Network courseware, cases E. literature F. Others

3. What ideological and political education online learning platforms are currently under construction in your university? [multiple choice]

A. Online course learning platform of Ideological and Political education B. Themed website of Ideological and political education C. Online learning platform of Party School and Youth League School D. Website of functional department of Party Committee E. Websites of teaching and scientific research institutions F. thematic websites G. Others

4. What platforms do you use for ideological and political education network resources in your university? [multiple choice] B. Learning platforms such as Rain Class and Lanmo Cloud Class C. Wechat official account D. Official website E. Video account F. Others

5. What interactive forms of ideological and political education online learning exist in your university? [multiple choice] A. Integration of online and offline learning B. Interaction of online learning in and out of class C. Curriculum ideological and political learning interaction D. Interaction between practice and theoretical learning E. Interaction between evaluation and feedback F. Others

6. What are the online learning assessment methods in your university? [multiple choice] A. Closed book theory exam B. Open book Theory exam C. Essay writing D. Individualized assessment method E. Others

7. To what extent do you think the construction of network resources can achieve the goal of ideological and political education in colleges and universities? A. Fully realized B. Partially realized C. unrealized D. don't know

   The fourth part is the construction of ideological and political education network resources in colleges and universities from the perspective of personalized learning

1. How do you evaluate the online learning resources of ideological and political education in your university? A. Learning is highly interactive; B. Learning forms are attractive and methods are diverse C. Rich learning content D. Ideological and political education network learning resources to be enriched E. other

2. What problems do you think exist in online courses of ideological and political education in colleges and universities from the perspective of personalized learning? [multiple choice] A. The content lacks interaction, which makes it difficult to exchange thoughts and confusion in A timely manner B. Cannot arouse emotional resonance,

difficult to form spiritual guidance C. The course lacks vitality and cannot timely followup social hot information D. Other

3. From the perspective of personalized learning, what problems do you think exist in the form of online materials for ideological and political education in colleges and universities? [multiple choice] A. Digital resources cannot be updated in time, which is not conducive to learning anytime and anywhere B. The content resource system is not complete enough to facilitate targeted learning C. Learning resources need to be improved, and interaction is not active enough, which is difficult to promote independent cooperative learning D. Other

4. From the perspective of personalized learning, what do you think are the shortcomings in the use of classroom learning network resources for ideological and political education in colleges and universities? A. The pictures and videos used in class are not of high quality. B. The cases used in class are outdated C. At present, the learning resources are not good or bad, so it is impossible to find high-quality teaching resources D. Personalized data cannot be accessed in realtime during classroom learning E. The teaching resources taught in the classroom are the same as the textbooks, and the content lacks individuation F. other

5. What do you think is the effect of the network platform construction of ideological and political education in colleges and universities from the perspective of personalized learning? A. Real-time update, which is of great help to study B. The case is novel and the content closely follows the current political hot spots C. It is based on teaching materials, which is no different from the classroom. D. It is not updated frequently and the operation effect is poor E. Lack of interaction between teachers and students F. Others

6. From the perspective of personalized learning, what problems do you think exist in the online learning platform of ideological and political education in colleges and universities? [multiple choice] A. The operation is not simple enough to quickly solve the confusion in learning B. The interface is not clear, and hotspot information cannot be intuitively grasped C. The system is not running smoothly, which makes it difficult to facilitate personalized learning

7. From the perspective of personalized learning, what do you think is the frequency of online learning interaction in ideological and political education in colleges and universities? A. more B. average C. occasional interaction D. No

8. From the perspective of personalized learning, what problems do you think exist in online learning interaction of ideological and political education in colleges and universities? [multiple choice] A. Lack of respectful atmosphere and individualized learning habits B. It is difficult to form good teaching interaction through independent learning C. Less collaboration between teachers and students and no individualized assessment; D. lack of emphasis on personality cultivation and comprehensive development E. other

9. When you use ideological and political education network resources for personalized learning, how satisfied are you with teachers? A. satisfied B. somewhat satisfied C. Generally D. Not satisfied

10. When you use ideological and political education network resources for personalized learning, what problems do you think teachers have? A. Network hotspot cases are used less, and some cases are obsolete B. Lack of technology in developing personalized learning courseware and teaching video C. Insufficient attention is paid to students'personalized learning D. Lack of individualized organization ability of network materials E. The use of APP technologies such as wechat and Weibo is insufficient in class F. Others

11. Do you think the construction of ideological and political education network resources in colleges and universities will change because of personalized learning? A. Yes B. no C. not clear

12. From the perspective of personalized learning, how satisfied are you with the construction of ideological and political education network resources in colleges and universities? A. satisfied B. fair C. Not satisfied

13. From the perspective of personalized learning, what are your suggestions for the construction of ideological and political education network resources in colleges and universities?

The questionnaire is finished. Thank you for your cooperation!

Appendix 2 Interview outline on the construction of ideological and political education network resources in colleges and universities from the perspective of personalized learning -- For college teaching administrators

1. Does your university have online learning resources and platforms for ideological and political education? If so, which ones? Is it conducive to personalized learning? Why?

2. Do you think ideological and political teachers in colleges and universities have personalized teaching ability? If so, in what ways? If not, in what ways?

3. How do you think the current construction and improvement of ideological and political education network resources can promote personalized learning? What are the problems?

4. Do you think college ideological and political network resource management is helpful to personalized learning? If so, in what ways? If not, in what ways?

5. Do you think the ideological and political online courses offered by universities are conducive to personalized learning? If so, in what ways? If not, in what ways?

6. Do you think the assessment method of ideological and political online teaching in colleges meets the characteristics of personalized learning? If so, in what ways? If not, in what ways?

7. What are your suggestions for the construction of ideological and political education network resources in colleges and universities from the perspective of personalized learning?

Appendix 3 Interview outline on the construction of ideological and political education network resources in colleges and universities from the perspective of personalized learning -- For ideological and political teachers in colleges and universities

1. Does your university have online learning resources and platforms for ideological and political education? If so, which ones? Is it conducive to personalized learning? Why?

2. How do you think the current construction and improvement of ideological and political education network resources can promote personalized learning? What are the problems?

3. In the process of online teaching, will you consider the differences of students and adopt personalized teaching methods? If so, how?

4. Do you organize online learning resources in a personalized way during online teaching? If so, how?

5. Do you have personalized interaction with students when you use network resources for teaching? If so, how?

6. Will you adopt personalized evaluation methods in the teaching process using network resources? If so, how?

7. When you use network resources, will you adopt personalized tutoring methods and approaches? If so, how?

8. What are your suggestions for the construction of ideological and political education network resources from the perspective of personalized learning