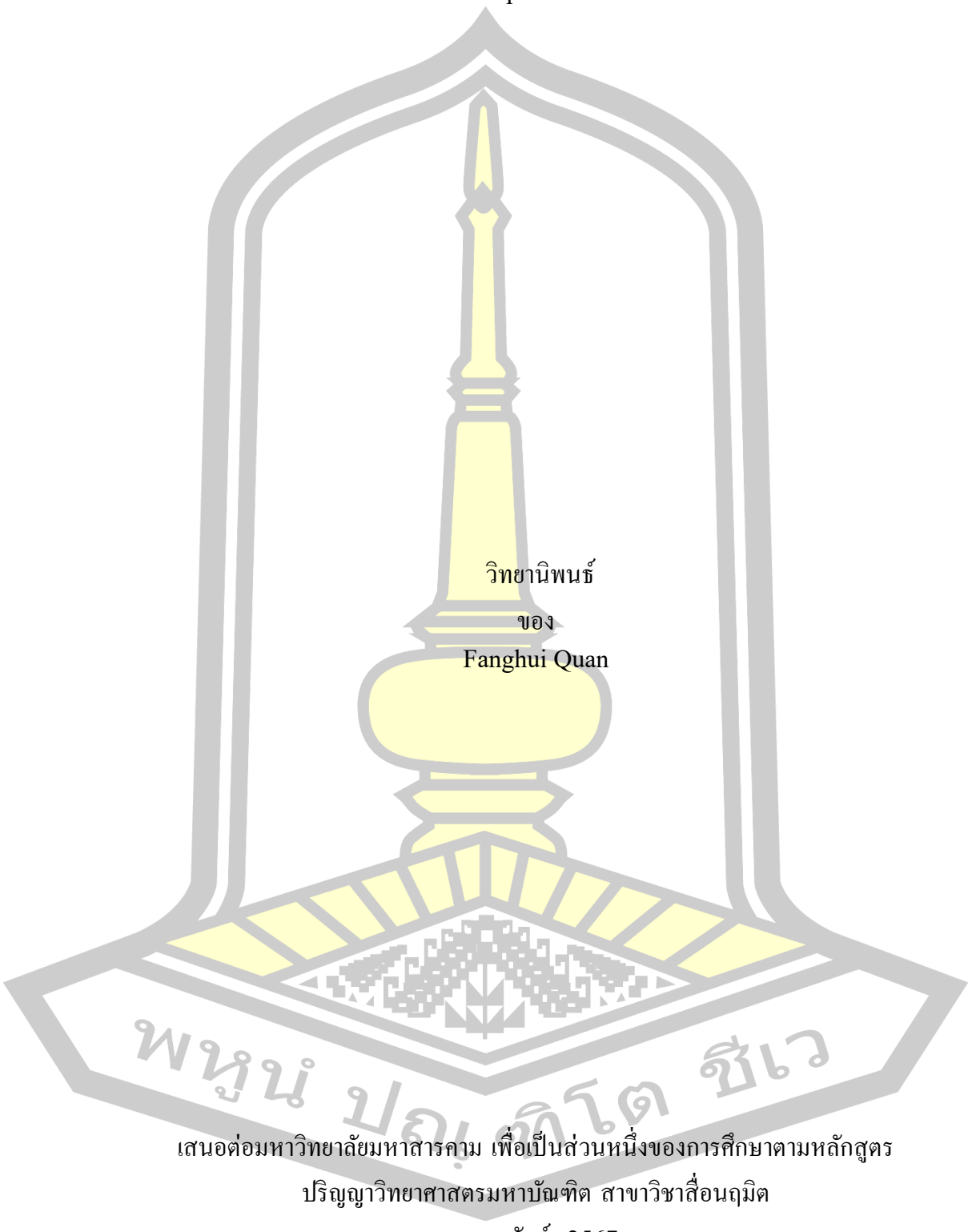
Optimizing Functions for Intelligent Vocational Education Platform Based on User Experience

Fanghui Quan

A Thesis Submitted in Partial Fulfillment of Requirements for
degree of Master of Science in Creative Media
February 2024

Optimizing Functions for Intelligent Vocational Education Platform Based on User Experience



วิทยานิพนธ์

ของ

Fanghui Quan

เสนอต่อมหาวิทยาลัยมหาสารคาม เพื่อเป็นส่วนหนึ่งของการศึกษาตามหลักสูตร

ปริญญาวิทยาศาสตรมหาบัณฑิต สาขาวิชาสื่อนฤมิต

กุมภาพันธ์ 2567

Optimizing Functions for Intelligent Vocational Education Platform Based on User Experience

Fanghui Quan

A Thesis Submitted in Partial Fulfillment of Requirements
for Master of Science (Creative Media)
February 2024

The examining committee has unanimously approved this Thesis, submitted by Ms. Fanghui Quan , as a partial fulfillment of the requirements for the Master of Science Creative Media at Mahasarakham University

Examining Committee

..... Chairman
(Assoc. Prof. Charuni Samat , Ph.D.)

..... Advisor
(Asst. Prof. Suwich Tirakoat , D.I.S.)

..... Committee
(Asst. Prof. Khachakrit Liamthaisong , Ph.D.)

..... Committee
(Asst. Prof. Kotchaphan Yongmee , D.F.A.)

Mahasarakham University has granted approval to accept this Thesis as a partial fulfillment of the requirements for the Master of Science Creative Media

....
(Assoc. Prof. Jantima Polpinij , Ph.D.) (Assoc. Prof. Krit Chaimoon , Ph.D.)
Dean of The Faculty of Informatics Dean of Graduate School

TITLE Optimizing Functions for Intelligent Vocational Education Platform Based on User Experience
AUTHOR Fanghui Quan
ADVISORS Assistant Professor Suwich Tirakoat , D.I.S.
DEGREE Master of Science **MAJOR** Creative Media
UNIVERSITY Mahasarakham University **YEAR** 2024

ABSTRACT

The purpose of this study is to investigate the demand of teachers and students for Intelligent Center of Vocational Education (ICVE) platform, investigate the influence of platform function, platform interaction and interface on the satisfaction of teachers and students, and compare the satisfaction of teachers and students with ICVE platform before and after modifying the platform function and interaction. Data were collected through interviews and questionnaires among 15 teachers and 100 students in guangxi modern polytechnic college. Data analysis adopts thematic analysis, descriptive statistics and independent t-test.

The results show that most teachers and students are not satisfied with the function, interaction and beautiful interface of the platform before modifying the design. After improving the functional requirements, simplifying the interaction process and optimizing the interface design, the satisfaction of teachers is obviously improved. The comparison results include the interactive experience after ICVE revision, the satisfaction of the revision function and the aesthetic level of use before and after the system improvement. It is found that all three items after improvement are higher than those before improvement, with statistical significance of 0.05.

Keyword : UX, Blended teaching, ICVE platform, Vocational education

ACKNOWLEDGEMENTS

Thanks to the platform data resources provided by Guangxi Modern Polytechnic College, thanks to the teachers and students at school for their help, and thanks to the support provided by Mahasarakham University.

Fanghui Quan

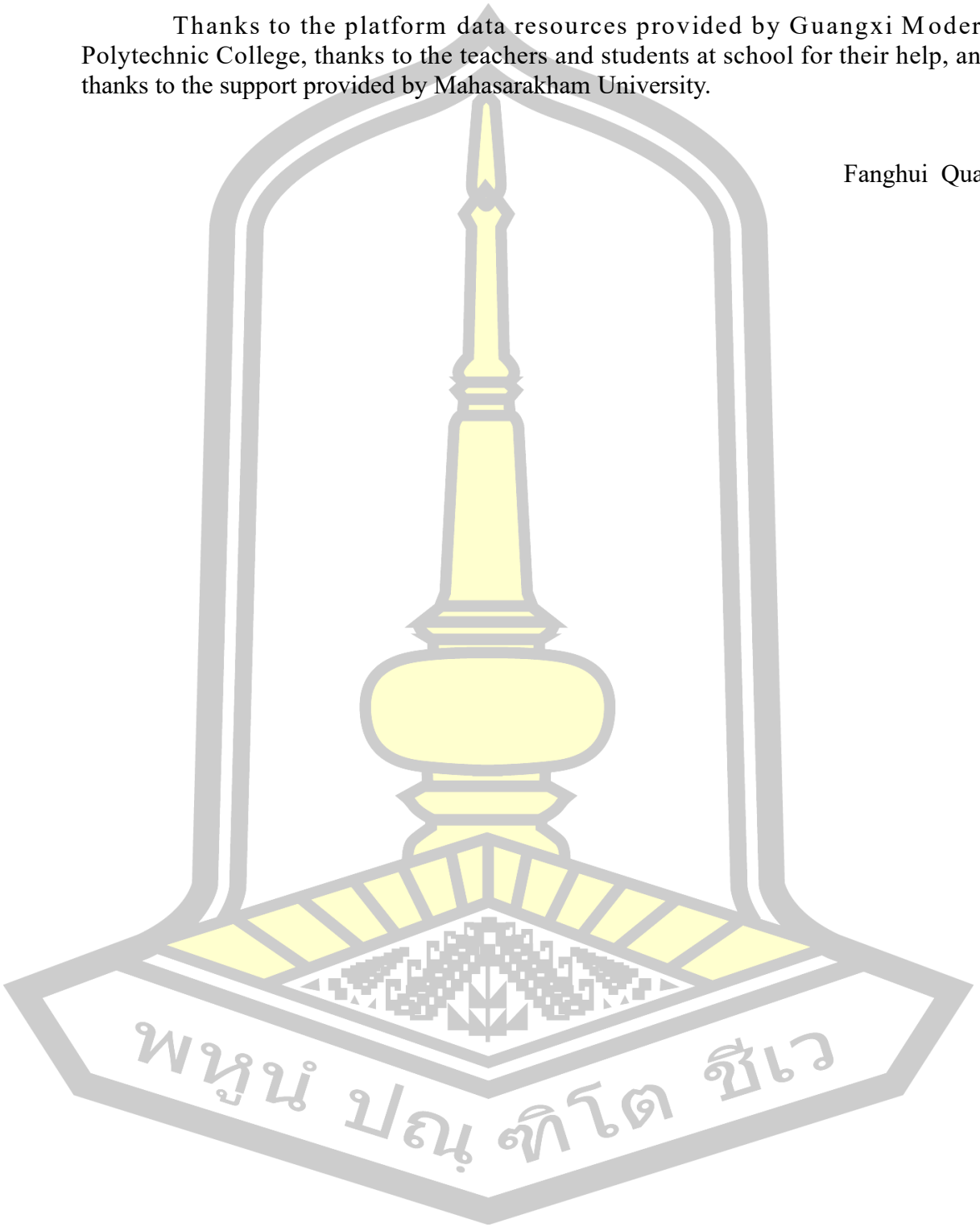
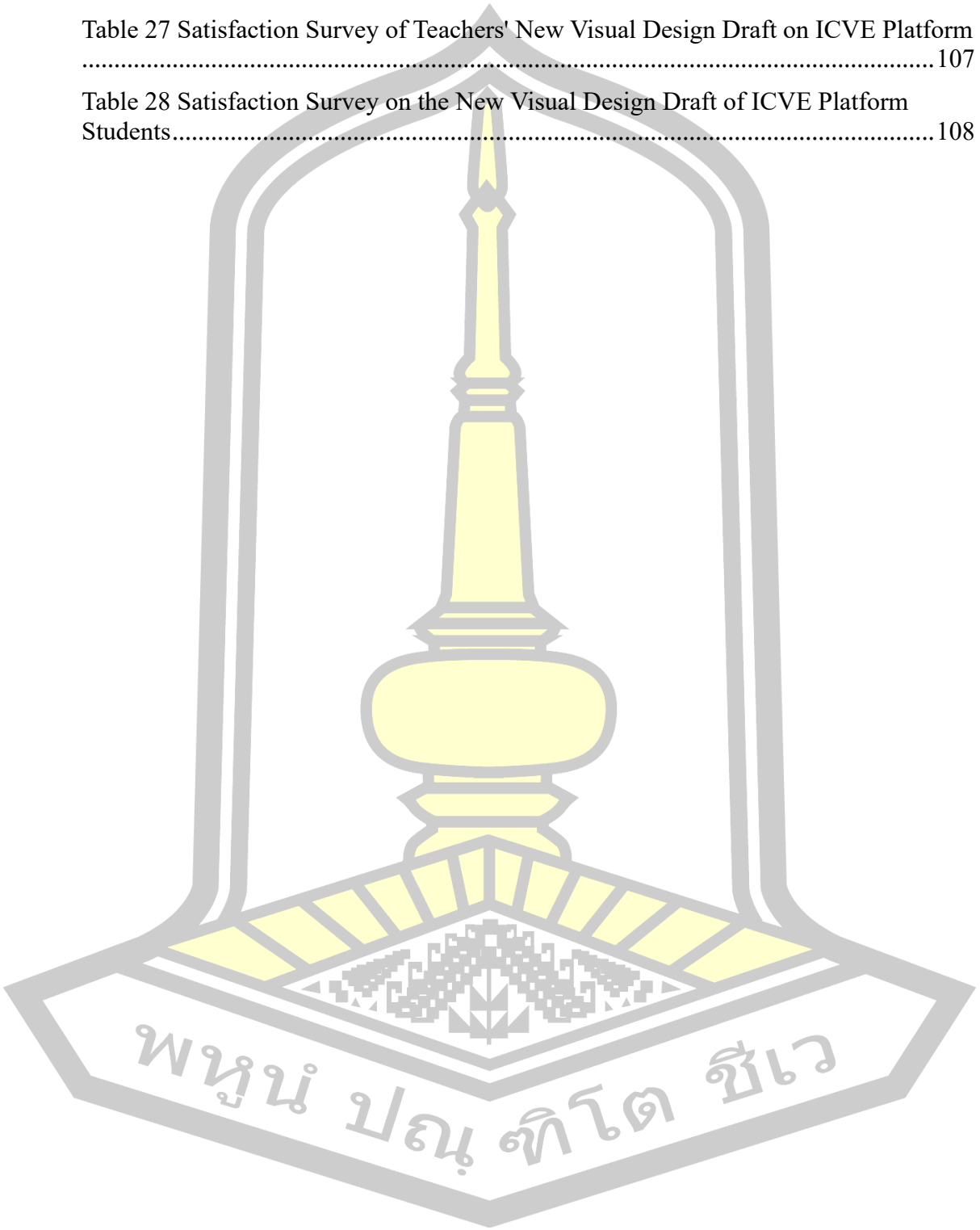


TABLE OF CONTENTS

Page

LIST OF TABLES

Page



LIST OF FIGURES

Page

Chapter 1
Introduction

1.1 Background and Problems of Research

It has become a development trend to build a digital China, and to drive the systematic change of social production mode and lifestyle with digital transformation. The digital transformation and innovation of education system has also become the core topic of international education reform and practice. (Xie,Y.R., (n.d.).). Classroom is the core and main position of the digital transformation of education. With the promotion of the "internet plus" wave, intelligent education came into being. The development of multimedia technology and network technology enriched the presentation and communication methods of educational resources and changed people's learning ways and behavior habits. Online learning has become a way of life, and online education has become a hot spot of the times.

Online education integrates the traditional classroom teaching resources, increases the diversity of classroom interaction, changes the limitations of traditional classroom time and space, and greatly increases the convenience of teaching. In recent years, with the increase of residents' education expenditure and the increase of Internet penetration rate, online education has developed rapidly, and the market scale has increased from 156.54 billion yuan in 2016 to 313.36 billion yuan in 2019. (INSIGHT AND INFO,.2022).

Figure 1 Market size and growth rate of online education industry in China from 2016 to 2021

Source: Guanyan Tianxia Data Center

Figure 2 The scale and growth rate of online education users in China from 2017 to 2021

Source: Guanyan Tianxia Data Center

In 2020, the epidemic led to the restriction of offline learning activities. Under this circumstance, online education, which can break the limitations of time and space, has become an important way for students to acquire knowledge, which has greatly supplemented traditional education. Major primary and secondary schools, universities and offline education and training institutions have turned offline courses to online, promoting the explosive growth of the industry. According to data, the number of online education users in China will reach 342 million in 2020, with a growth rate of 27.1%; The online education market reached 485.8 billion yuan, with a growth rate of 55% (Education and Teaching, 2022).

During the epidemic prevention, the online education industry pressed the "acceleration button". According to the 47th Statistical Report on Internet Development in China issued by China Internet Network Information Center, as of December 2020, the number of online education users in China reached 342 million, accounting for 34.6% of the total netizens. According to the "2020 China Online Education Market Data Report" published by the Network Economic and Social E-Commerce Research Center, the online education market in China will be about 432.8 billion yuan in 2020, an increase of 24.79% over 2019.(Liu,Y.,2021)

Due to the epidemic situation in COVID-19, more and more online education platforms have emerged, which are suitable for online and offline mixed classroom teaching. Online and offline mixed teaching platforms, which are widely used in

higher education schools at all levels, rank first, such as Muketang platform and Xuexitong platform. According to the requirements of the country, vocational education schools widely use Intelligent center of vocational education platforms for curriculum construction, which is called ICVE platform for short. Because the ICVE platform has been online for a short time, both students and teachers have encountered certain problems in the process of use, and the results are not ideal, mainly because the operation path and process are not clear enough, which leads to certain problems in use. Optimizing the quality of online education service has gradually become the common aspiration of teachers and students. This paper mainly compares three online education platforms of SPOC suitable for school teaching and analyzes the ICVE platform from the perspective of user experience, aiming at optimizing the existing user interface of ICVE platform, outputting a visual interface that can improve user satisfaction, and providing a direction for the revision of ICVE.

At present, most vocational colleges use ICVE platform for online and offline blending teaching. After a period of use, we find that the user experience satisfaction of this platform is not high. We refer to the evaluation of students and teachers on QQ group, WeChat group and application store (Figure 3) and find the following situations. In the interface design, the function entrance is chaotic, the design position is unreasonable, the font size and icon size can not be adjusted according to the actual user's needs, and the overall interface design is not concise and intuitive. In terms of operation interaction, the operation path is too complicated, there are too many page levels, and there are too few related tips during operation. In terms of functions, there is a lack of personalized settings, effective customer service communication channels, and a single channel is not rich enough, and there is a lack of timely updated platform operation tutorials.

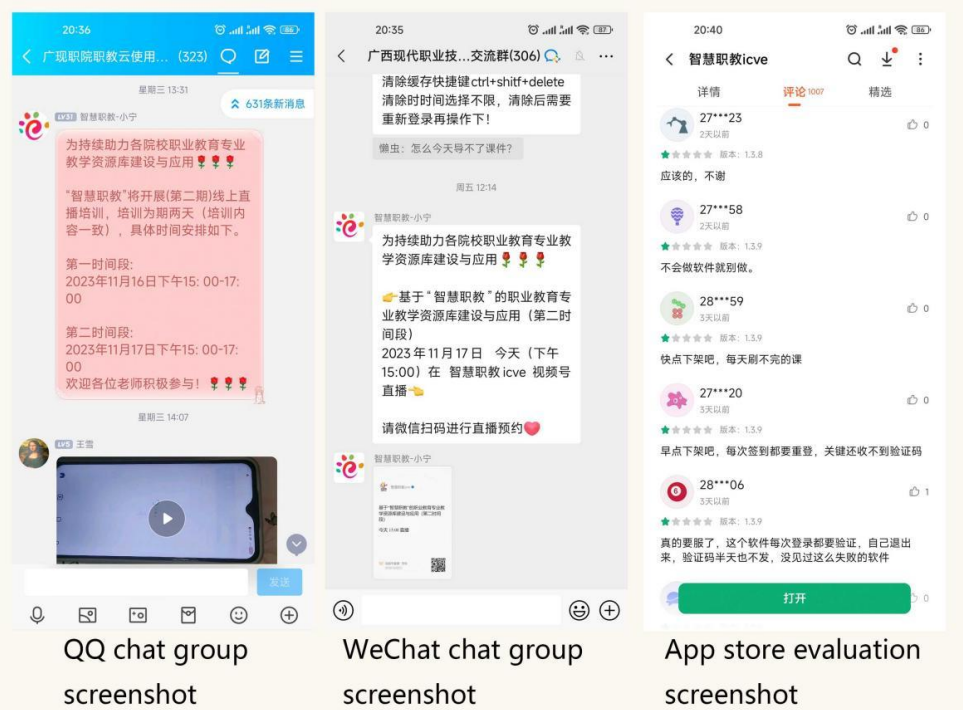


Figure 3 Feedback from students and teachers on QQ group, WeChat group and app store.

According to the question of appeal, we plan to make a comparative study of the existing online mixed education platforms. By comparing the positioning, advantages, disadvantages, functions, interaction and interface design of three online and offline mixed teaching platforms (Xuexitong platform, Muketang platform and ICVE platform), we can find out the improvement of ICVE compared with the other two platforms., and get suggestions and feedback from users for improvement through questionnaires and interviews. Reorganize the overall structure of ICVE platform, design a new flow chart for the interaction path that needs to be simplified, and revise the original interface design, hoping that the new design can provide some new ideas for ICVE update iteration.

1.2 objectives

The objectives of this study include.

1) to compare the features and use of ICVE and online learning platforms in China

2) to optimize the design prototype for ICVE Intelligent center of vocational education platform based on user experience.

3) to evaluate the user satisfaction with the optimized ICVE design prototype and visual interface.

1.3 Scope of Research

1) Population and research participants in this research were teachers and students who are in Guangxi Modern Polytechnic College, Jinchengjiang District, Hechi, Guangxi, China

2) The number of online learning platforms used for comparison is 3 platforms that consisted of ICVE Platform, Xuexitong (Xuexitong https://i.chaoxing.com), and Muketang (中国大学 MOOC (慕课) http://www.icourse163.org). The topics for comparison included of the functions, positioning, advantages and disadvantages, and interface style of products.

3) The platform limitation of design prototype, the design prototype platform of this study is considered as XD design platform.

1.4 Importance/Benefit of Research

By studying the function, positioning, advantages and disadvantages, interface aesthetics, user needs, user feelings and user interaction behavior of online education platform, the prototype and visual interface of ICVE are redesigned, so that the newly designed ICVE interface can meet the expectations of users and provide the direction for the improvement of ICVE.

1.5 Definition of Terminology

1) User Experience

User Experience (UE/UX for short) is a purely subjective feeling established by users in the process of using products.ISO 9241-210 defines user experience as "people's cognitive impression and response to products, systems or services used or expected to be used". (ISO 9241-210:2010(en).,2010). In other words, the user experience mainly reflects the user's willingness and attitude towards the products used. The supplementary explanation of ISO definition is as follows: "User experience means all the feelings of users before, during and after using a product or system, including emotions, beliefs, preferences, cognitive impressions,

physiological and psychological reactions, behaviors and achievements."(ISO 9241-210:2010(en).,2010).The user experience in this study is mainly reflected by the satisfaction of teachers and students in vocational colleges in China with the user experience using ICVE platform, and judged by the satisfaction of three dimensions, namely, functional satisfaction dimension, interactive satisfaction dimension and beautiful interface satisfaction dimension.

2) Online learning platforms

There are many kinds of online learning platforms, including those for school education and those for social practitioners. The online learning platform in this paper mainly refers to the online and offline mixed teaching platform for school education, which is suitable for the construction of school resource database, teacher teaching and student learning. In the learning platform, teachers can upload curriculum resources for curriculum construction, students can view learning content, complete homework and exams, and students and teachers can also interact with each other in class. This paper will compare three main online and offline mixed teaching platforms for school education, namely, Superstar Learning Platform, Mu Classroom Learning Platform and ICVE Platform, find out their advantages and disadvantages through comparison, and design the shortcomings of ICVE platform. In this research, there were three platform used for study including of ICVE Platform, Xuexitong, and Muketang.

3) User satisfaction

User satisfaction refers to the user's feelings and evaluation of a product or service. Improving customer satisfaction can help products improve customer loyalty, increase sales and word-of-mouth effect. In user interface design, user satisfaction refers to the user's experience and satisfaction with the interface design. It pays attention to whether users feel comfortable, convenient and happy when operating the product interface, and can successfully complete the task. In this study, we will investigate the satisfaction of teachers and students of ICVE platform, and make a new design of ICVE through their feedback.

4) Prototype design

Prototype design plays a vital role in the field of product development and user experience. By drawing the product prototype, the requirements can be

visualized, and then the feasibility of the product can be tested and verified quickly, providing a solid and reliable basis for the subsequent promotion of product research and development. Prototype design is a key link in the process of product development, which is usually carried out in the early stage of product design. The purpose of prototype design is to verify the concept, function and user experience of the product, so as to improve it in further development and production. Prototype design enables the design team to pay more attention to the appearance, function and interaction mode of products, especially by creating interactive prototypes, which can simulate the interaction process between users and products, help to collect user feedback and behavior data, and then help to optimize the interface, function and process of products and improve the user experience. The essence of prototype design is a communication tool. Through prototype design, product managers can accurately convey product positioning, objectives, functions, architecture, processes and other information to designers and developers, and can also communicate and feedback with customers, investors and stakeholders, thus improving product design and increasing its market competitiveness. In this study, we will use the prototype diagram to revise ICVE. Through the prototype diagram, we can conduct product research on teachers and students, so as to obtain feedback data from users and help adjust product design.

5) Visual Interface Visual Interface

The visual interface in this study mainly refers to the aesthetic design of the webpage interface of ICVE platform, which is mainly designed for the teachers and students of ICVE platform. Through the visual interface design, the icons, fonts, font sizes and colors operated by users can be designed to beautify the user interface of ICVE platform.

Chapter 2
Review of Literature

2.1 Research on the Current Situation of Online Education Platform

2.1.1 The Importance of Developing Online Education

Online education is a new type of education that uses modern information technologies such as the Internet and artificial intelligence to interact between teaching and learning, and it is an important part of educational services (Website of the Ministry of Education, 2019).

In 2018, the Ministry of Education of China issued the Action Plan of Education Informatization 2.0, which proposed to basically realize the development goal of "three aspects, two highs and one big" by 2022. Among them, "Three Holidays" means that teaching application covers all teachers, learning application covers all school-age students, and digital campus construction covers all schools; "two highs" means that the level of information application and the information literacy of teachers and students have generally improved; One refers to building a "Internet +Education" platform. It is the upgrade of educational informatization, and it is necessary to realize the transformation from special resources to large resources; From improving students' information technology application ability to improving information technology literacy; From application integration development to innovation integration development (National business daily net.,2022).

Chu Zhaohui, a researcher at China Academy of Educational Sciences, believes that "Internet + education" can play a more positive role in promoting educational equity. At present, the development level of "Internet + Education" in China is still in the primary stage, and there is still much room for improvement compared with the popularization level of the Internet. In order to meet the needs of mass education services, promote the sharing of high-quality education resources, better benefit remote and poor areas, and improve education equity, the meeting decided to promote "Internet + education", encourage qualified subjects to develop online education, and build a new platform for vocational training and skill upgrading. In addition, the meeting also called for speeding up the construction of an educational

private network, so that all schools can access the fast and stable Internet by 2022. Support the development of rich online educational resources for deep poverty-stricken areas (National business daily net.,2022).

According to the White Paper on Online Education Industry in China in 2018 released by Ai Media Consulting (hereinafter referred to as the White Paper), the number of online education users in China will reach 296 million in 2020. These users will be involved in preschool education, K12 education, vocational education, interest education and other online education fields. By then, China is expected to become a "supermarket" for the development of online education industry in the world. The White Paper predicts that the online education market in China will reach 433 billion yuan in 2020, and the "Internet + Education" market is welcoming a new round. In addition, in the survey conducted by Ai Media Consulting, 84.9% of the respondents recognized the educational model of combining online and offline (National business daily net.,2022).

Zhu Yongxin, a member of the Standing Committee of Chinese People's Political Consultative Conference, believes that the development of "Internet + education" can effectively promote the sharing of quality education resources between urban and rural areas, make up for the inequality caused by the gap between urban and rural teachers' level, change the traditional talent training mode and teaching methods, and reshape the educational form and ecology (National business daily net.,2022).

It can be seen that the development of online education has been unstoppable, and classroom teaching has changed accordingly. The traditional teaching mode can no longer adapt to the development of education in the new era. The online and offline mixed teaching mode combining online education and classroom teaching has become a new trend of national education development.

2.1.1.1 Two common forms of online education

There are many kinds of online education, and the two common ones are MOOC and SPOC.

1) MOOC

MOOC, the full name of which is massive open online courses in English and massive open online course in Chinese, is a large-scale open online course, which is the product of "Internet + education". "M" stands for Massive, which is different from traditional courses with only dozens or hundreds of students. A MOOC course has tens of thousands of students, up to 160,000 students at most. The second letter "O" stands for Open, which is interest-oriented. Anyone who wants to study can come in and study, regardless of nationality, and only need one email address to register and participate. The third letter "O" stands for Online, and learning is done online, without travel and time and space restrictions; The fourth letter "c" stands for Course, which means course.

In 2012, the top universities in the United States set up online learning platforms one after another to provide free courses online. The rise of three course providers, Coursera, Udacity and edX, provided more students with the possibility of systematic learning. The courses of these three platforms are all aimed at higher education, and like real universities, they have their own learning and management systems. Moreover, their courses are free. In 2013, MOOC entered Asia on a large scale. The Hong Kong University of Science and Technology, Peking University, Tsinghua University and The Chinese University of Hong Kong have successively provided online courses. Take Coursera as an example. This company has cooperated with 33 universities around the world, including Columbia University and Princeton University. In February 2013, the company announced that another 29 universities had joined their lineup. By November, 2022, the number of massive open online course in China has reached 62,000, with 402 million registered users and 979 million students. The number of students who have received massive open online course credits is 352 million, and the number and number of students in massive open online course ranks first in the world (Encyclopedia, 2023).

MOOC is suitable for large-scale learners to study online in different time and space. MOOC has the following advantages: 1. Diversified resources. MOOC course can integrate a variety of social networking tools and learning tools, which can provide richer course resources and make the problem of resource acquisition easier. 2. It is easier to use. In the past, when studying, time and space were big problems; MOOC courses can get all kinds of high-quality courses

with the help of the internet, even at home. 3. The audience is wider. Different from traditional courses, it will not be limited by the venue, so it will not be limited by the course, and it can meet the needs of large-scale users. 4. More autonomy. Effective learning of any content comes from autonomy. Online learning is more interesting, richer in content, more autonomous in learning, and easy to cultivate good study habits (Qing,C.,2022).

2) SPOC

With the development of MOOC, more kinds of online education forms have gradually developed, and small-scale classrooms that are in contrast with MOOC's large-scale classrooms have also emerged. SPOC, a Small Private Online Course, was first put forward and used by Professor Armand·Fox of the University of California, Berkeley. Small and Private are relative to MOOC's Massive and Open. Small refers to the number of students ranging from tens to hundreds. Private refers to setting restrictive access conditions for students, and applicants who meet the requirements can be included in the SPOC course. The current SPOC teaching case is mainly set for college students and students in the fence. The former is a mixed learning mode that combines classroom teaching and online teaching. It is to use online teaching resources with strong pertinence, such as micro-lesson videos, courseware and materials, to implement flip classroom teaching. Teachers can freely set and control the progress, rhythm and grading system of the course according to their own preferences and students' needs. The latter is to select a certain number of learners from all over the world to be included in the SPOC course according to the set application conditions. The selected students must ensure the study time and intensity, participate in online discussions, complete the prescribed homework and exams, etc., and those who pass will receive the course completion certificate.

2.1.1.2 Comparison between MOOC and SPOC

In 2012, due to the explosive growth of MOOC courses and users worldwide, The New York Times called this year "the first year of MOOC". Undoubtedly, compared with its predecessor, OER (Open Educational Resource), MOOC has made great progress in curriculum design, massive access and value-added services. However, from a practical point of view, "massive open online

course" still faces many difficulties and challenges, which are mainly manifested in production cost, business model, teaching and learning methods, immersion learning experience, high dropout rate and learning management. To a great extent, all kinds of challenges may be related to the characteristics of MOOC, such as large-scale access, unlimited identity and completely online teaching. Practice shows that even though MOOC has incomparable advantages over traditional teaching, it still can't erase the unique value of face-to-face courses. Only by combining the advantages of the two to make up for the shortcomings of both sides can MOOC gain lasting vitality (He,B;&Cao,Y.,2015).

Relatively speaking, the "small-scale" of SPOC can make the students who have applied successfully have a sense of responsibility and a sense of urgency to occupy limited resources, thus improving their attention and learning motivation and effectively ensuring the quality of learning (Yang,Z.Y & Zheng,Q.,2014).

SPOC inherits, perfects and surpasses massive open online course. Although there is not much difference between them in course content design and technical platform, SPOC has made great innovations in teaching form: (1) In terms of operating mechanism, in order to better achieve teaching objectives and show better teaching effects, SPOC courses will screen and subdivide learners in advance when selecting courses, and generally set access conditions. (2) In terms of teaching form, massive open online course focuses on online learning, while SPOC advocates blended learning, that is, combining online learning with face-to-face teaching. (3) In terms of teaching process and effect, unlike massive open online course's open access and inclusive education, the number of students in the SPOC course is relatively small, teachers are more fully involved in the learning process, and the guidance and correction of course assignments and answering questions are more accurate and frequent (Kong,X.Y.,2020).

In a word, SPOC is more suitable for online and offline mixed teaching mode in school classroom teaching, which also provides a new development direction for online education platform. At present, the online platforms suitable for SPOC teaching that are widely used in higher vocational colleges mainly include ICVE Platform, Xuexitong and Muketang.

2.1.2 ICVE Intelligent vocational education platform

2.1.2.1 What is ICVE?

Intelligence Vocational Education Platform, referred to as ICVE in English, is a digital teaching, resource sharing platform and online teaching service platform of vocational education which were built and operated by Higher Education Press. This platform is a designated platform for the whole society to share the achievements of the national "Teaching Resources Database of Vocational Education" project. It provides high-quality of digital resources and online application services for the majority of vocational education teachers, students, employees and social learners. The ICVE promotes the reformation of vocational education, expands the means and scope of teaching and learning, improves the efficiency and benefit of teaching and learning, and promotes the construction of a learning society. The platform is open to gather and operate the construction achievements of provincial, school and enterprise resource pools, and provides support services for the integration, sharing, popularization and application of all kinds of resource pools at all levels. The platform actively explores cooperation with relevant institutions, carries out in-depth training and competitions in the field of information-based teaching and vocational skills in vocational education, gathers training resources and competition works, and expands the sharing of high-quality resources through information means. The platform is based on innovating resource application mode and constructing resource sharing mechanism, exploring the way of cloud service to open an exclusive online teaching cloud platform (vocational education cloud) for colleges or enterprises in need, and building their own online teaching environment in the "vocational education cloud" to help teachers or trainers integrate platform resources and their own resources, offer exclusive online courses for their students and employees, and carry out online and offline mixed teaching or training.

2.1.2.2 Use of ICVE

ICVE was downloaded 1.61 million times in Xiaomi App Store, with a total score of 5 and a score of only 1.5. The overall score was very low. Through investigation, it was found that most teachers had doubts about the use of

ICVE, and their satisfaction with the use of products was not high, mainly because ICVE was put on the app store for a short time and many functions were not perfect, which led to a poor user experience.

Teachers' point of view

Teachers' feedback on ICVE mainly has the following problems: 1. Teachers' steps to build courses are cumbersome, and courses and resources have to be transmitted separately, which makes it more troublesome to write the catalogue twice. 2. The teacher can only see the course after it is reviewed by the school auditor. If the course content is to be revised halfway, it will have to be re-reviewed. 3. Some function entrances are hidden and difficult to find. 4. I don't know what to do when I operate without prompt guidance. 5 There is no platform manual.

Students' views

Through the opinions expressed by students on the Internet, the following problems are found: 1. The UI interface is not beautiful. 2. There are many bugs. 3. There is no corresponding notice to inform students after signing in and homework is released. 4. The display of courseware on students' side is not intuitive enough, so it is difficult for students to find courseware. 5. The start and end times are not clearly displayed, and there is no corresponding reminder when the deadline is approaching. 6. There is no corresponding auxiliary information in the interface of job submission. 7. There is no auxiliary information reminder when logging in with account password. 8. Unable to retrieve the password conveniently. 9. The operation process of registration is not simple enough. After registration, there is no account cancellation function, resulting in the mobile phone number being registered and occupied. 10. Commonly used functions are not put in a convenient position, which leads to inconvenient operation. 11. There is no limit on the size of the prompt when handing in the picture homework, which makes the work blurred or unclear after uploading. After uploading, you can't make changes, and you have to apply before you can make changes, which makes it difficult to modify the job.

Figure 4 Scoring of ICVE Platform in Xiaomi App Store

2.1.2.3 Main problems in using ICVE

Summary ICVE mainly has the following problems in use:

1. Functionality: The placement of functions does not conform to the operating habits of common functions.

2. Interface: the interface design is not beautiful enough, and the key contents are not obvious enough, such as common functions and buttons.

3. Operation: Many important operations are not prompted and guided, and the operation path is unreasonable, which leads teachers and students to think in the process of use and wastes unnecessary time.

2.1.3 Chaoxing Xuexitong platform

2.1.3.1 What is a Chaoxing Xuexitong platform?

Chaoxing Xuexitong platform, referred to as "Xuexitong" for short, is a free application program integrating mobile teaching, mobile learning, mobile reading and mobile social interaction, which was developed by Beijing Century Chaoxing Information Technology Development Co., Ltd. in 2016. It is a professional mobile learning platform for mobile terminals such as smartphones and tablets. On December 24, 2019, it was filed by the Ministry of Education, and the record number was Jiaoapp No.1100163.

Xuetong is a platform for course learning, knowledge dissemination and management sharing based on micro-service architecture. It integrates knowledge management, course study, thematic creation and office application, making use of the massive books, periodicals, newspapers, videos and original resources accumulated by Chaoxing for more than 20 years, and provides readers with a one-stop learning and working environment. The Xuexitong contains all kinds of micro-applications related to teaching and learning. Users can self-help complete library collection inquiry, electronic resources search and download, library latest information browsing, study school professional courses, hold group discussions, and check the school address book. At the same time, it has more than one million e-books, a large number of newspaper articles and metadata of Chinese and foreign literature, providing users with mobile learning services.

2.1.3.2 The present situation of the use of Chaoxing Xuexitong platform

In Xiaomi App Store, the download volume is 170 million times, with a total score of 5 and a score of 3, and the score is moderate. In the process of using, the overall feeling is good, but there are also some problems, such as: 1. There are few e-books resources, which cannot meet the learning needs of students. 2. Homework has no deadline reminder function, which causes students to miss the due date. 3. When submitting the exam homework card, there is no corresponding prompt to alleviate the user's anxiety. 4. There is no one-click import schedule function, so it needs to be built one by one, which is more troublesome to use. 5. There is no push for class sign-in reminder. 6. Computers and mobile phones cannot log in at the same time. 7. The learning progress bar doesn't show what you have learned and what you haven't.

Figure 5 Scoring of Xuexitong Platform in Xiaomi App Store

2.1.4 Muketang platform

2.1.4.1 What is a Muketang platform?

Muketang Online education platform (hereinafter referred to as "Muketang") is an online and offline hybrid wisdom teaching tool developed by MOOC of China University on the basis of massive open online course platform. It is an online education platform jointly launched by Wangyi and Higher Education Press, which undertakes the task of national excellent open courses of the Ministry of Education and provides MOOC courses of famous universities in China to the public. Here, everyone who is willing to improve himself can get a better higher education for free. Officially released on March 6, 2019. Online and offline mixed intelligent teaching tools for offline classroom teaching interaction. Support online courses (MOOC/SPOC) to learn and admire classroom functions. You can watch course videos, take course tests/homework/exams, interact in class, and participate in extracurricular tasks. Muketang is a smart teaching tool to improve the efficiency of classroom teaching. Teachers can use Muketang to create an associated online classroom or an independent offline classroom, and then complete online lesson

preparation, offline mixed teaching, and online viewing and summarizing (online learning +offline classroom) data. By providing integrated teaching management, smarter classroom interaction and interactive experience at your fingertips, teachers can build an overall plan for classroom teaching and help teachers practice smart teaching.

Teachers can design online courses and classroom teaching through the course management background of Muketang. Before class, teachers can prepare lessons online and release teaching videos in advance for students to learn; In class, teachers can also use the teaching contents (exercises, discussions, etc.) set in the background of curriculum management, and initiate teaching activities in the classroom; After class, teachers can assign homework online to consolidate their studies or publish tests. Muketang will also comprehensively record students' online learning data and offline classroom data to help teachers visually see the teaching situation. Classroom education and online courses will be opened, and one-stop solution will be made before/during/after class. Panoramic view of online and offline teaching data, visually check the learning situation of each student, and help teachers to carry out targeted teaching. School Cloud +Muketang provides the support of curriculum application and data statistics needed for curriculum evaluation, helping teachers in need to evaluate top-quality courses.

2.1.4.2 The present situation of the use of Muketang.

In Xiaomi App Store, the download volume is 170 million times, with a total score of 5 and a score of 3.6, which is above average. In the process of use, the overall feeling is good. For example, the course resources are excellent, most of them are university courses, and the lecturers teach for first-tier university teachers. There are also special learning videos, such as English, minority languages, computers and other courses. However, there are also some problems, such as: 1. After the course is over, it will take several months to start again, which has caused time troubles for students who want to study. 2. After the course is over, you can't watch it again. You must wait until the next class starts, and the progress will be cleared. 3. The exam was not notified, resulting in missing the exam time. 4. After the course progress is brushed, it shows that it is not full, and there is no hint of where it has not been brushed. 5. The process of changing the password is too complicated.

Figure 6 Scoring of Muketang Platform in Xiaomi App Store

2.2 UX user experience

2.2.1 The Concept of User Experience and Its Design Thought

The concept of User Experience (UE or UX for short) was first put forward by Donald Norman, an American cognitive psychologist and computer engineer. It refers to the subjective feelings generated by users when using products and the satisfaction of their needs. It is a collection of all subjective feelings associated with interaction (Gong,H.P,& Zhou,J.Y,& Zhang,X.B, & Zhang.J.,2020).

Donald Norman first applied the concept of UCD (User-Centered Design) to the interactive design of computer human-computer interface in his book "User Centered System Design: New Perspectives on Human-Computer Interaction" in 1986, thus starting the systematic research work of "User-Centered Design". UCD is an attractive and efficient method of user experience. The idea of UCD is very simple: users should be taken into account in every step of developing products. User-centered design can be described as a multi-stage problem-solving process, which not only requires designers to analyze and predict how users may use the software, but

also verifies their assumptions by testing actual users in real use environment. This kind of test is necessary, because it is very difficult for interaction designers to intuitively understand the experience and learning curve of first-time users. The main difference from other design philosophies is that the user-centered design concept tries to optimize the user interaction interface around how users can finish their work, want to work and need to work, instead of forcing users to change their usage habits to adapt to the ideas of software developers (Norman, D. A., & Draper, S. W., 1986).

Garrett believes that user experience is the expression of products in the real world. It explains how products are related to users and play a role, which should specifically include users' experience of products' functions, contents, brand characteristics and usability. This kind of real-world user experience exists before,during and after users use products (Gong,H.P, Zhou,J.Y, Zhang,X.b, & Zhang.J., 2020). In addition, visual experience, interactive experience, immersion, pleasure and social relations will affect the virtual user experience to some extent.

2.2.2 User experience cellular model

The honeycomb model of user experience is mentioned by Peter Morville in The User Experience Honeycomb. He thinks that user experience consists of seven modules, which can be embodied by the honeycomb model. Useful, the user needs are real. As a practitioner, you can't be satisfied with acting according to the will of managers. We must have the courage and innovative ability to see whether the products and systems are useful or not, and whether there are more creative ideas to make the scheme more useful. Function can well meet the needs of users. Desirable (desirable/satisfactory). All aspects of emotional design, such as graphics, brands and images, are of unique value. Findable (available) We must work hard to design websites that can be easily navigated, and users can find what they need. Accessible (accessible) Users can easily complete the operation. Even if the website is efficient, we should be suitable for people with disabilities. Credible (trust). Let users generate trust. Factors affecting users' trust and trust in websites. Valuable, our website must be able to bring value. For non-profit websites, user experience must promote the completion of goals. For a profit-making website, the website should contribute value to investors and improve customer satisfaction (Morville,P.,2004).

Figure 7 User experience cellular model

2.2.3 User experience elements

Jesse James Garrett, the founder of Adaptive Path, a user experience consulting company, systematically explained in concise language that the integration of design, technology and business is the most important development trend in his book Elements of User Experience. The constituent elements of user experience are divided into five aspects: strategy layer, scope layer, structure layer, framework layer and performance layer. The model composed of these five levels has become a widely used tool to guide user-centered user experience design, and it can also be said to be the guiding ideology in the field of user experience research (Gao,Z.C.,2016). The book analyzes the complex connotation of user-centered design method (UCD) in website design with clear instructions and vivid graphics, and pays attention to ideas rather than tools or technologies, so as to make your website have a high-quality experience process.

2.2.4 User experience design method

In the book "Software Concept Revolution: the Essence of Interactive Design", a set of processes for user experience design is mentioned (Garrett,J.J.,2002):

1) Qualitative research/quantitative research: Conduct questionnaires, interviews and other surveys on people who may become users of your products to understand their behaviors, attitudes, information and reasons. Understand the needs, behaviors and attitudes of real users through investigation, and then design for the purpose of solving problems, which is the first link of interactive design work-investigation.

2) Establish a user portrait: sort out the user data obtained from the survey, and use a virtual character to represent such groups. This is what we call a user portrait, also called a typical user.

3) Write a problem script: bring the user portrait into a specific usage scenario and list the problems that users may encounter when using the product.

4) Writing action scripts: around the characteristics and problem scripts of typical users, design user operation processes for different usage scenarios for typical users.

5) Line drawing block diagram: Sketch the product around the above contents.

6) Making prototype: using prototype design platform to make prototype diagram.

7) Evaluation: User evaluation of the designed prototype, and modification according to the feedback.

2.3 Design of Online and Offline Mixed Education Platform in Higher Vocational Colleges

2.3.1 Design philosophy

In this study, the main principle is the user-centered design idea, which is to analyze and empathize with the user's needs, user's operation behavior, user's use feelings and psychological activities from the user's point of view, so that the designed products can meet or even exceed the user's expectations and obtain higher user satisfaction.

In this study, we will also use some basic design theories, such as Fitz's Law, Hick's Law, Jacob's Law, Homologous Law and so on, to give theoretical guidance to the design prototype. Fitts' Law gives us inspiration in design that the less

distance we move and the larger the area of the target, the easier it is for users to operate and the higher the efficiency. In addition, the reverse application of Fitz's law can play a role in avoiding mis-operation. Hick's Law gives us inspiration in design that the more options in the human-computer interaction interface, the longer it takes the user to make a decision. The design of Jakob's Law inspires us that human beings will rely on the previously used operation methods when using Internet products. The new operation must be fine-tuned step by step on the basis of the old operation. Users spend most of their time using other products, so users want your products to conform to their operating habits. Users will transfer their operating habits in other products to another similar product, so your page should have a consistent usage pattern with the same type of page, using the existing thinking model, so that users can focus on their own goals instead of learning new operating methods. The design inspiration of the Law of Common Region is that people will classify everything within a certain boundary into one group. When different elements appear in the same clearly defined area at the same time, users will regard these elements as the same group. The law of the same domain can make people feel that all their items are a group more than the law of proximity.

2.3.2 Design cycle

A) Before design

Before the design, analyze the product structure and function of the original product, compare it with similar competing products, and analyze the advantages and disadvantages. Through questionnaire and Contextual lnquiry, the user experience and demands of the original products are analyzed, the pain points and needs of users are found, and the user portraits are analyzed and made for students and teachers of different majors.

B) Under design

In the design, the product structure, function, advantages and disadvantages that have been analyzed are sorted and redesigned by emotional board, and the optimal scheme of product modification is refined through emotional board. Make the frame structure diagram of the product with the brain diagram tool, and describe the overall structure, functions and positions of the product in detail in the

diagram. Divide the operation process, design and make product flow chart according to different operation tasks, and design simple operation flow for multiple user interaction processes. According to the sorted frame structure diagram and product flow chart, the prototype design is carried out by using the ink knife online design platform. In the form of questionnaire survey, the designed prototype is investigated by users, and the feedback from users is sorted out, and it is modified according to the feedback until it is optimized. After making the design prototype, beautify the page and find the style and color that meet the product positioning for interface design.

C)After design

Use questionnaire to investigate the interface effect after design, analyze and sort out the feedback content, and modify the interface design. Organize the work done and output the design prototype and interface design revision report.

2.4 Acceptance principle

According to the previous product function comparative analysis and user demand analysis, user experience analysis and user interaction behavior analysis, the user portrait is made, and the wire frame, product flow chart and design prototype are made according to the user's real needs and product positioning. The satisfaction of the design prototype is investigated by questionnaire survey, and finally the visual interface manuscript is designed, and the product design report is output.

2.5 Related Research

2.5.1. UX and Evaluation

Meili Hua and Hang Qiu discussed the concept and basic principles of prototypes and affirmed the value of prototypes in interaction design. As a research tool, prototypes have relatively low production costs, which encourages design teams to boldly explore new solutions and have a more positive attitude towards design errors. Using the prototype as the core of the design enables to discover more problems in the initial design stage. With the prototype as the core, the design team can integrate the prototype with research and evaluation, while executing these three design activities. Through prototyping, designers can review the feasibility of the product. On the other hand, by utilizing the results of research and evaluation, they

can ensure that prototype development activities are on the right track, which in turn provides new ideas for prototype development (Hua, M.L., & Qiu, H. ,2008).

S. Rajeshkumar, Ridha Omar, and Murni Mahmud (2013) conducted a review and summary of several UX and usability evaluation methods, with the analysis and observation results indicating the existence of both correlation and non-correlation between UX and usability. They also classified the evaluation methods for UX, allowing UX researchers and practitioners to easily determine the most suitable UX evaluation method for their research (Rajeshkumar, S., & Omar, R., & Mahmud, M.,2013).

2.5.2. Blended teaching

Jingya Wang and Yuhui Qi discussed the main problems in the practice of blending teaching in higher vocational education, which are mainly reflected in the three aspects of "misplacement of centrality," "separation of experience," and "lack of effectiveness". They proposed that the integration of deep learning can effectively solve the problems in blending learning. Effective implementation of vocational blending learning can be based on the deep learning DELC path, constructing a blending learning path covering the 'preparation, zone-resource, zone-pretest, zone-construction, zone-practice, zone-interaction, zone-evaluation, and zone-post-test zone, in order to stimulate the occurrence of deep learning in the learning process of students and improve the current implementation status of vocational blending learning which provides ideas for the overall design of blending learning (Wang,J.Y.,&Qi,Y.H., 2021).

Fangfang Lv discussed the problems of insufficient depth of industry-education cooperation, poor integration effect of course certification, difficulty in achieving long-term integration of competition and education, and lack of innovation in comprehensive education in the practice of “job, course, competition, certification” comprehensive education. She clearly defined the dual main responsibility of schools and enterprises, highly integrated the elements of production, education, and innovation, and incorporated "innovation" into the "job-course-competition-certification", which is an innovative exploration and practical attempt of the integrated education model. By constructing a "dual element triple transformation" curriculum system, a blending teaching model, and an value-added evaluation system,

she promoted the establishment of a new model of integrating education and competition, and cultivated high-quality technical and skilled talents with innovation and entrepreneurship abilities (Lv,F.F., 2023).

Yaoxiang Zhong and Bifeng Zhou conducted research on the reform of blending teaching mode in the course of "Business Data Analysis", carried out blending teaching practice, designed blending teaching for the course, and concluded in practice that "increasing resources, increasing activities, increasing interest" can enhance skills, "using grading to promote learning, using competition to promote teaching, using evaluation to promote improvement, using group work to promote creativity" can promote improvement, and "excellent teaching materials, excellent teaching methods, excellent evaluation" can optimize the teaching process. These blending teaching implementation strategies can effectively promote further improvement in teaching quality. "Integrating teaching methods, teaching resources, student interests, student performance, student competitions, student innovation, teaching evaluation, textbooks, teaching methods, etc. into blending learning has provided new strategies for blending learning."(Zhong, Y.X., & Zhou, B.F., 2022).

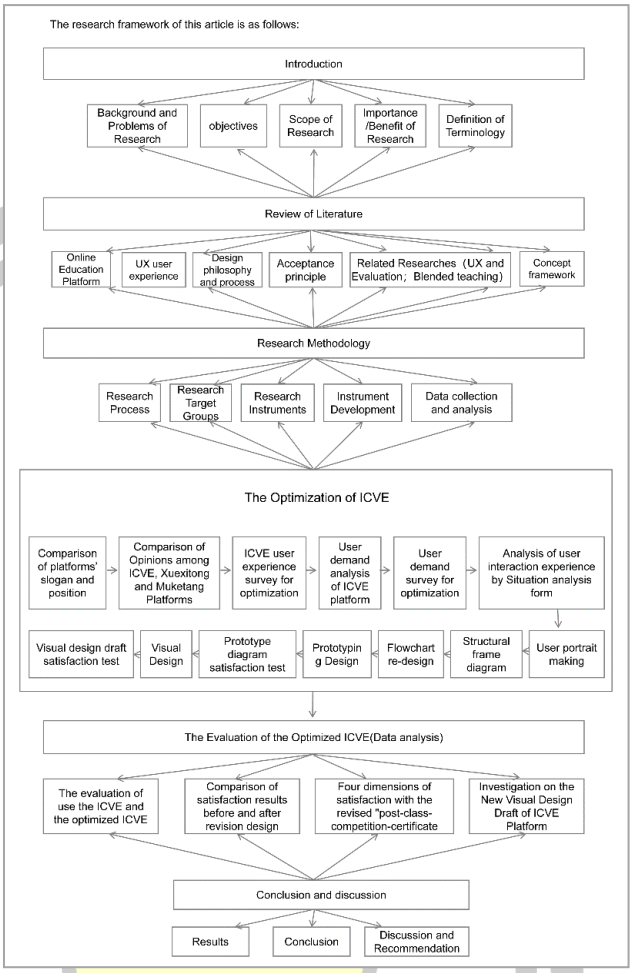
Hong Guo, Siyi Li, Zhanwen Song, and Shuyan Lin integrated the PBL project-based teaching method into the blending online and offline teaching mode, exploring new ideas for hotel English teaching. They redesigned the curriculum from the aspects of teaching objectives, teaching content, teaching methods, teaching process, and teaching evaluation, aiming to enhance students' interest and habits in learning English, promote personalized and team learning abilities, and improve students' English application and comprehensive abilities which provides new possibilities for effective teaching in blending learning. (Guo, H., & Li, S.Y., & Song, Z.W., & Lin, S.Y., 2021)

Wanting Li, Qihua Pang, and Song Zhang conducted a microbiology project-based discussion class in a blending learning environment, focusing on "selecting projects, developing plans, collaborative exploration, creating works, showcasing and exchanging, summarizing and evaluating". They attempted to quantitatively analyze and evaluate the teaching effectiveness of project-based discussion classes through methods such as questionnaires, interviews, and knowledge tests, figuring out that project-based discussion classes can to some extent

enhance students' interest in learning, internet literacy, and memory and application of knowledge and play a positive role in improving teaching effectiveness and students' overall quality. However, teaching teams still need to continuously optimize teaching design and provide differentiated guidance based on research data and student characteristics to better stimulate students' learning autonomy and further enhance the classroom effectiveness of blending learning. Project-based learning provides a method for the practice of blending learning, optimizing the effectiveness of blending learning. (Li, W.H., & Pang,Q.H., & Zhang,S., 2022)

2.6 concept framework

The purpose of this study is to analyze the problems existing in ICVE platform and put forward a new design scheme. The research object is from teachers and students of Guangxi Modern Polytechnic College, in order to make the operation of ICVE platform more concise, the interface more beautiful and the functions more complete, reduce the time cost of teachers and students using ICVE platform, and solve their new needs for platform use. The improvement scheme of ICVE platform can provide some reference value for the field of vocational education learning platform and some suggestions for the improvement method of vocational online learning platform. The analysis of ICVE platform in this study is not suitable for all online learning platforms. Only suggestions can be made to improve the learning platform related to vocational education**,**



which is not applicable to undergraduate education and postgraduate education.

Figure 8 The research framework of this article

In this study, when users use the online education platform, the less time they spend operating a single task, the higher the user satisfaction. Therefore, the time it takes to operate a task is an independent variable. User satisfaction is a dependent variable.

Figure 9 Independent variable and dependent variable

Chapter 3

Research Methodology

3.1 Research Process

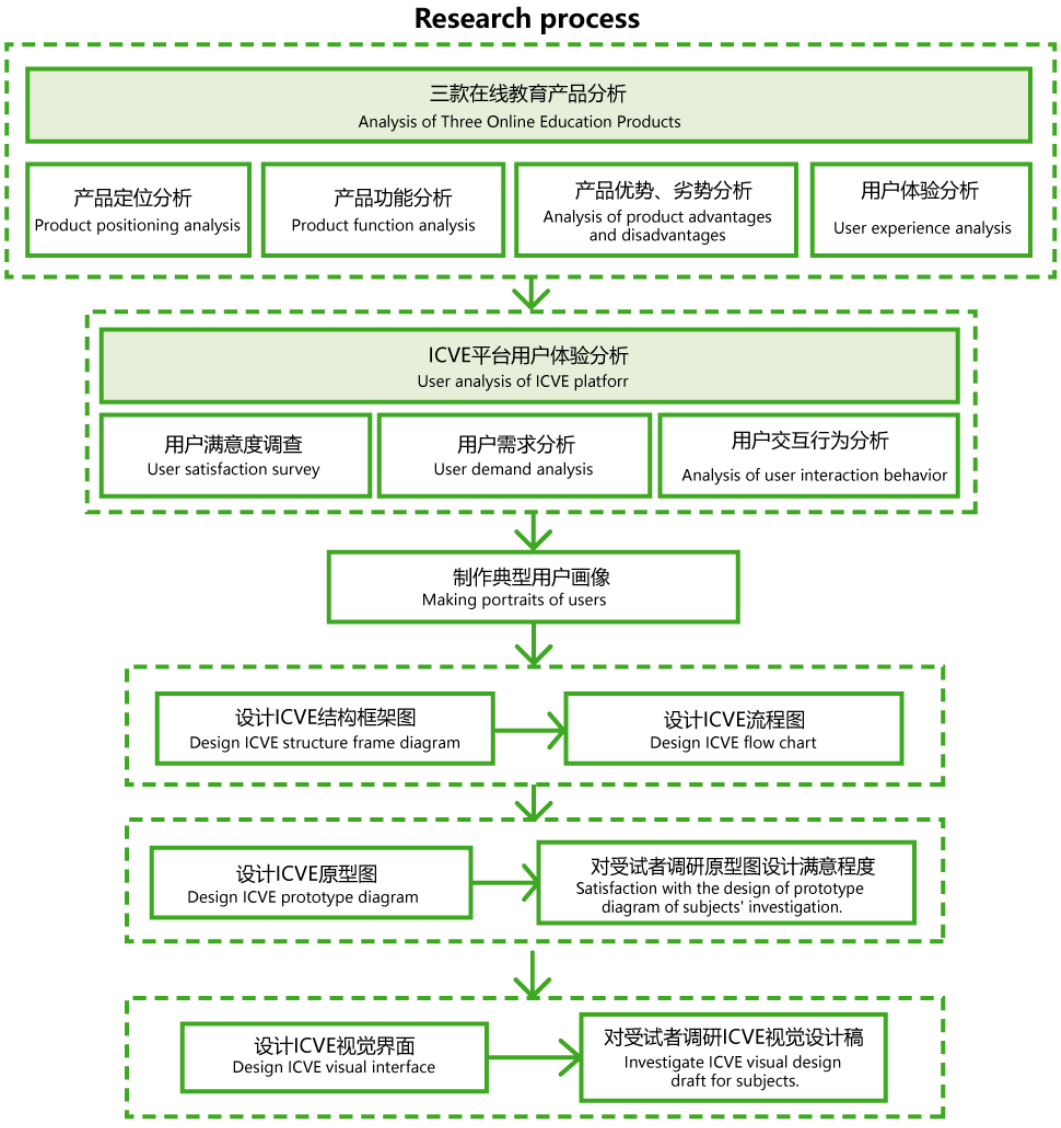


Figure 10 Research processes

The above picture shows the steps of this study, which are detailed as follows.

1) Analysis of three online education products.

This part mainly revolves around ICVE platform, Xuexitong and Muketang, and is subdivided into four parts, which are product positioning analysis,

product advantages and disadvantages analysis, product function analysis and user experience analysis.

(A) In the product positioning analysis, we will analyze the positioning of these three platforms and the slogan of the products. Product positioning can help the products to define the target market, that is, determine which specific market segment the products should be marketed for, and determine the most potential and suitable target market. Accurate product positioning can help enterprises focus their resources and energy on the most profitable market and avoid blind expansion and waste of resources. Product positioning helps enterprises to establish a unique brand image. By clearly positioning the unique selling point and value proposition of products in the target market, products can be distinguished from competitors and shape their own brand image. In this part, we will find and explain the positioning of three educational platforms from their official website introduction, application market and network evaluation.

(B) In the analysis of product advantages and disadvantages, we will compare and analyze the advantages and disadvantages of the three educational platforms. By evaluating the advantages and disadvantages of the products, we can find the characteristics that are different and differentiated from competitors, so as to gain a competitive advantage in the market. It can also help enterprises find the shortcomings of products and make improvements and innovations according to market demand to enhance the competitiveness of products. By comparing the advantages and disadvantages of three educational platforms, we can find the advantages of ICVE platform and expand the advantages, and at the same time, we can find the disadvantages of ICVE platform compared with other platforms and optimize the shortcomings.

(C) In the product function analysis, we will compare the background of vocational education and the existing functions of three educational platforms in combination with the national "on-the-job competition certificate" at this stage. Through comparative analysis, we can find the shortcomings of ICVE platform functions and find the functional points that ICVE platform needs to be improved. This can provide inspiration for the preliminary design of ICVE.

(D) In the analysis of user experience, we mainly conducted a questionnaire survey. We investigated their user experience on three learning platforms from four aspects: function, interaction, beautiful interface and comprehensive experience, and compared the data obtained. From these comparisons, we can find user preferences and prepare for the later design.

2)User experience analysis of ICVE platform

This part is divided into three parts, namely, user satisfaction survey, user demand analysis and user interaction experience analysis.

(A) In the user satisfaction survey, we will use the questionnaire survey tool to investigate the samples (teachers and students), and evaluate the user satisfaction from four dimensions: platform function, beautiful interface, interactive operation and overall feeling, and find that the satisfaction of teachers and students in these four dimensions is low.

(B) In the analysis of users' needs, we will use the questionnaire tool to investigate the actual needs of samples (teachers and students) on the ICVE platform, sort out the results of the investigation and import them into NVivo12 software to generate word cloud maps and tree maps. Word cloud maps are a graphical expression method for visually displaying text data, which presents words with high frequency in the text with different font sizes or colors, thus forming a graph for people to obtain quickly. Word cloud map can help users identify and analyze keywords in a large number of text data, especially in text mining and content analysis. Users can get some data insights and trends by observing the keywords in the word cloud map. The tree diagram can provide a hierarchical view of data and show the contrast between data categories or subcategories.

(C) In the analysis of user interaction experience, we will apply scenario analysis to investigate and analyze the user interaction experience. Specifically, through screen recording, users will operate the ICVE platform against the task items on the task list, fill in the task record form after completion, and describe the operation path of each task and the user's emotional attitude when operating. In this way, the user's operation behavior, operation path and their emotional attitude can be intuitively observed. In this way, we can know where the

user is not very skilled or has problems in operation, which is of great guiding significance to the new design of ICVE.

3)Make a portrait of a typical user

Through the above research, we have learned about the user's needs and related usage, so that we can design typical user roles for ICVE platform, which can help the later design work, and our design will focus on user roles. Here it is applied to Adobe Illustrator software for production.

4)Design structure diagram and flow chart

(A) Design ICVE structure diagram

Structure diagram (also called system structure diagram or information architecture diagram) is a graphical tool to show the overall structure and organizational relationship of user interface. It mainly focuses on the connection and hierarchical relationship between different pages, modules or components. It is applied to XMind software to design the structure and content of ICVE platform and show it in the form of mind map.

(B) Design ICVE flow chart.

Flowchart is a graphical tool used to represent user interface interaction and operation flow. It plays a guiding and communicating role in the process of design and development. Flowchart can be used to describe the steps and paths that users go through from the beginning to the completion of a task or operation. It shows the steps and processes of user interaction with the system in a graphical way. Adobe XD software is used to draw several important processes here.

5) Design the prototype and investigate the satisfaction of the prototype

(A) Design ICVE prototype.

Here, it will be applied to Adobe XD software to design the prototype diagram, set the page size of 1920*1080 pixels, and adopt the design layout of the left menu bar and the horizontal secondary menu bar to meet the convenience of operation.

(B) Satisfaction with the prototype design of the sample survey

Here, the questionnaire will be used to investigate the sample population's satisfaction with the prototype design. If the feedback is good, the visual

design draft will be made. If the feedback is not good or general, the prototype will be further modified until it is satisfied.

6) Design visual interface and investigate satisfaction

(A) ICVE visual design draft production

Here, we will continue to use Adobe XD software to make visual design drafts, focusing on the design of colors, pictures and text sizes.

(B) Satisfaction with the visual design draft of the sample survey

Here, a questionnaire will be used to investigate the sample population's satisfaction with the visual design draft. If the feedback is good, the production will be completed. If the feedback is not good or generally, it will continue to be revised until it is satisfied.

3.2 Research Target Groups

3.2.1 Population

The main target groups of this study are teachers and students in Guangxi Modern Polytechnic College located Jinchengjiang District, Hechi, Guangxi, China, where there are 15,000 students and 650 teachers. The school's disciplines and specialties are divided into Education, Art, Design, Language, Sports, Finance, Engineering, and Computer and so on.

3.2.2 sample

Given a population of 15,000 student, a minimum sample of 99 was determined by consulting Taro Yamane formula table with 10% of error. Then, the sample of this study consists of 100 randomly selected students from different majors. firstly, the list of students from each major is derived from the school resource database, and the list of each major is randomly selected by using the WeChat applet of lottery selection until the required sample size is reached. For teachers, this is a volunteer selection process by 15 teachers from different majors.

学号/工号	姓名	角色	院系	专业	班级
2021401143	邓鹏飞	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022101390	张兰让	学生	国防学院	广告艺术设计(后备	22广告班(后备兵员
2022101447	刘建宁	学生	国防学院	广告艺术设计(后备	22广告班(后备兵员
2022201203	黄承琦	学生	国防学院	广告艺术设计(后备	22广告班(后备兵员
2022201269	韦强	学生	国防学院	广告艺术设计(后备	22广告班(后备兵员
2022201317	董富成	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022301245	苏阳阳	学生	国防学院	广告艺术设计(后备	22广告班(后备兵员
2022301553	欧弦耀	学生	国防学院	广告艺术设计(后备	22广告班(后备兵员
2022301587	陈海琪	学生	国防学院	广告艺术设计(后备	22广告班(后备兵员
2022401013	韦利露	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401014	廖武庆	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401024	李文杰	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401026	杨鸿婉	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401040	黄建森	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401041	黄锦兮	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401046	李雪燕	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401061	谭静丽	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401066	韦孔玲	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401111	勾国力	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401137	盘毓万	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401138	覃宏宇	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401139	吴嘉嘉	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401160	盘庆幸	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401183	罗李湘	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班
2022401190	曾伟麟	学生	建筑工程学院	广告艺术设计2加3	22广告衔接2班

Figure 11 List of Advertising Students Exported from School Resource Library

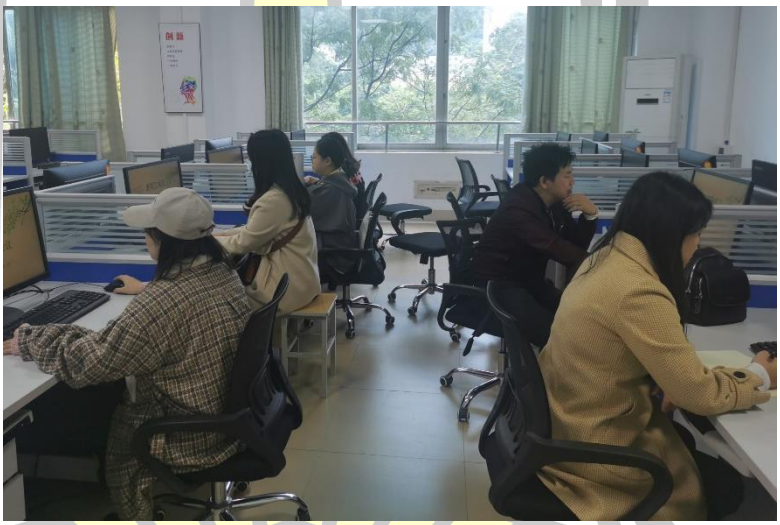


Figure 12 Some volunteer teachers accept the investigation scene in the test classroom.

3.3 Research Instruments

The main research method adopted in this study is the horizontal development research method, mainly because this study does not need to consider the time span. In data collection, two forms of development research method are mainly adopted. One is the self-report method, that is, the form of interviewing or questionnaire survey to let the interviewees provide their true feelings and opinions according to their own feelings of using the learning platform. The other is the behavior observation method,

which allows users to operate and observe their behaviors and emotions by designing a series of tasks to collect real data.

Therefore, there are three tools for data collection in this study, including questionnaire, interview guideline and forms for Situation Analysis. The details are as follows.

There were 3 tools for data collection that consisted of questionnaire survey, interview guideline, and recording form, detail as following.

1). Questionnaire Survey

In this study, the following contents were investigated by questionnaire.

A) users' experience of ICVE platform, Xuexitong platform and Muketang platform.

B) users' satisfaction with ICVE platform.

C) users' satisfaction with the prototype of ICVE platform after revision.

D) users' satisfaction with the visual design of ICVE platform after revision.

The specific method is as follows: firstly, make an electronic questionnaire by using the questionnaire platform of Questionnaires, and then send it to the tester's mobile phone for users to fill in through QQ, WeChat and other tools. Finally, collect the results by using Questionnaires.

2) Interview Guideline

In this study, the specific needs of users for the revision of ICVE platform are investigated by means of interviews. The specific methods are as follows: First, choose a comfortable environment suitable for conversation, then interview the interviewees by using the recording function of the mobile phone, and finally, organize the interview contents by using Excel, edit the keywords and upload them to the analysis software.

3) Forms for Situation Analysis

This study will use the method of situation analysis forms to collect the interactive experience of users operating the old ICVE platform. The specific methods are as follows: First, use Word document to edit the task items to be collected and generate a task item table. Secondly, using Word document to edit the specific task

content collection table and generate the task record table. Then, inform the interviewee of the relevant requirements, and the interviewee will use the computer and screen recording software to operate each task and fill in the task record form. Finally, the interviewee will send the recorded video and task record form to the collector, who will sort it out and summarize it.

3.4 Instrument Development

3.4.1 The establishment of questionnaire survey method

The questionnaire of this study mainly includes the following contents: User Experience Survey of Three Learning Platforms,ICVE's User Satisfaction Survey，The ICVE platform user demand survey, Survey on Satisfaction of Revised Design Prototype Drawings and Survey on Satisfaction of Revised Visual Design Drawings.

1)Survey on User Experience of Three Learning Platforms

Through questionnaire survey, this paper investigates their user experience on three learning platforms from four aspects: function, interaction, beautiful interface and comprehensive experience, and compares the obtained data. From these comparisons, we can find users' preferences and prepare for the later design.

2)User satisfaction survey of ICVE platform

By asking questions about the main functions of ICVE and the feelings and satisfaction in the operation process, we can understand the thoughts and needs of users and collect the problems existing in the process of ICVE.

3)Investigation on User Needs of ICVE Platform

The questionnaire tool is used to investigate teachers and students' actual needs for ICVE platform.

4)Survey on Satisfaction of Revised Design Prototype Drawings

In the form of questionnaire survey, the satisfaction of the revised design prototype of ICVE is investigated, mainly to investigate whether the layout of each interface meets the expectations of users.

5)Satisfaction degree of visual design after revision

In the form of questionnaire survey, this paper investigates the satisfaction of ICVE's revised visual design, mainly investigating whether the overall style, color, element position size, font size and title size of the interface meet the aesthetic needs of users.

3.4.2 Establishment of Situation Analysis Form

By analyzing the main functions and operation paths of ICVE, different subtasks are designed for teachers and students. By recording and depicting the process of each user completing the task, we can obtain the operating behavior and the emotional experience behind the behavior during the user's operation.

The main steps are as follows:

1) Each participant carefully consulted the ICVE Platform Task List.

2) In a comfortable environment, the sub-tasks for students and teachers are completed on computers and mobile phones respectively.

In this process, the examiner needs to screen and video the subjects' behaviors all the time, at the same time, record all the actions, language and every feedback of the interface of the subjects, and the examiner needs to make a Task Record Form.

During the development of the above instruments, experts and peers were specially invited to guide the investigation forms. After discussion and modification, the above questionnaire forms was finally determined and applied to the research.

Figure 13 Experts and peers give guidance on the forms created.

3.5 Data collection and analysis

The purpose of this study is to explore the influence of the function, interaction and beautiful interface of online education platform on users' satisfaction, and to provide a direction for the revision design of ICVE platform. In this study, questionnaires were distributed by QQ software before and after the design revision of ICVE platform, and five surveys were conducted. Finally, Excel, NVivo12 and Spss 26 are used to process the data, delete the missing values, code and input the answers to the questions, and calculate the scores of each dimension through summation, and finally get the original data of data analysis.

1. Before the new design of ICVE platform, teachers and students were surveyed on the user experience of three different learning platforms, and the user's experience of using different education platforms was understood from four aspects: function, interaction, beautiful interface and comprehensive experience. The data obtained were compared, and from these comparisons, we learned the preferences of users, who liked online education platforms with complete functions but simple operation and beautiful interface.

2. Before the new design of ICVE platform, the second and third questionnaires were conducted to teachers and students, which were respectively the user satisfaction survey of ICVE platform and the user demand survey of ICVE platform. The satisfaction questionnaire mainly focused on the function, interaction, interface and overall use experience of ICVE platform in the actual use process of teachers and students and learned the current satisfaction of users with ICVE platform. The user demand research is based on the real needs of teachers and students and discusses the needs of teachers and students in different dimensions, such as function, interaction and beautiful interface, which provides the direction for the revised design.

3. After the prototype design of ICVE platform, the fourth questionnaire survey was conducted among teachers and students, and the satisfaction degree of teachers and students to the revised prototype diagram was known. Through the satisfaction analysis of functional design, interactive design and interface layout design, the difference between before and after the revision was compared, and it was

known that the user's satisfaction with the revised interface was significantly improved. On this basis, we made a visual design draft.

4. After making the visual design draft on ICVE platform, the fifth questionnaire survey was conducted among teachers and students to find out their satisfaction with the visual design draft. By comparing the satisfaction values before and after the platform design, the results show that users are more satisfied with the revised design.

In this study, 115 questionnaires were distributed, including 15 teachers and 100 students, and 115 questionnaires were collected, with a recovery rate of 100% and a questionnaire efficiency of 100%. The survey results can be used as the basis for the conclusion of this study.

3.6 Data analysis

1. Analyze and study the product positioning and function comparison, product advantages and disadvantages, interface layout and user needs of three online education platforms (ICVE, Superstar Learning Link and Muketang).

2. Analyze the original interactive process of ICVE, analyze the user's operation behavior, analyze the user's emotional experience in the use process, and revise the design prototype of ICVE through the analyzed data.

3. Design prototype satisfaction analysis and visual interface satisfaction analysis.

3.7 Statistics for Data Analysis

3.7.1 Statistics for comparison is independent t-test

$$t = \frac{(x_1 - x_2)}{\sqrt{\frac{(s_1)^2}{n_1} + \frac{(s_2)^2}{n_2}}}$$

Where:

x_1 is the mean of sample 1

s_1 is the standard deviation of sample 1

n_1 is the sample size of sample 1

x_2 is the mean of sample 2

s_2 is the standard deviation of sample 2

n_2 is the sample size in sample 2

3.7.2 Statistics for descriptive analysis consists of Arithmetic mean ($\bar{x}$) and Standard deviation (S.D.)

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

Where:

x_i is the observation data

n is number of observations

$$S.D. = \sqrt{\frac{\sum(X - \overline{X})^2}{n - 1}}$$

Where:

x_i is the observation data

n is number of observations

$\bar{x}$ is Mean

Chapter 4
The Optimization of ICVE

According to the relevant documents issued by the General Office of the Ministry of Education and the General Office of the State Council, the construction of blended courses in higher vocational colleges should be integrated into the job content related to the major, into the professional competition content of the industry, and into the "1+X" certificate assessment content. Therefore, before redesigning the ICVE platform, the above issues should be fully considered, and the relevant national policies and requirements for vocational education should be integrated into the revised design of the ICVE platform. In addition, we should give full consideration to the problems and actual needs of teachers and students, and design a new version by comparing the functions, advantages and disadvantages of other platforms of the same type.

Before we start our work, we will compare the three platforms through online materials and data.

4.1 Comparison of platforms' slogan and position

Firstly, we analyze the positioning of the three platforms in the following table (Table 1).We can see the differences in the positioning of the three learning platforms. The ICVE platform focuses on the development of vocational education, Muketang is a learning platform focusing on the development of undergraduate education, and the "Xuexitong" platform is a comprehensive learning platform that integrates books, papers, periodicals and magazines. Although the positioning of the three platforms here is different, the purpose is the same, that is, an online and offline mixed learning platform for college students (including junior college students and undergraduate students) to complete the learning and assessment of school courses through the learning platform. Here, we can make it clear that the positioning of ICVE platform is to focus on vocational education, which is closely related to the actual work content of enterprises' jobs. To promote the development of vocational education, we should combine the development of enterprises' frontiers and integrate new technologies,

new processes and new ideas into vocational education. Therefore, when designing this platform, we should consider whether there are ways for school-enterprise cooperation in teaching and related information. ICVE platform will establish a professional resource database of national vocational colleges, in which you can find the professional courses of national vocational colleges, which provides opportunities for teachers and students to exchange and learn, that is, teachers can learn from each other to promote the development and construction of courses, and students can freely learn the courses of teachers from other colleges.

Table 1 Orientation of Three Learning Platforms

platform	ICVE	Xuexitong	Muketang
position	Focus on vocational education. Committed to building a national professional resource library for vocational education.	Comprehensive education service platform. Committed to creating a one-stop learning and working environment for readers, which integrates knowledge management, course learning, thematic creation and office application.	Focus on undergraduate education. Committed to building high-quality courses in national first-class undergraduate schools.
slogan	The future is broad and promising.	Learning is a kind of faith.	A good university has no walls.

We compare the advantages and disadvantages of these three platforms, let's compare the advantages and disadvantages of the three platforms (Table 2), by comparing advantages, we found that the ICVE platform is strongly supported by the government to promote the construction of vocational education learning platform, which shows that the platform will receive more financial subsidies to complete the iteration and improvement of the platform. The platform has an intelligent evaluation system, which can intelligently evaluate the teaching effect of teachers and the learning effect of students, which is a very good function for teachers and students.

Teachers and students can actively adjust teaching and learning strategies in the learning process. At the same time, the platform has different links before, during and after class in the course design. In each link, teachers can arrange different tasks for students, which can make students learn knowledge more three-dimensionally. We should reserve our existing advantages. Comparing the advantages of the other two platforms, we can see the advantages that ICVE platform does not have, such as the functions of Xuexitong platform, such as live broadcast and library, and the flexible login mode and management mode of Xuexitong platform, and the perfect course certificate system of Muketang platform. Students can get the certification certificate of a course after studying and passing the exam, which is worth learning. Comparing the disadvantages of the three platforms, we can combine the disadvantages of the three platforms in a positive way and apply them to the improvement of ICVE platform. For example, the disadvantages of ICVE include less functions, uncluttered operation, insufficient interaction, etc. We can consider making improvements when redesigning, and we can also apply them to the revised design for the disadvantages of the other two platforms. By analyzing the disadvantages of ourselves and our competitors, we can provide more directions for the revision of the platform.

Table 2 Advantages and disadvantages of three learning platforms

platform	ICVE	Xuexitong	Muketang
advantage	1. With the support of relevant policies, it will be promoted in national vocational colleges. 2. Intelligent evaluation system 3. A platform for free online learning 4. Have a professional teaching resource library of vocational	1. There are many functions, such as live broadcast, library, teaching material library, etc. 2. Contribute to information sharing and intercommunication. 3. Provide a variety of curriculum resources. 4. Auxiliary teaching	1. There are free courses in national first-class famous schools. 2. Undergraduate education professional teaching resource database 3. High teaching

	education. 5. You can set the score weight ratio. 6. There are links before, during and after class.	and course selection. 5. It is convenient for education management 6. Classroom interaction is strong 7. Visualization of learning process 8. The login method is free and flexible	level 4. Be able to connect SPOC courses with MOOC. 5. Rich teaching resources 6. Issue course certificates
disadvantaged	1. Less functions 2. The operation is not simple enough 3. Insufficient interaction and communication 4. The interface design is not clear enough 5. Insufficient interaction and communication 6. It is not closely connected with the teaching materials. 7. There are no competition-related modules. 8. There is no module related to job information and industry information. 9. Not combined with	1. The iterative rhythm is slow, and the function update is lagging behind. 2. The design of function entrance is confusing. 3. Insufficient interaction and communication 4. It is not closely connected with the teaching materials. 5. There are no competition-related modules. 6. There is no module related to job information and industry information.	1. Less functions 2. Insufficient interaction and communication 3. It is not closely connected with the teaching materials. 4. There are no competition-related modules. 5. There is no module related to job information and industry information.

	"1+X" certificate.		

Combined with the recent national policies and platform positioning and advantages and disadvantages, we listed some functions in detail, and found that the functions of the three platforms have certain differences, which is directly related to the positioning of the three platforms. We will take the listed functions into account when designing, and at the same time, improve the functions in combination with the positioning, advantages and disadvantages of the platforms.

Table 3 Functional Analysis of Three Learning Platforms

Functional contrast		ICVE	Xuexitong	Muketang
Curriculum resources	Course resources (courseware PPT\ video \ audio \ document)	✓	✓	✓
	Teaching calendar	✓	✓	✓
	Teaching log	×	×	×
	Other college courses	✓	✓	✓

My resources	cloud drive/disc	✓	✓	✓
	examination question bank	✓	✓	✓
classes	Join Class \ Student Management	✓	✓	✓
Class activities	register one's attendance	✓	✓	✓
	Course live broadcast	×	✓	✓
	replay	×	×	✓
	Raise your hand and answer first.	✓	✓	✓
	group	✓	✓	✓
	vote	✓	✓	✓
	Select people	✓	✓	✓
	questionnaire	×	✓	×
	discuss	✓	✓	✓
	Course notes	✓	✓	✓
	electronic whiteboard	×	×	×
	Screen recording	×	×	×
	screenshot	×	×	×
Homework & assessment	Homework, grading	✓	✓	✓
	Examinations and quizzes	✓	✓	✓
Evaluation&comment	Curriculum evaluation (students evaluate teachers)	✓	✓	✓
	Homework evaluation-teacher evaluation (teacher evaluates students)	✓	✓	✓
	Homework Evaluation-Students Evaluate Teachers (Students Evaluate Students)	×	×	×
Notification message	Comment message	×	✓	✓
	Announcement message	✓	✓	✓
	message	✓	✓	✓
statistics	Statistical analysis of academic situation	✓	✓	×
	Statistical analysis of curriculum resources	✓	✓	×

certificate	Course credit certificate	×	×	✓
	My certificate	×	×	✓
Customer service and help	Telephone customer service	✓	✓	✓
	Wechat customer service	×	×	×
	QQ customer service	×	✓	✓
	Mailbox customer service	×	✓	×
	Help Manual \ Tutorial Manual	×	✓	✓
Personalization and setting	font size	×	×	×
	colour	×	×	×
	Icon size	×	×	×
other	Paper detection	×	✓	×

In the comparison of the above functions (Table 3), we have summarized the functions and divided them into the following categories according to different purposes, such as course resources, my resources, classes, class activities, homework & assessment, evaluation & comment, notification messages, statistics, certificates, customer service and help, personalization and setting, and others. We find that the functions of ICVE platform are relatively few compared with the other two platforms. In the functional design of the new version, we will add and optimize the functions of ICVE with the above table.

4.2 Comparison of Opinions among ICVE, Xuexitong and Muketang Platforms

We conducted a simple questionnaire survey on the user experience of the three platforms and got the users' opinions on the three platforms from four aspects: function, interaction, beautiful interface and comprehensive experience. The results of the survey of opinions towards ICVE, Xuexitong and Muketang platforms in terms of functions, interaction, beautiful interface, and the highest comprehensive experience shown as below table.

Table 4 Opinions on the best platforms

Opinion list	Platform (frequency, percentage)		
	Xuexitong	Muketang	ICVE

the best of function	42, 36.52%	40, 34.78%	33, 28.70%
the best of interaction	44, 38.26%	40, 34.78%	31, 26.96%
the best of beautiful interface	38, 33.04%	49, 42.61%	28, 24.35%
the highest comprehensive experience	43, 37.39%	39, 33.91%	33, 28.70%

Through the above frequency analysis, we compare ICVE, Xuexitong and Muketang platform, and can draw the following conclusions: among 15 teachers and 100 students, 42 people think that Xuexitong has the best functional design (36.52%), 44 people think that Xuexitong has the best interactive design (38.26%), and 49 people think that Muketang has the best interface design (42.61). In contrast, three aspects of ICVE platform are relatively weak and need to be improved.

4.3 ICVE user experience survey for optimization

4.3.1 Teacher client

Table 5 ICVE User Satisfaction Survey —— Teacher client

content	Sample size	average	Standard deviation	Median
Do you think it is helpful for teachers to use ICVE platform in class?	15	2.533	1.407	3.000
In actual use, do you think the functions of this ICVE intelligent vocational education platform can meet your needs?	15	2.867	1.246	3.000
Are you satisfied with the design and user interface of this ICVE intelligent vocational education platform?	15	3.400	1.549	4.000
Are you satisfied with the operation and performance of ICVE intelligent vocational education platform during the use?	15	2.933	1.438	3.000
How do you feel about the overall use of ICVE?	15	3.600	1.242	4.000

Through the above survey of teachers' satisfaction with ICVE users, according to the results of descriptive statistics, the average scores of teachers on ICVE platform are 2.533, 2.867, 3.400 for design and user interface, 2.933 for operation and performance, and 3.600 for overall use, all of which are below 3.6. It can be seen that the average satisfaction of teachers is low.

4.4.2 Student client

Table 6 ICVE User Satisfaction Survey —— Student client

content	Sample size	average	Standard deviation	Median
Do you think it is helpful for teachers to use ICVE platform in class?	100	2.870	1.454	3.000
In actual use, do you think the functions of this ICVE intelligent vocational education platform can meet your needs?	100	2.840	1.412	3.000
Are you satisfied with the design and user interface of this ICVE intelligent vocational education platform?	100	3.130	1.405	3.000
Are you satisfied with the operation and performance of ICVE intelligent vocational education platform during the use?	100	2.940	1.286	3.000

According to the survey of ICVE users' satisfaction, the results of descriptive statistics show that: the average satisfaction of function is 2.870, the average satisfaction of design and user interface is 2.840, the average satisfaction of operation and performance is 3.130, the average satisfaction of overall use is 2.940, and the average satisfaction scores are all below 3.2, which shows that the overall satisfaction of students is low.

4.4 User demand analysis of ICVE platform

We further investigated the users of ICVE platform, analyzed the user experience and revised design of ICVE platform by interview and questionnaire survey, and investigated 15 vocational teachers and 100 vocational students who used ICVE platform. In terms of the interview method, semi-structured interviews are applied. After organizing the interview content and text, NVivo12 software is used as a qualitative research analysis tool to draw corresponding conclusions based on the text analysis results. Considering the questionnaire survey method, two questionnaires are used before and after comparison, and appropriate data analysis methods are selected for quantitative research.

4.4.1 Interview Analysis - Thematic Analysis Method

Before interviewing 15 teachers and 100 students, the outline of the interview questions is first discussed with the interviewee. The interviewees are able to provide some opinions and suggestions on these questions to help the researchers further improve the interview questions. Finally, after revision and improvement, the final 19 questions are formed in the interview outline to explore the satisfaction and need for additional features of ICVE platform among 15 teachers and 100 students.

4.4.2 Word cloud and tree structure diagram

After the interview, the responses of the 115 interviewees are organized, summarizing and compiling the textual information, and importing the organized text data into NVivo12 software. The word frequency analysis is performed on the text content of the interview, filtering out invalid words, and deleting irrelevant points such as numbers and emotional words. Finally, a word cloud (Figure 9) and a tree structure diagram (Figure 10) are generated.

Figure 14 Word cloud of user demand analysis

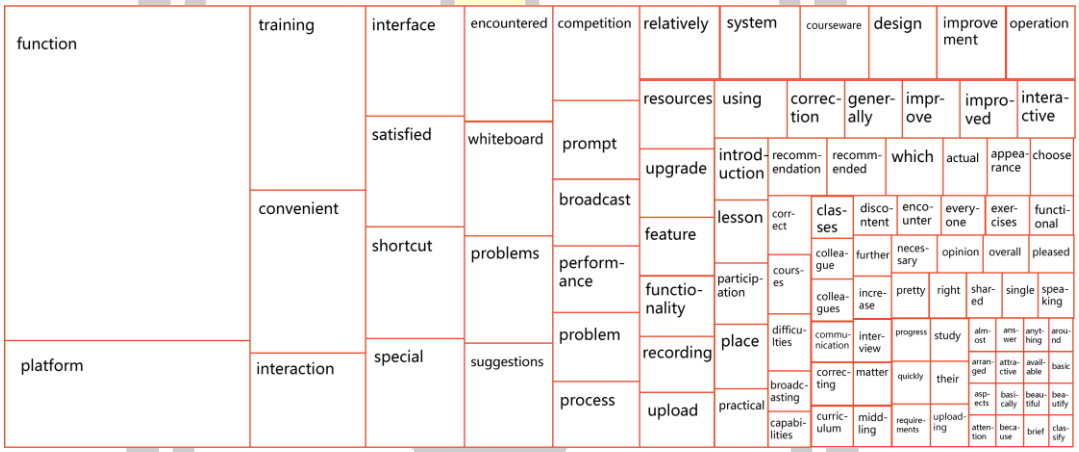


Figure 15 Tree structure diagram

Through the analysis of word cloud map and tree structure, we can see that 15 teachers and 100 students have great demand for improving the function of ICVE platform, and they pay more attention to the interactive function of the platform. For the key words of ICVE revision, the following words appear frequently, such as "function", "interaction", "competition", "live broadcast", "interface", "shortcut" and "information". In order to further explore the interviewees' increasing demand for functions, we conduct structural coding and data analysis on the interview text, and read and mark the text materials repeatedly to identify important themes and patterns, so as to increase the required functions for the revision of ICVE platform.

4.4.3 Text encoding

In this paper, the text content of sample users' answers is coded into five levels. Firstly, the original interview text is read and summarized word by word, and the information in the interview text is marked, named and classified to form the most basic conceptual elements. By coding the interview data of sample users, a total of 3 first-level nodes, 5 second-level nodes and 61 reference points are formed (Table 7).

Table 7 Text encoding for basic elements of ICVE

Primary node	Secondary node	Reference point	Reference point example
Overall evaluation	Advantages of the main features	16	Better grasp the classroom situation and students' progress.
	Issues in use	10	Sometimes the system may get stuck and the interaction is not easy enough.
	Satisfaction	6	I think the aesthetics of the user interface can be further improved.
The need for increased functionality	Features that need improvement	23	It is available to add job information and job training functions; add shortcut key prompt function; upgrade the whiteboard function; add competition information and competition training functions; and add 1+X certificate learning function.
Appearance design and user interface	Satisfaction	6	I think there is still room for improvement in terms of appearance design and user interface.

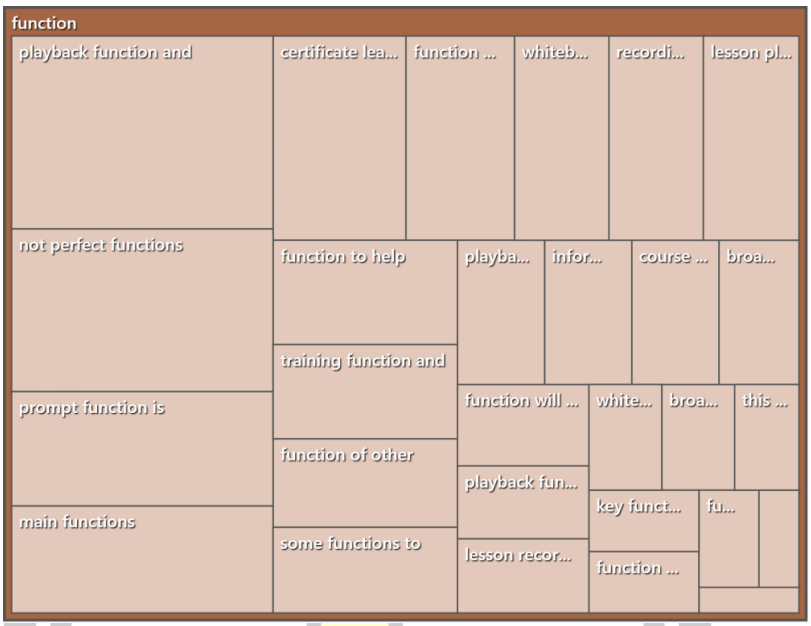


Figure 16 Comparison of platform function coding reference points

By comparing the above text encoding and encoding reference points, the text content answered by 15 vocational teachers and 100 vocational students (Figure 11) can be sorted out and analyzed. It can be found that: 115 subjects have a very low satisfaction with the functionality of the ICVE platform. For the missing functions of the platform, most teachers are more concerned about the job information function, job training function, whiteboard function, shortcut key prompt function, classroom live broadcast and playback function, competition information and training function, etc. This provides us with ideas and directions for improving the platform. Meanwhile, teachers are not satisfied with the platform's interchangeability and interface aesthetics and have also raised some improvement requirements.

4.5 User demand survey for optimization

4.5.1 Teachers side

Table 8 Investigation on interactive demand of teacher-side revision

What do you think can be improved in interaction?	Frequency	Percentage	Cumulative percentage
Simplify the operation process	4	26.67%	26.67%
Increase the interesting interactive effect	4	26.67%	53.33%
other	3	20.00%	73.33%

Table 8 Investigation on interactive demand of teacher-side revision

What do you think can be improved in interaction?	Frequency	Percentage	Cumulative percentage
Increase the interactive visual effect	4	26.67%	100.00%
Total	15	100.0%	

Table 9 Investigation on Design Requirements of Teacher-side Revised Interface

What do you think can be improved in the interface design?	Frequency	Percentage	Cumulative percentage
Optimize button design	2	13.33%	13.33%
Concise interface design	5	33.33%	46.67%
Optimize icon design	3	20.00%	66.67%
Color matching of oil painting	5	33.33%	100.00%
Total	15	100.0%	

Table 10 Investigation on interactive demand of teacher-side revision

What do you think can be improved in interaction?	Frequency	Percentage	Cumulative percentage
Simplify the operation process	4	26.67%	26.67%
Increase the interesting interactive effect	4	26.67%	53.33%
Increase the interactive visual effect	4	26.67%	100.00%
other	3	20.00%	73.33%
Total	15	100.0%	

Table 11 Investigation on Design Requirements of Teacher-side Revised Interface

What do you think can be improved in the interface design?	Frequency	Percentage	Cumulative percentage
Concise interface design	5	33.33%	46.67%
Optimize icon design	3	20.00%	66.67%
Optimize Color matching	5	33.33%	100.00%
Optimize button design	2	13.33%	13.33%
Total	15	100.0%	

Through the frequency analysis of teachers' user demand survey, we can draw the following conclusions: teachers think that the areas that can be improved in interaction design are simplifying the operation process, increasing the interesting interaction effect and increasing the interactive visual effect; At the same time, in terms of interface design function, it is considered that button design, concise interface design, icon design and color matching can be optimized.

4.5.2 Students side

Table 12 Student’s demand on worth improving in ICVE Platform

Do you think there is anything worth improving in ICVE Platform?	Frequency	Percentage	Cumulative percentage
Simplification of interaction process	22	22.00%	22.00%
All of the above	18	18.00%	40.00%

Table 12 Student's demand on worth improving in ICVE Platform

Do you think there is anything worth improving in ICVE Platform?	Frequency	Percentage	Cumulative percentage
other	18	18.00%	58.00%
The interface design is beautiful and clear	20	20.00%	78.00%
Reasonable functional design	22	22.00%	100.00%
Total	100	100.0%	

Table 13 Student's demand on improving in function

What do you think can be improved in function?	Frequency	Percentage	Cumulative percentage
Competition module	17	17.00%	17.00%
Curriculum module	15	15.00%	32.00%
Post module	22	22.00%	54.00%
Textual research module	19	19.00%	73.00%
Service module	12	12.00%	85.00%
other	15	15.00%	100.00%
Total	100	100.0%	

Table 14 Student's demand on improving in interaction

What do you think can be improved in interaction?	Frequency	Percentage	Cumulative percentage
other	15	15.00%	15.00%
Simplify the operation process	30	30.00%	45.00%
Increase the interactive visual effect	27	27.00%	72.00%
Increase the interesting interactive effect	28	28.00%	100.00%
Total	100	100.0%	

Table 15 Student's demand on improving in the interface design

What do you think can be improved in the interface design?	Frequency	Percentage	Cumulative percentage
Concise interface design	29	29.00%	29.00%
Color matching of oil painting	27	27.00%	56.00%
Optimize button design	17	17.00%	73.00%
Optimize icon design	27	27.00%	100.00%
Total	100	100.0%	

All above table, through the investigation of students' user needs, the statistical results show that 100 interviewed students think that the needs to be improved include simplified interaction process, beautiful and clear interface design and reasonable functional design. Different specific improvement requirements are put forward in terms of function improvement, interaction design improvement and interface design.

4.6 Analysis of user interaction experience by Situation analysis form.

By recording the screen (Figure 12), the user operates the required tasks, and then fills in the task record form (Table 14) to describe the operation path of each task and the user's emotional attitude when operating. In this way, the user's operation behavior, operation path and their emotional attitude can be intuitively observed. These contents can provide ideas for designing the flow chart.

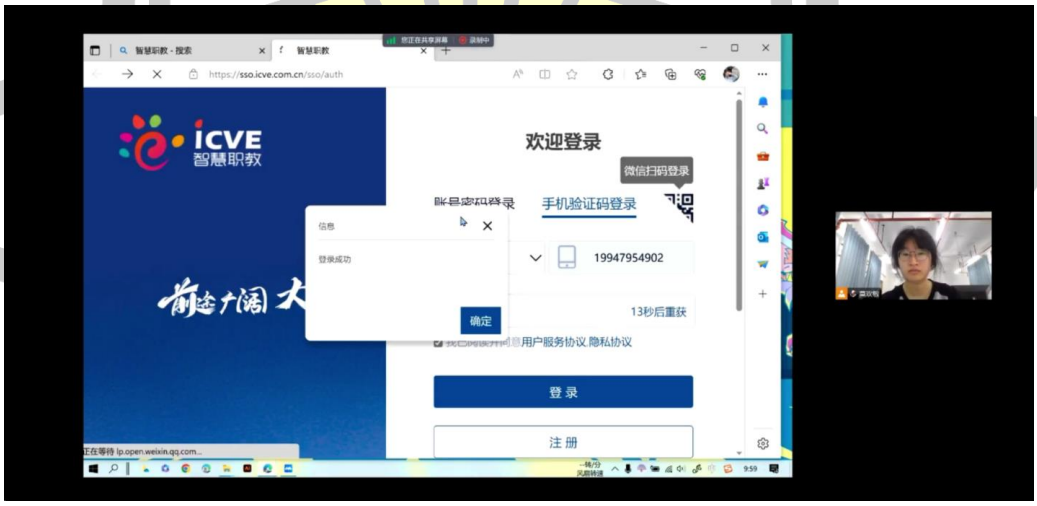
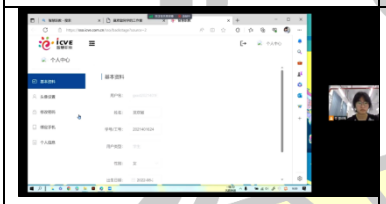
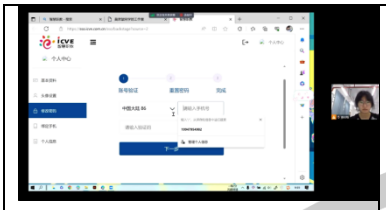
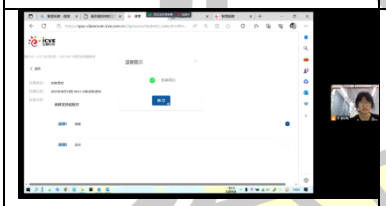
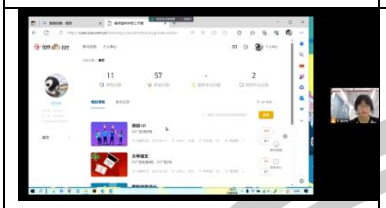
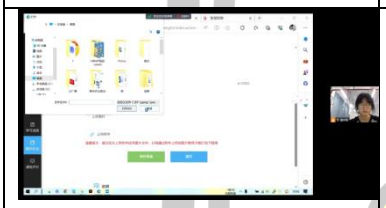


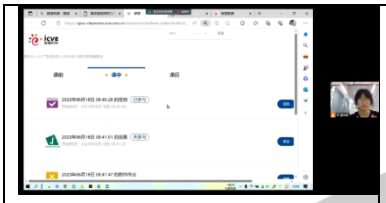
Figure 17 The user is operating the task in the task record table by recording the screen.

Table 16 student task record table.

Student task record form			
Task 1, log on to ICVE			
Interface display	User operation path	Emotions/ attitudes/ feelings	Remarks
	1. Enter the URL -2. Enter the account password -3. Click Login.	More pleasant	The operation is simple and can be easily completed.
Task 2, Enter the Setup Center			
Interface display	User operation path	Emotions/ attitudes/ feelings	Remarks
	1. Enter the URL -2. Enter the account password -3. Click Login -4. Click the avatar on the main page.	calm	The operation is simple and can be easily completed.
Task 3, Change Password			
Interface display	User operation path	Emotions/ attitudes/ feelings	Remarks

	1. Enter the URL -2. Enter the account password -3. Click Login -4. Click the avatar on the main page -5. Click Modify Password -6. Enter the mobile phone and verification code -7. Enter the new password twice -8. Finish.	agitated	The bound old mobile phone number cannot be untied by other verification methods, and customer service is needed.
Task 4: Join the class where the course is located.			
Interface display	User operation path	Emotions/ attitudes/ feelings	Remarks
	1. Enter the website -2. Enter the account password -3. Click Login -4. Click Join Class on the main page -5. Search for the name of the course class -6. Apply to join -7. Wait for the teacher to approve.	Little impatient	You need to wait for the teacher to pass before you can enter the class.
Task 5: Watch and learn learning resources such as courseware and videos.			
Interface display	User operation path	Emotions/ attitudes/	Remarks

		feelings	
	1. Enter the website -2. Enter the account password -3. Click Login -4. Click the course on the main page to enter the course details -5. View the course resources for learning.	calm	The operation is simple and can be easily completed.
Task 6, Upload Job			
Interface display	User operation path	Emotions/attitudes/feelings	Remarks
	1. Enter the website address -2. Enter the account password -3. Click Login -4. Click the course on the main page to enter the course details -5. Click the attachment homework icon -6. Select the homework to be submitted and click View Details -7. Enter the homework page and submit the homework according to the operation prompts.	Little impatient	The homework page is hidden, and I hope to put it in a more obvious position as a common function.
Task 7, Participation in Activities			
Interface display	User operation path	Emotions/attitudes/feelings	Remarks

	1. Enter the website -2. Enter the account password -3. Click Login -4. Click on the teaching calendar on the main page to enter the classroom -5. Select the class -6. Click on the activities you want to participate in.	Little impatient	The active page is hidden, and it is hoped to be placed in a more obvious position as a common function.

4.7 User portrait making

User portrait is also called user role. User portrait refers to describing and analyzing users according to their personal information, behavior characteristics, interest preferences and other data, thus forming a representative user model. As an effective tool to outline the target users, and to connect users' demands and design directions, user portraits have been widely used in various fields. In the process of actual operation, we often connect the user's attributes, behaviors and expected data transformation with the most simple and close-to-life words. As the virtual representatives of actual users, the user roles formed by user portraits are not built out of products and markets, and the formed user roles need to be representative and can represent the main audiences and target groups of products.

4.7.1 The role of user portrait

Through user portraits, we can deeply analyze different user groups, provide data support for decision makers, and help enterprises formulate appropriate business strategies for different users. User portraits can help brands better understand the needs and preferences, interests, behavior patterns and buying habits of target users, so as to formulate more accurate positioning products, and formulate marketing strategies for different user groups to carry out personalized marketing and marketing activities. User portraits can provide in-depth user insight and demand analysis for brands, provide guidance for brand new product research and development, help optimize product functional design, interface layout and user interaction mode, guide product design, so as to design products that are more in line with users' needs and

preferences, help brands design new products with more market competitiveness, and improve product satisfaction. Generally speaking, the function of user portrait is to conduct user research, help product precise marketing, assist product design, promote personalized service and make business decisions.

4.7.2 ICVE platform user portrait

Through interviews with teachers, according to their proficiency in computer operation, teachers can be divided into young teachers who are willing to accept new knowledge and new things, and old teachers who reject new technologies. According to their characteristics, their characteristics are refined and user portraits are drawn. (Figure 13)The age of Miss Li in Portrait 1 is set at 30 years old. She belongs to a group of young teachers, and she is good at using information technology. At the same time, she is willing to accept new knowledge and new technology. She can make good use of information technology to teach during class, actively prepare lessons and write lesson plans after class, and can also use various scientific and technological software to make micro-lessons to assist classroom teaching. Generally, the use scenarios are used at school and at home. The pain point of using ICVE platform at present is that the operation and interface settings of ICVE platform are not concise and clear, and the operation is complicated, hoping to simplify the interface and operation and save time.Teacher Zhang in Portrait 2 is set to be 50 years old and belongs to an old teacher. The psychological characteristics of such teachers are that they think that they are about to retire and there is no need to learn new teaching methods and technologies. They are more averse to information-based teaching and prefer traditional teaching methods. Although they have used 1-2 teaching platforms, they are only limited to uploading courseware materials. They rarely or hardly use teaching platforms to interact in class, and they are not familiar with the interactive functions of the platforms and do not know how to apply them. Generally, the use scenarios are used at school and at home. The pain point of using ICVE platform at present is that the operation of ICVE platform is very complicated, there is no corresponding tutorial to view, and it is often impossible to get a timely reply when contacting customer service. Usually, it takes a lot of time to explore, and the result is not satisfactory. It is often necessary to consult young teachers, which not only wastes your own time but also takes up other teachers' time. Therefore, I hope

that the platform can have some relevant operation instructions, and at the same time, I hope that the platform can be contacted through various channels.

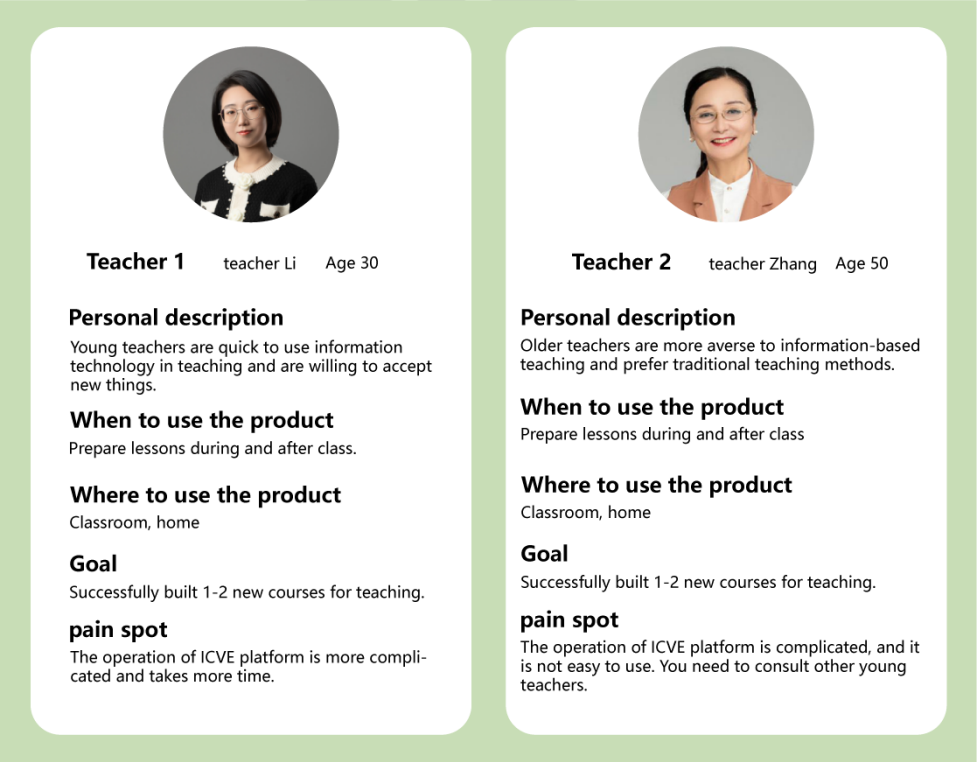


Figure 18 Portrait of teachers and users

Through interviews with students, it is found that students have a high level of information literacy and can quickly learn to apply various software platforms, but their needs are quite different. Therefore, according to students' different grades and different needs, user portraits are drawn. (Figure 14)Students in higher vocational colleges have only been in school for two years (freshmen and sophomores), and Zhao is a freshman in student portrait 1. These students have just entered the university and are full of expectations for university life. I feel fresh about all activities, love to participate in all kinds of group activities, actively participate in the study of professional course knowledge, and actively prepare for various professional competitions, eager to win prizes, so I take a fancy to courses and competitions. In the process of using ICVE platform, the biggest pain point is that the platform does not have special competition-related modules, such as competition-related information, competition progress, competition reminder, etc. There is no corresponding

competition training module to guide the competition, and there is no professional communication related to the competition. For the preparation and training of the competition, it depends on teachers to a large extent. I hope the platform can quit the competition-related modules.Secondly, the design of course functions is not perfect, such as no live broadcast and playback functions. In Student Portrait 2, Wang is a sophomore. These students are about to go out for internship after finishing their sophomore study. Therefore, in addition to getting credits, they also have to actively prepare for the interview. For the upcoming internship life, Wang always feels confused and has no confidence in himself. In the process of using ICVE platform, it is found that ICVE platform has no post internship module and lacks relevant information and job recruitment information. At the same time, There is a lack of pre-job training and psychological counseling. In addition, Wang found that the platform lacks relevant research modules. For him who is about to practice, having a qualification certificate recognized by the industry will bring better results to his internship. Therefore, Wang hopes that ICVE platform will add post modules and research modules to help him better meet the upcoming internship.

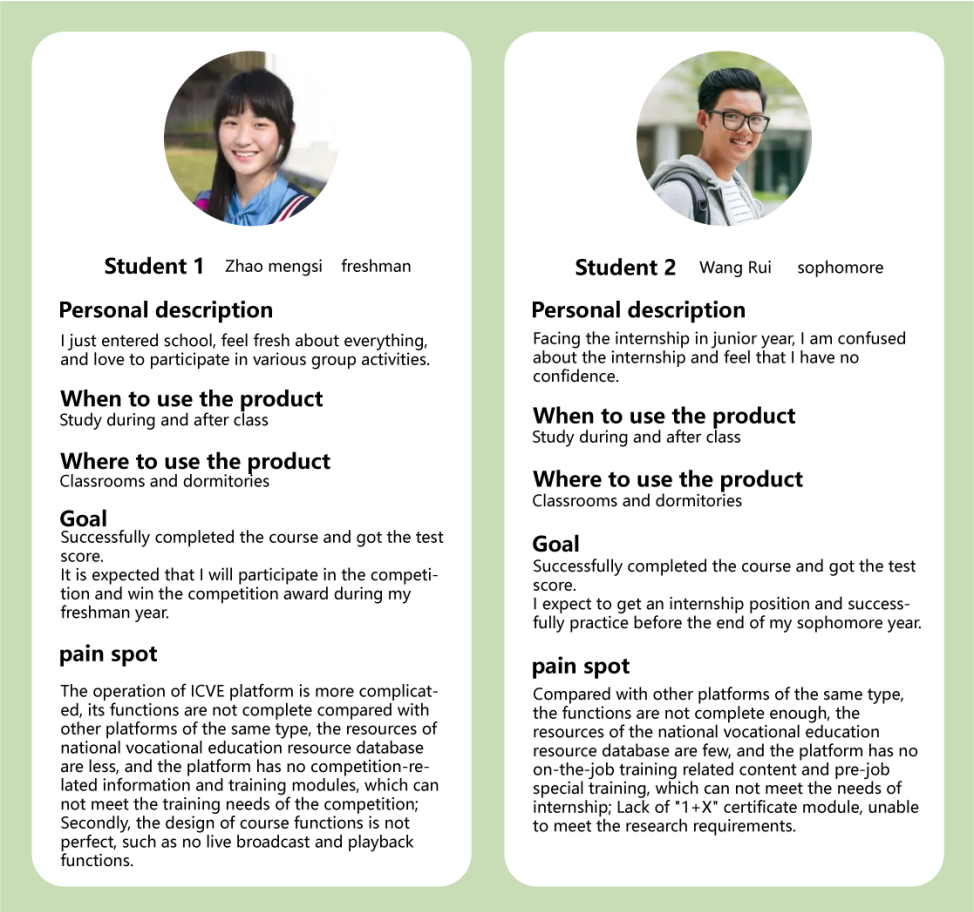


Figure 19 Portrait of student users

4.8 Structural frame diagram

After designing the user portrait, we take the characters in the user portrait as our target users' reference and design the ICVE platform structure diagram for "them" in line with their expectations. Here, we need to design two structure diagrams, one for teachers and the other for students.

In the Figure 15， we design the teacher terminal from the following aspects: courses, classes, classrooms, comprehensive statistics, news center, resource base, competition topics, post module, "1+X" certificate module and setting center.

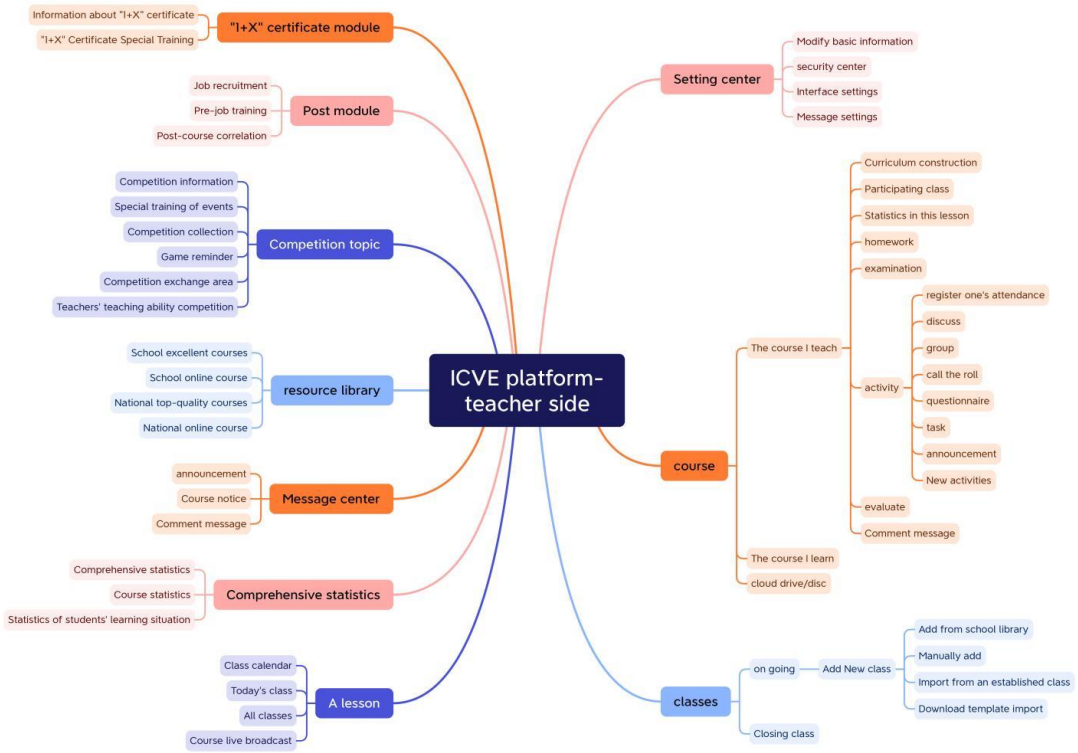


Figure 20 Teacher-side structure diagram

In Figure 16, according to the actual needs of student users, we design the student terminal from the following aspects: courses, classes, news centers, resource libraries, competition topics, post modules, "1+X" certificate modules, and setting centers.

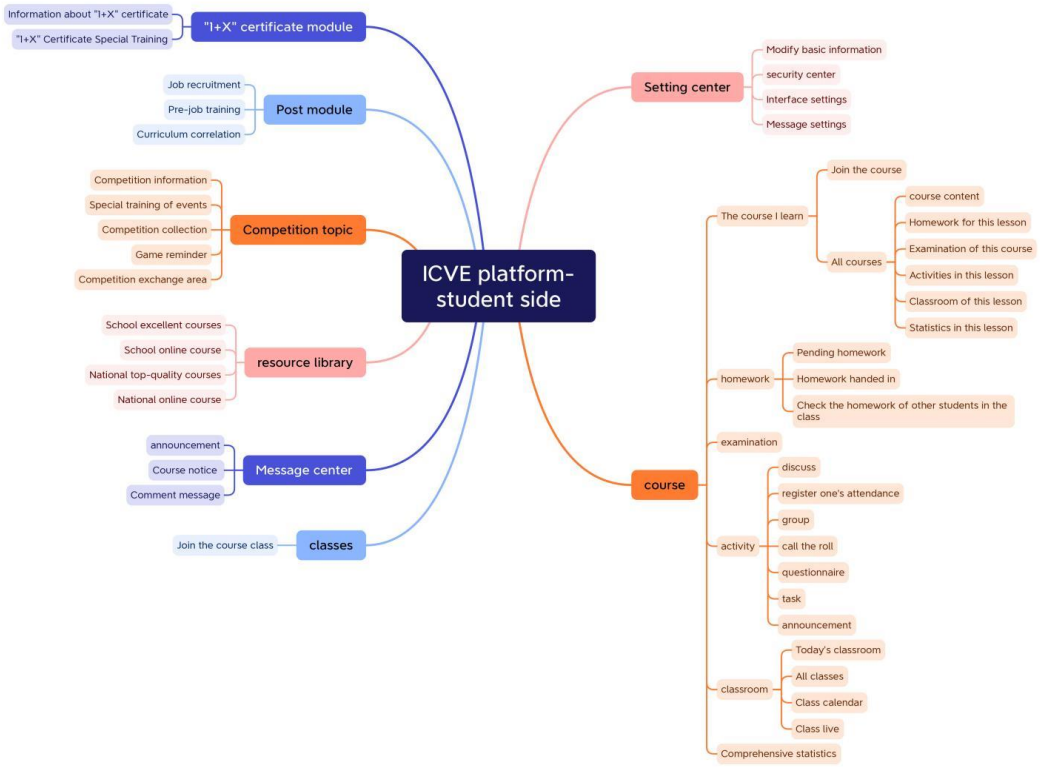


Figure 21 Student-side structure diagram

4.9 Optimization ICVE Flowchart re-design

After designing the structure diagram, list the most important task flow, and design the flow diagram for each task. The principle followed here is to simplify the user's flow as much as possible, and the default in the design diagram is the logged-in state.

The following figure shows the task flow of viewing messages. We designed it as the process of entering the home page-clicking the "Message Center" button-browsing messages.

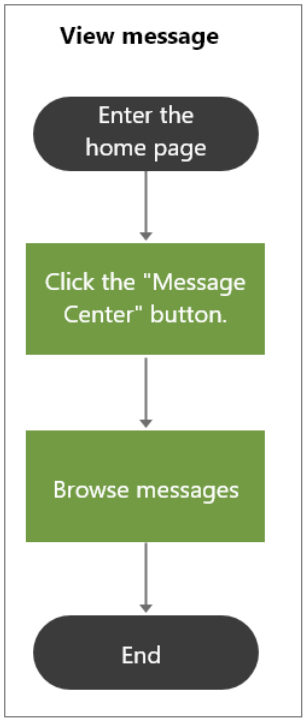


Figure 22 View message

The following figure shows the task flow of viewing courseware. We design it as the process of entering the home page-clicking on the course to be studied-clicking on the chapter to be studied-clicking on the course materials.

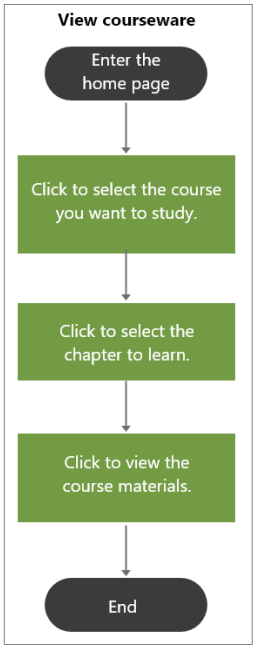


Figure 23 viewing courseware

The following figure shows the task flow of submitting a job. We designed it as a process of entering the home page-clicking the "Job" button-selecting the job to submit-submitting the job according to the step requirements.

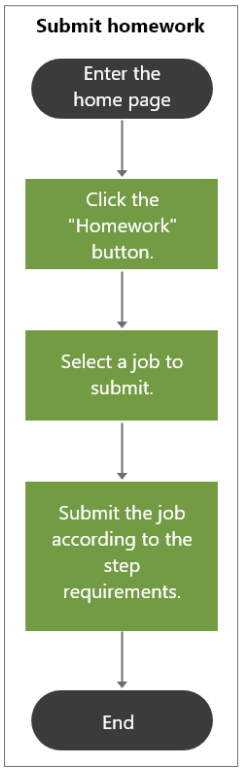


Figure 24 Submission job

The following figure shows the task flow of participating in the special training of events. We designed it as the process of entering the home page-clicking the "event topic" button-clicking the special training of events-searching or selecting the competition to participate in and entering the special training.

Figure 25 To participate in the special training of events.

The following figure shows the task flow of joining a course class. We designed it to go to the home page-click the "Class" button-click the "Join Course Class" button-search for the name of the course to join and click Join this process. What is necessary here is that by default, students don't need to operate this process, and the whole class of students is directly added to the course class by the teacher during the construction. However, in order to prevent the teacher from missing individual students and not adding them to the class, students can also choose to join the class manually.

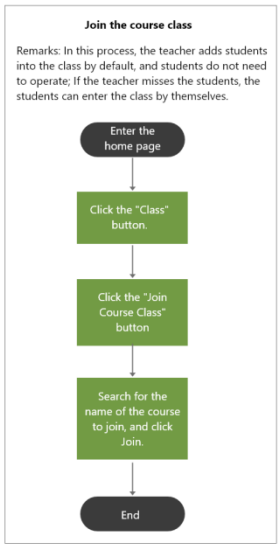


Figure 26 Joining the course class.

The following figure shows the task flow of entering the classroom live broadcast. We design it as the process of entering the home page-clicking the "Classroom" button-selecting the live broadcast in progress. Similarly, the default state here is that students do not need to operate, and teachers can choose the whole class to enter the live broadcast when they start the live broadcast.

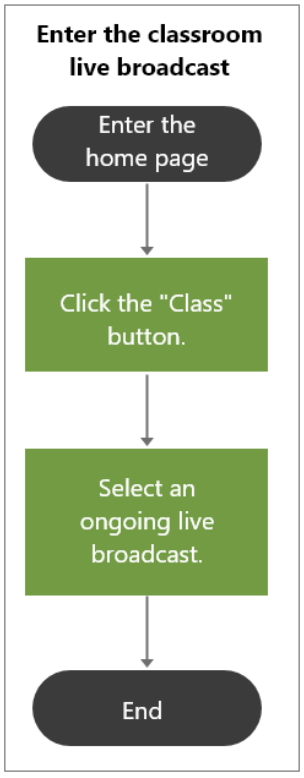


Figure 27 Enters the live broadcast of the course.

4.10 Prototyping Design

After designing the frame diagram and the flow chart, the prototype diagram can be designed. Here, the prototype diagram of the teacher and the prototype diagram of the student are designed respectively. In terms of layout style, the same style is adopted, because in some special circumstances, teachers may need to log in to the student's account to help students solve some problems. Therefore, in order to enable teachers to learn to use the student quickly, the layout style here is the same as that of the teacher, but the key content will be slightly different because of the different needs of users.

The following figure shows the top column design, which is common in both teachers and students. It is divided into four contents, the brand LOGO on the left, and the search box, platform tutorial and customer service on the right. The search box can search the content of the whole website. After clicking the platform tutorial, you can choose different user identities to see how to use the whole platform. If you still can't solve the user's problem by viewing the tutorial, you can consult through customer service. There are four ways of customer service, namely telephone customer service, WeChat customer service, QQ customer service and email customer service. Users can choose the way they like to consult.

Figure 28 Column design

4.10.1 Teacher-side prototype design

The following figure shows the design of the left menu bar on the teacher's side. The left menu bar is the most frequently clicked place by users. According to the importance and frequency of common functions, we design it as the following buttons, namely, personal avatar information, setting center, button for logging out, course, class, classroom, comprehensive statistics, message center, resource base, competition topic, post module and "1+X" certificate module.

Figure 29 Column design on the left

Click the setting center to enter the secondary page of the setting center. There are four main modules in this page, namely, modifying basic information, security center, interface setting and message setting. As shown below.

Figure 30 Set the center left menu bar.

Modify the basic information page, which is divided into basic information and personal information. The basic information includes the teacher's name, account ID, job number, gender, contact information, etc. Personal information includes the

graduate school, academic qualifications, professional titles and teacher qualification certificates of teachers. As shown below.

The Security Center page contains security operations such as password modification, avatar modification, mobile phone modification, email modification, WeChat binding and QQ binding. As shown below.

The interface settings page includes background color settings, brightness settings, font settings, overall UI scaling and other functions. The picture below shows the background color setting, and users can choose the color according to their personal preferences.

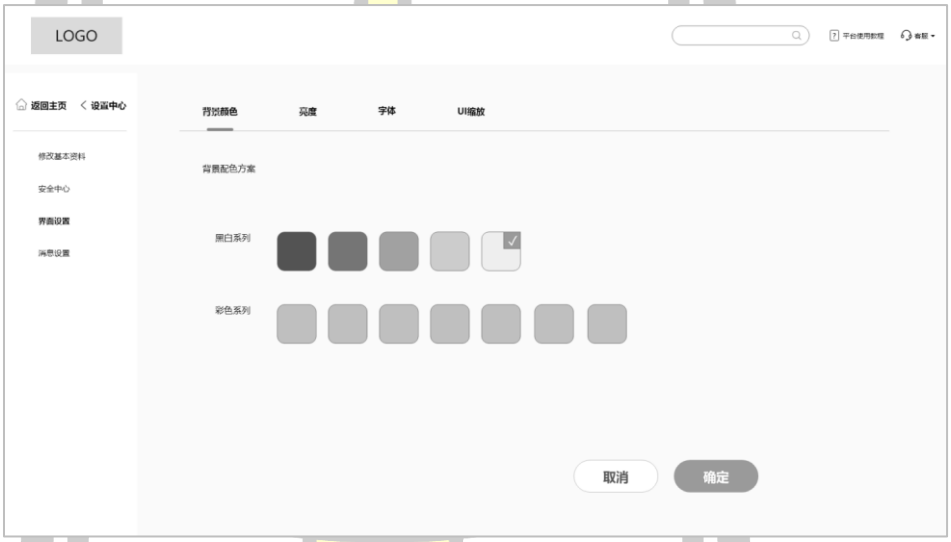


Figure 31 Setting Center 3- Background Color Setting

The following picture shows the course page, which is the first page you see after logging in. The course page is the most frequently used page by teachers and the most important function, so this page is set as the first page you see after logging in. In the course page, we subdivide the secondary menu bar into three contents, namely, the courses I teach, the courses I study and the cloud disk. Similarly, these three contents are arranged in order of priority. In the course I teach, I can create a new course, which is the square card of the first new course. The advantage of this design is that it is more eye-catching. Followed by all the professors' courses, these courses will appear in reverse chronological order. This is convenient for teachers to click on the courses they are teaching recently.

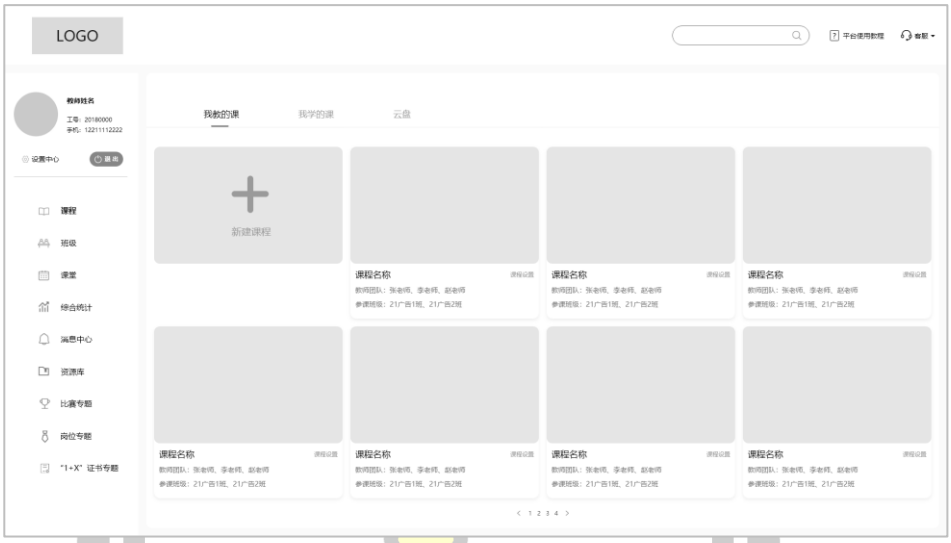


Figure 32 The first-level interface of the course-the course I teach.

The second page is my courses. Teachers should not only teach students knowledge, but also learn new knowledge and new technology themselves. Therefore, teachers are not only teachers, but also students. In this page, teachers can learn the course contents of other excellent teachers and explore more interesting courses to learn. In the design format, it is consistent with the design style of the class I teach.

The third page is the cloud disk, in which all the materials uploaded by teachers will be displayed, and they will be automatically saved to the cloud disk. Even if teachers delete a built course, the materials of this course can still be found in the cloud disk.

The following figure is a pop-up page when creating a new course, where teachers need to fill in the most basic information of the course, such as course name, course code, major category, whether it corresponds to "1+X" certificate, school teacher team, enterprise teacher team, course cover and so on. The items with red icons are required.

Figure 33 Course Secondary Interface-New Course.

After the above operation, you can enter the page of course content construction, that is, the page where we click on a course. The contents of the menu bar here are all set for a course, including course construction, classes, statistics, homework, exams, activities, evaluation and comments. Generally speaking, a teacher may teach three different courses at the same time in the same semester, and a course may have multiple classes. Therefore, it is designed that teachers click on different courses to enter the content page of the course. In the figure below, we can see that the teacher has entered the course construction page of AI print advertising design, with the course catalogue on the left and the content of the clicked chapter on the right. On the left, we can add or delete chapters, and on the right, we can add or delete specific courseware, videos, documents, etc. of chapters, and we can also sort these contents.

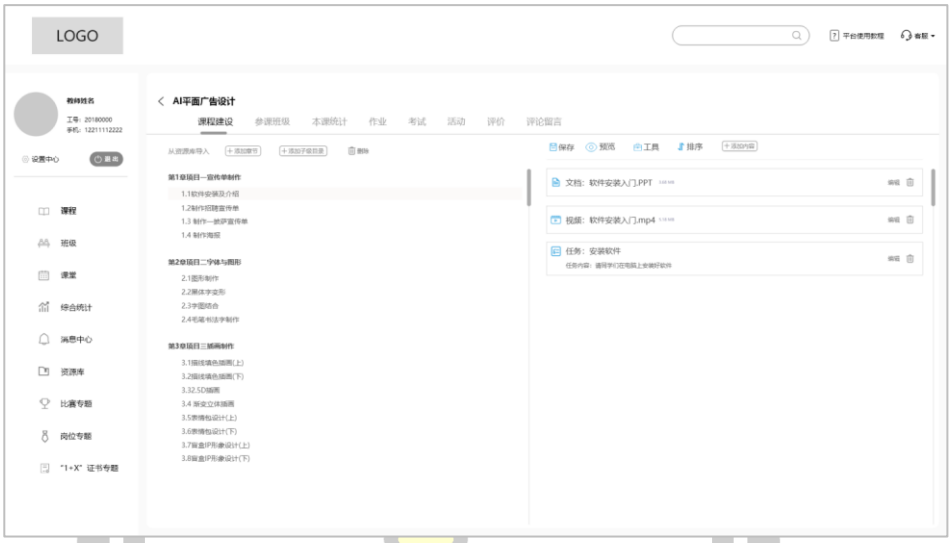


Figure 34 Course Secondary Interface 1- Course Construction Details.

A course is attended by different classes. In the participating classes page below, you can view all classes that choose this course, including the finished classes. The sorting is arranged in reverse chronological order, and the classes that are in class this semester will be arranged to the front. In the third-level menu bar, you can choose the class that is taking this course this semester or the finished class through the options. If you want to find a specific class, you can also get it by searching for keywords. In addition, classes for this course can also be added here.

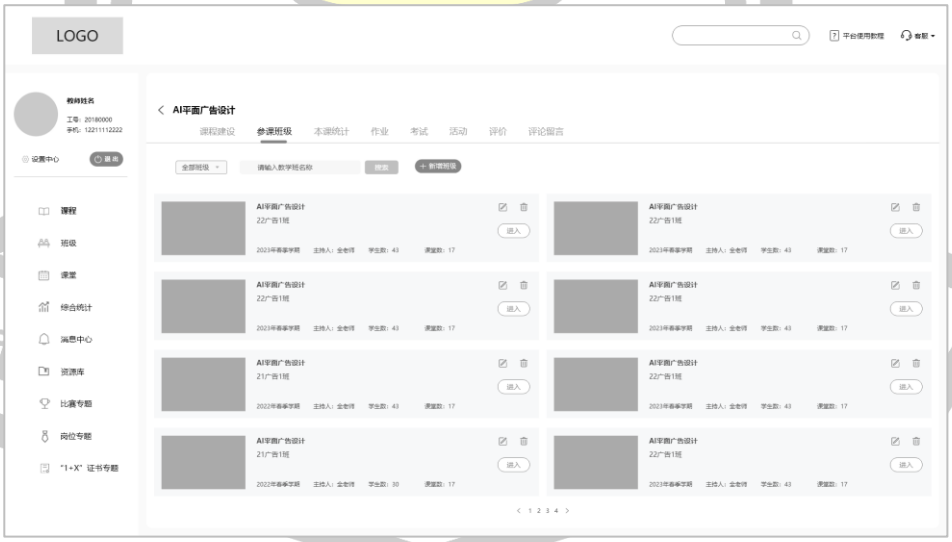


Figure 35 Course Level 2 Interface 2- Participating Classes.

In the statistics page of this lesson shown below, you can view the relevant statistics of this course, such as the total number of materials, the number of

documents, the number of courseware, the number of homework, the number of exams, the evaluation score of the course, the attendance rate and participation.

Figure 36 Course Level 2 Interface 3- Statistics of this course.

The following picture shows the homework page, which contains all the homework assigned by the teacher. You can choose different classes to view the homework, add new homework and directly view the homework to be approved through the three-level menu bar.

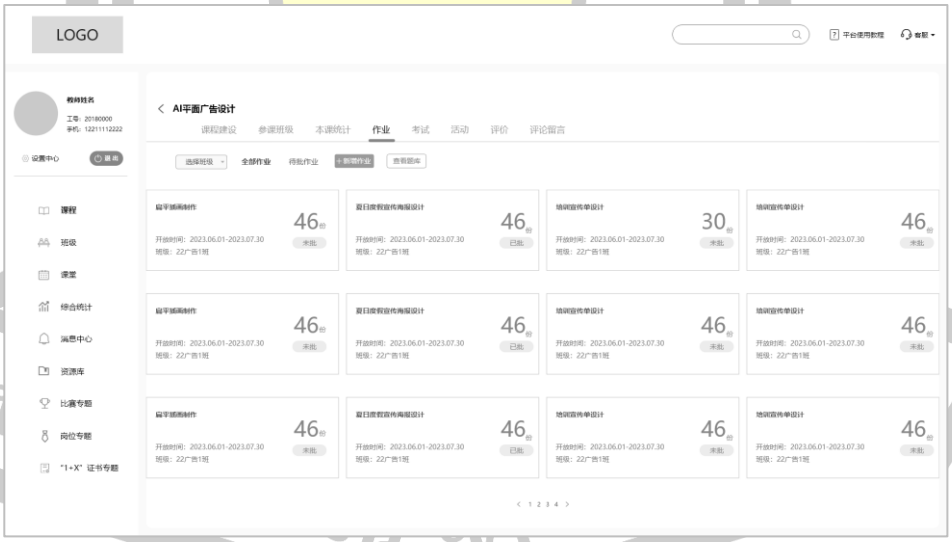


Figure 37 Course Level 2 Interface 4- Homework.

The following figure shows the exam page. In the three-level menu bar, you can select the exam content according to the class to correct, you can also view the exams to be approved and finished with one click, and you can also add exams.

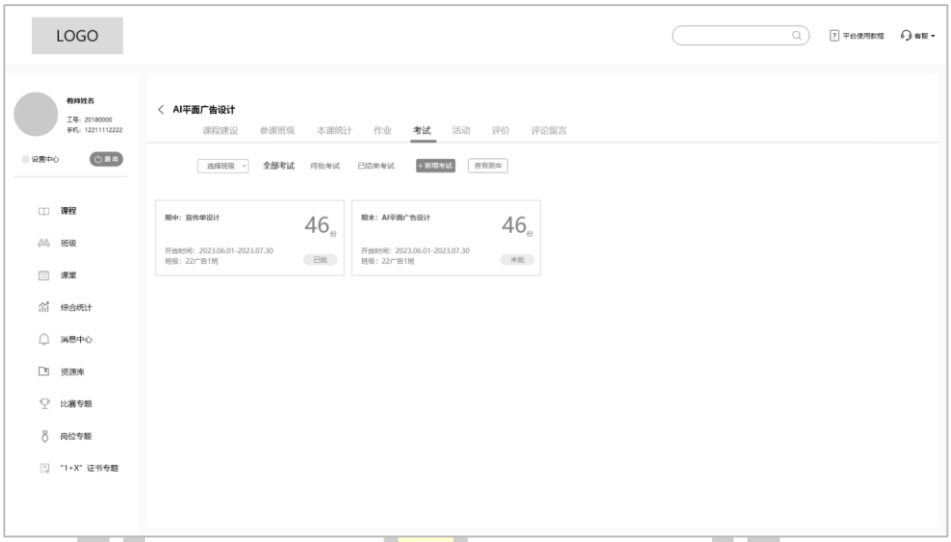


Figure 38 Course Level 2 Interface 5- Exam.

The following figure is the activity page of a course. In the three-level menu bar, you can see the types of activities and add activities.

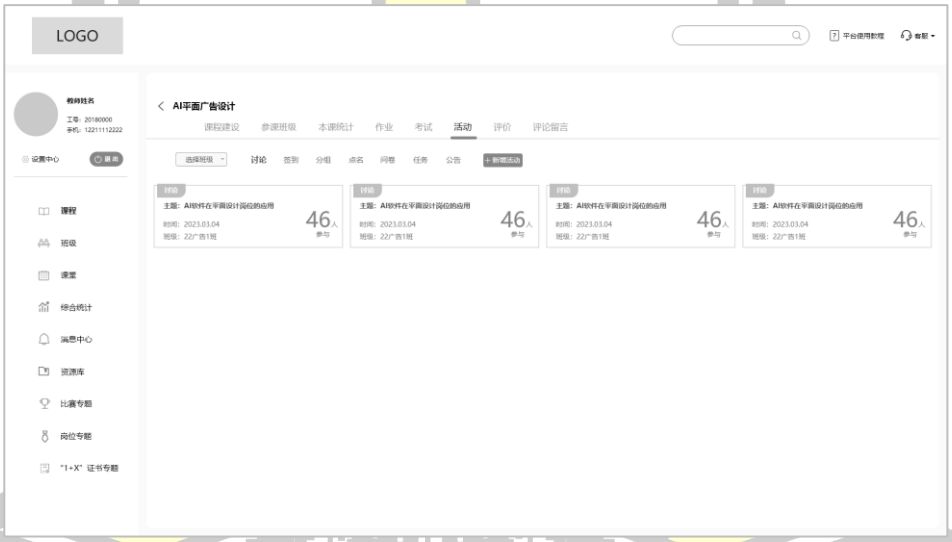


Figure 39 Course Level 2 Interface 6- Activities.

The following figure shows the evaluation of a course. On the left, the scores and grading standards are displayed. On the right, you can choose different classes to view the students' evaluation messages.

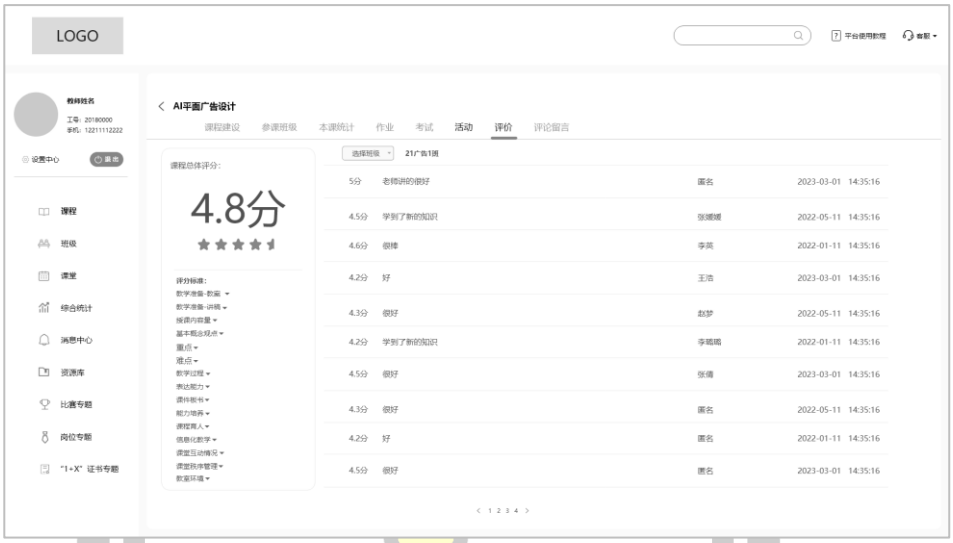


Figure 40 Course Secondary Interface 7- Evaluation.

The following figure is the comment and message page of the course. This page is mainly set up to facilitate students to ask teachers questions after class. You can upload pictures and text descriptions, as well as knowledge points related to the corresponding questions, so that teachers can reply after seeing them. Compared with directly using chat software to ask questions, the advantage of this function can be related to knowledge points, so that teachers can quickly select all comments of this knowledge point for relevant reply. At the same time, teachers can understand students' mastery of this knowledge point by observing the number of questions of the same knowledge point, so as to adjust teaching methods.

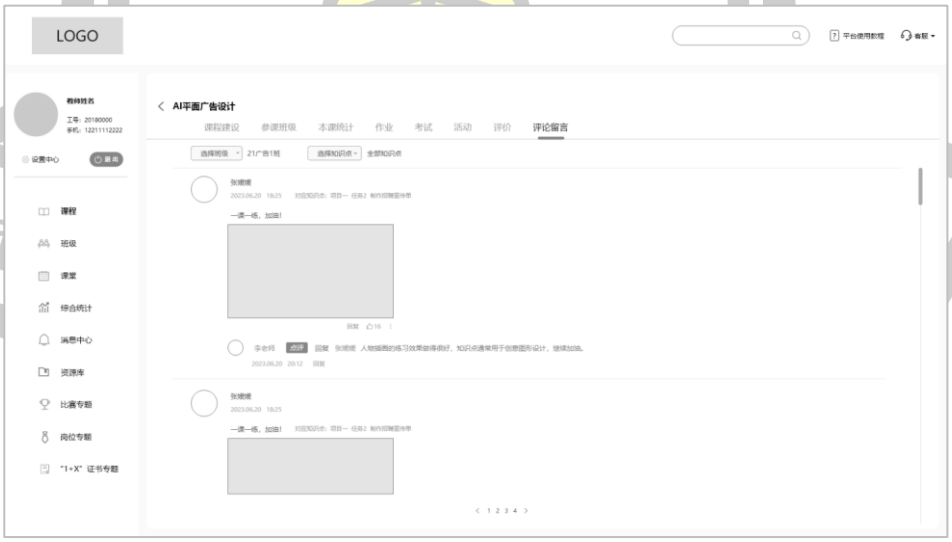


Figure 41 Course Level 2 Interface 8- Comment Message.

The picture below shows the class page in the first-level menu, where the second-level menu bar is divided into classes in progress and classes that have finished classes. Teachers can also add classes here.

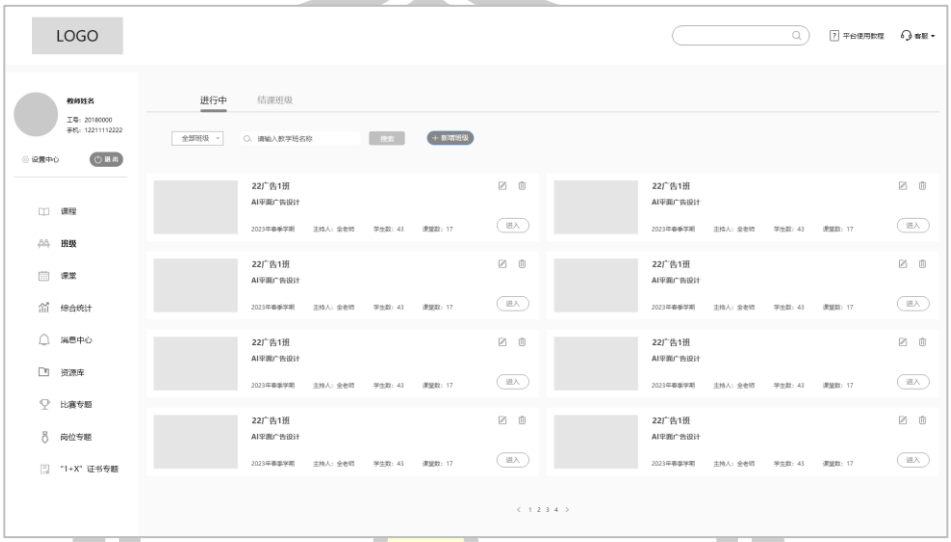


Figure 42 Class Interface 1- Ongoing Class and Closing Class.

The following figure shows the page of adding a class student list. Adding from the school library can directly select the classes uploaded by the school administrator. You only need to select the corresponding department and major to view all classes under this major. If the school administrator does not upload the school class list, he can also add the list of students into the class by manually adding. If it is a class that has been added in teaching other courses, you can directly import the list of students who have taught before into the new course through the "Import from Built Class" button. In addition, you can download the template, let students fill it out and import it into the course class.

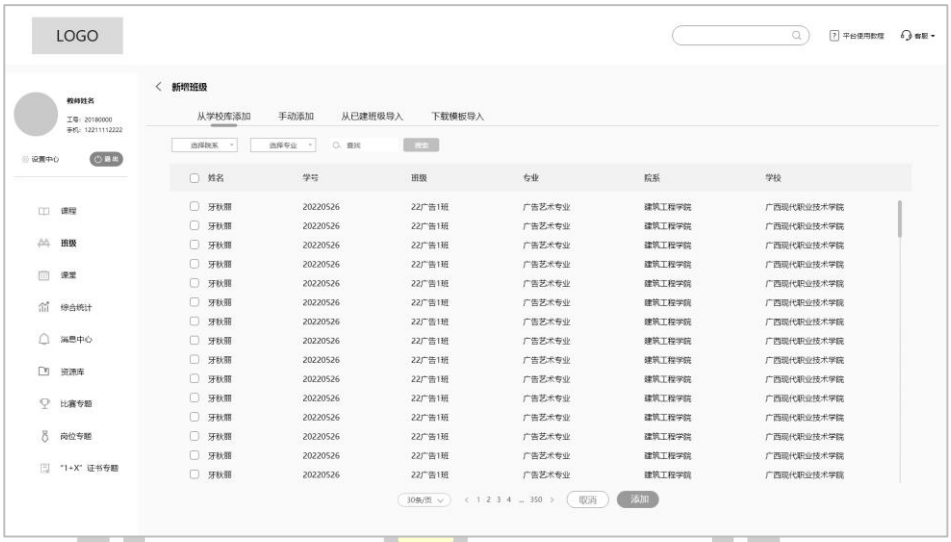


Figure 43 Class Interface 2- Add Class.

The picture below shows the class page in the first-level menu, where the class refers to what class the teacher took on what date. We can see that in the second-level menu on the right, it is divided into four content modules, namely, classroom calendar, today's classroom, all classrooms and classroom live broadcast. The following figure corresponds to the content of the first module "Class Calendar", and the calendar is on the left. By clicking the date, you can see the class corresponding to this date and display it on the right.

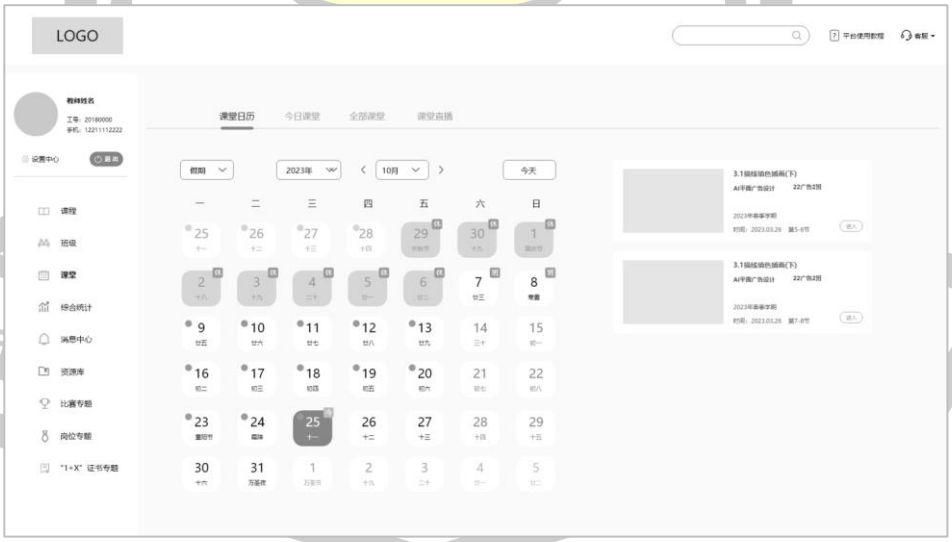


Figure 44 Class 1- Class Calendar

The picture below shows the classroom live broadcast. It should be noted that the classroom live broadcast is not available in every classroom. Usually, the

classroom live broadcast will be set up when necessary. For example, during the epidemic, if students cannot attend classes in the classroom, the teacher will start the classroom live broadcast. In addition, in a class, teachers from enterprises are needed to give lectures, and the live broadcast of the class can also be started, so that students can complete the learning of enterprise course content even if they don't go to the enterprise.

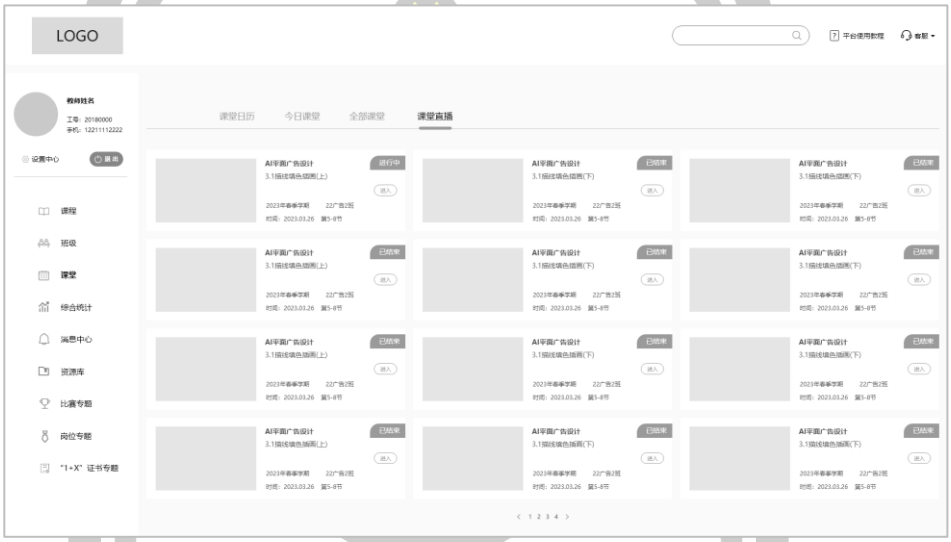


Figure 45 Class 4- Live Class

The following figure shows the message center page in the first-level menu. The secondary menu bar in this page contains three contents, namely announcement, course notice and comment message. Among them, the "announcement" section mainly displays the news released by the system and the course announcement. The "Course Notice" section contains not only the course announcement, but also the job release message and the job submission reminder message. The "Comments" section shows all the questions raised by students.

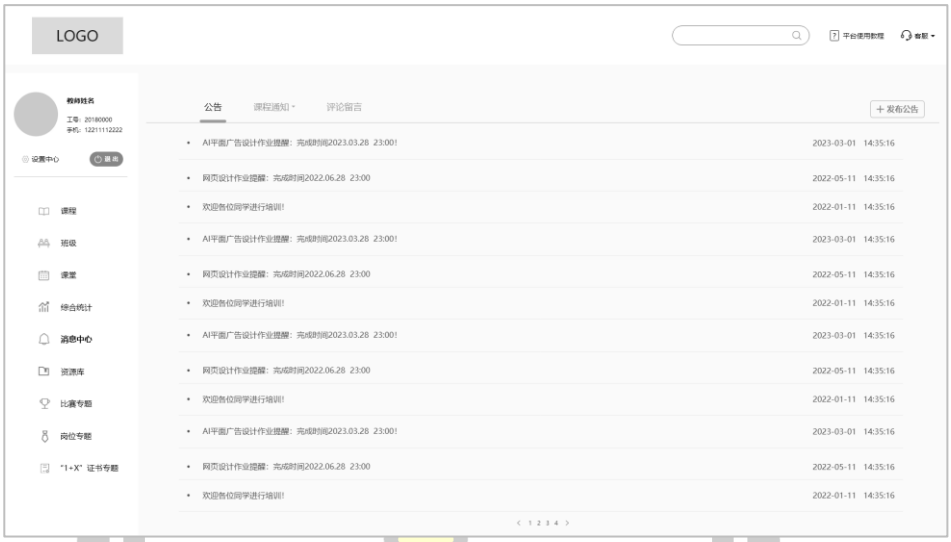


Figure 46 Message center

The following figure shows the page of "Resource Library" in the first-level menu bar. The secondary menu bar inside is divided into four contents, namely, school excellent courses, school online courses, national excellent courses and national online courses.

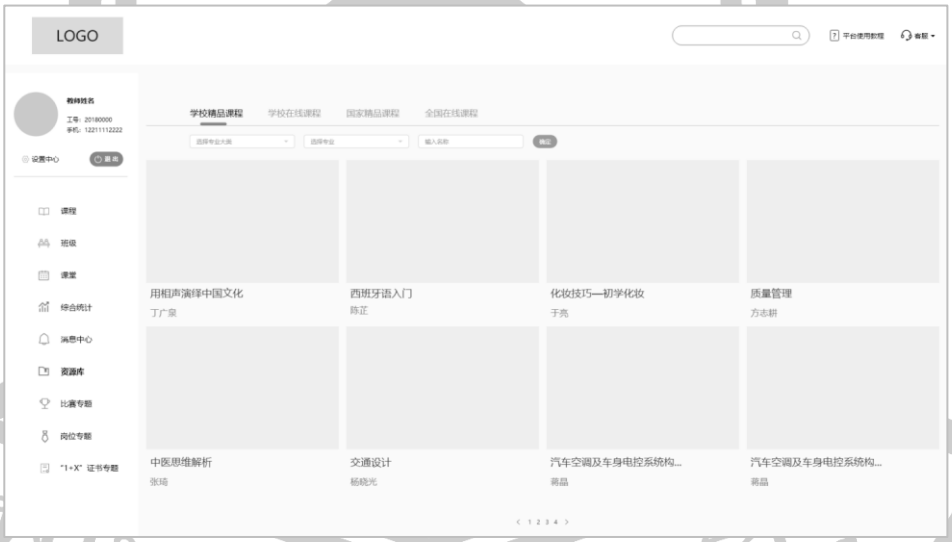


Figure 47 resource library

The picture below shows the "Competition Topics" module in the first-level menu bar. The second-level menu bar contains six sub-contents, namely, competition information, competition training, competition collection, competition reminder, competition exchange area, and teacher teaching ability competition. " "Competition information" shows the latest news information related to the competition.

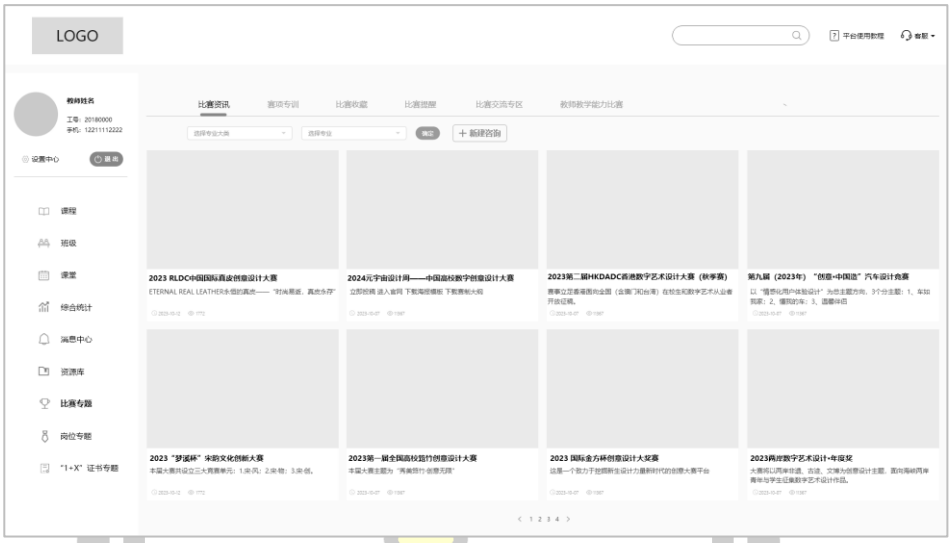


Figure 48 Competition Topic 1- Competition Information

The following picture "Special Training for Events" allows you to choose the competition you want to participate in for special training.

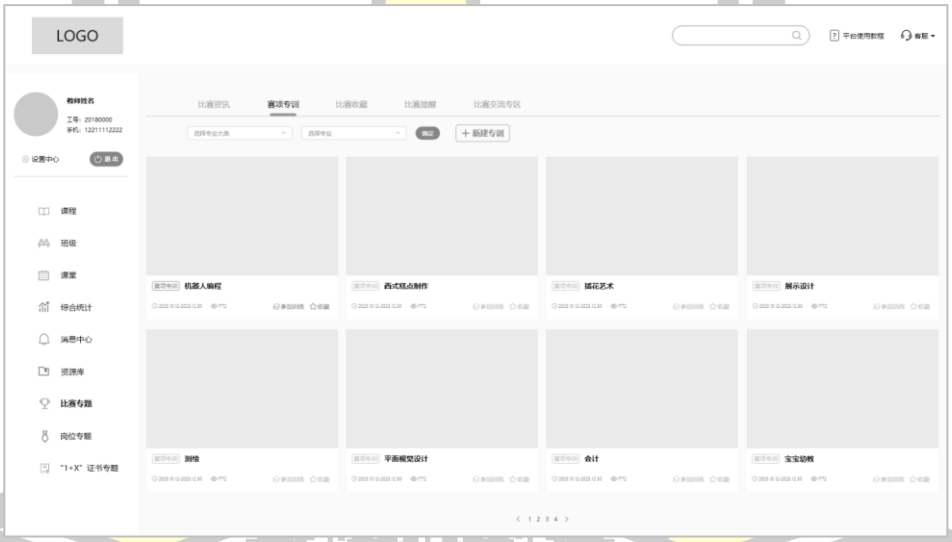


Figure 49 Competition Topic 2- Competition Training

The following picture "Competition Collection" allows you to collect the contents of the events you are interested in.

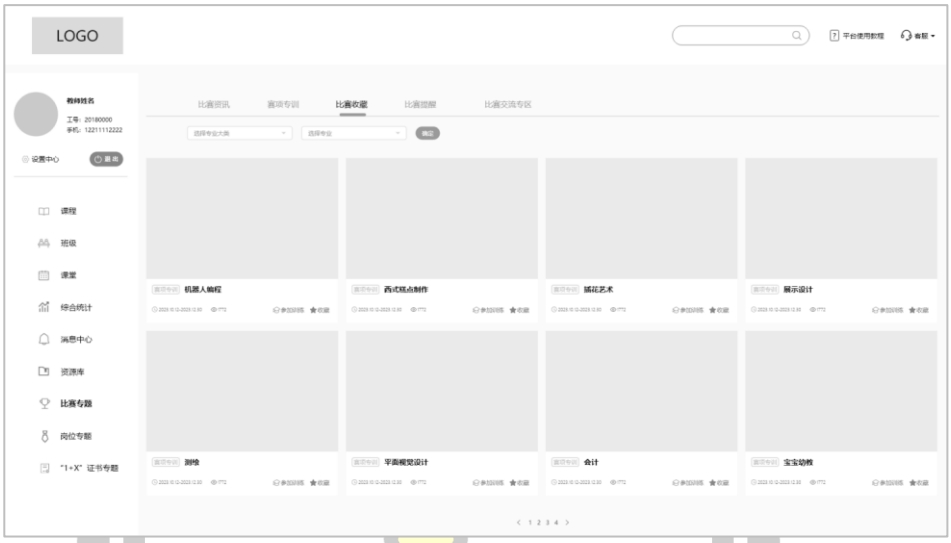


Figure 50 Competition Topic 3- Competition Collection

The following picture "Game Reminder" is mainly used to remind the time of the registered games.

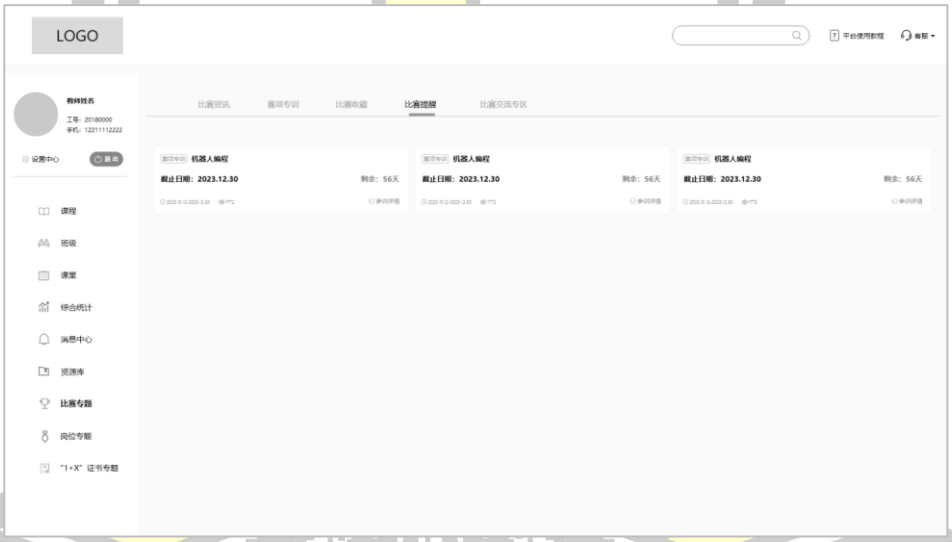


Figure 51 Competition Topic 4- Competition Reminder

In the following picture "Competition Exchange Zone", you can choose the competition you want to know and communicate with other players or the teachers in charge of the competition area. "Teachers' Teaching Ability Competition" is mainly set for the annual national teachers' teaching ability competition. In this module, teachers can learn excellent works that have won prizes, and also learn the latest news and information of the competition, as well as the requirements of the competition.

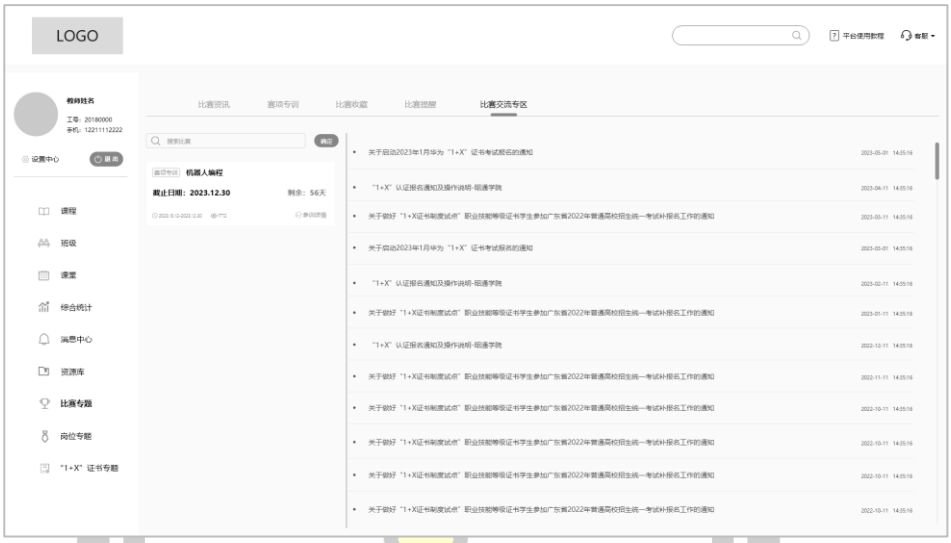


Figure 52 Competition topic 5- Competition exchange area

The following figure shows the page of "Position Module" in the first-level menu bar. The second-level menu bar is divided into three contents, namely job recruitment, pre-job training and course-related. " "Job Recruitment" contains the latest job recruitment information, so you can directly click to apply for the job. Here, the teacher's job is to link the professional-related jobs seen on other websites, and this job can also be collected by the personnel of relevant departments of the school, which can also be seen by other teachers and students after the release. The module of "Pre-job Training" is mainly aimed at pre-internship training for different majors. Through this content, students' panic about internship can be effectively reduced, students can be helped to adapt to internship as soon as possible, and psychological counseling can also be carried out before internship. The main content of the course-related module is to help students check the job requirements and responsibilities corresponding to the courses they have studied, so as to help students quickly understand the importance and key work content of the course before the start of the course.

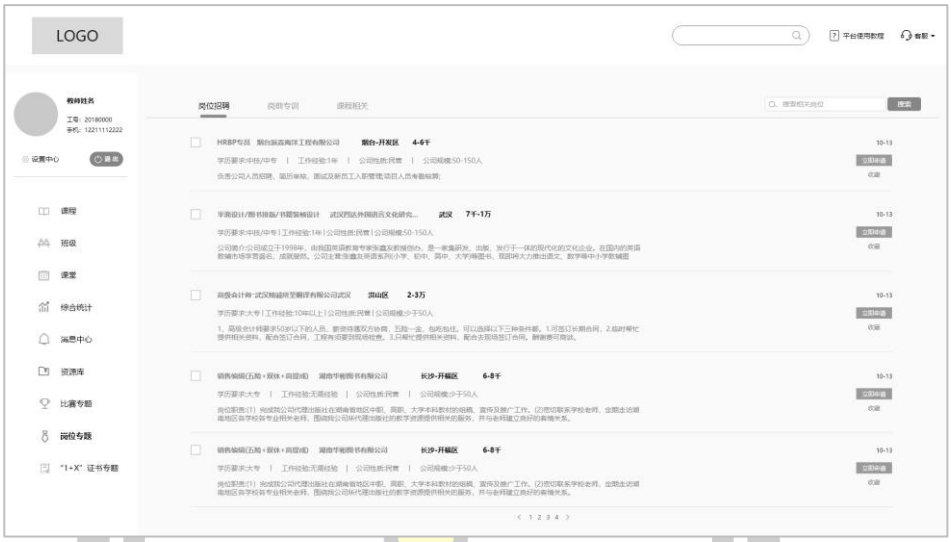


Figure 53 Post topic

The following figure shows the contents of the "1+X" certificate module in the first-level menu bar. The second-level menu bar is divided into two main contents, namely "1+X" certificate related information and "1+X" certificate special training. The former section mainly contains news about the "1+X" certificate, while the latter section is mainly for students to train and study. These contents are edited by the teacher in charge of "1+X" certificate teaching, and will be visible to all teachers and students after publication.

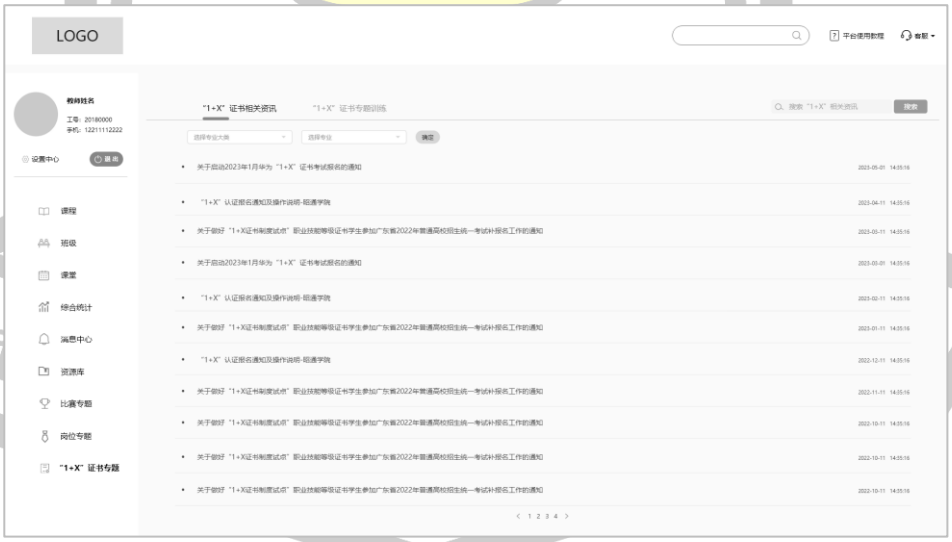


Figure 54 Certificate topic

4.10.2 Student-side design

The interface design of the prototype diagram on the students' side keeps the same style as the layout on the teachers' side, mainly making some minor adjustments to the content. The following figure shows the first-level menu bar on the left side of the students' side. Compared with the teachers' side, there are two contents missing, one is the "classroom" module, and the other is "comprehensive statistics". This is not to delete these two modules, but to design them into the second-level menu bar of the "course" module. The first-level menu bar on the students' side is simplified into courses, classes, news centers, resource libraries, competition topics, post topics and 1+X certificate topics. As shown below.

Figure 55 Left menu bar.

The picture below shows the first page you see after logging in to the student side, the course page. It mainly shows the subjects that students are studying, and the arrangement order is in chronological order, so that you can quickly see the courses you are taking recently, while the courses that have ended are behind. In this page, you can also search for more courses to study.Different from the teacher's side, the secondary menu bar of the course page on the student's side is divided into six contents, namely, my lessons, homework, exams, activities, classes and comprehensive statistics.

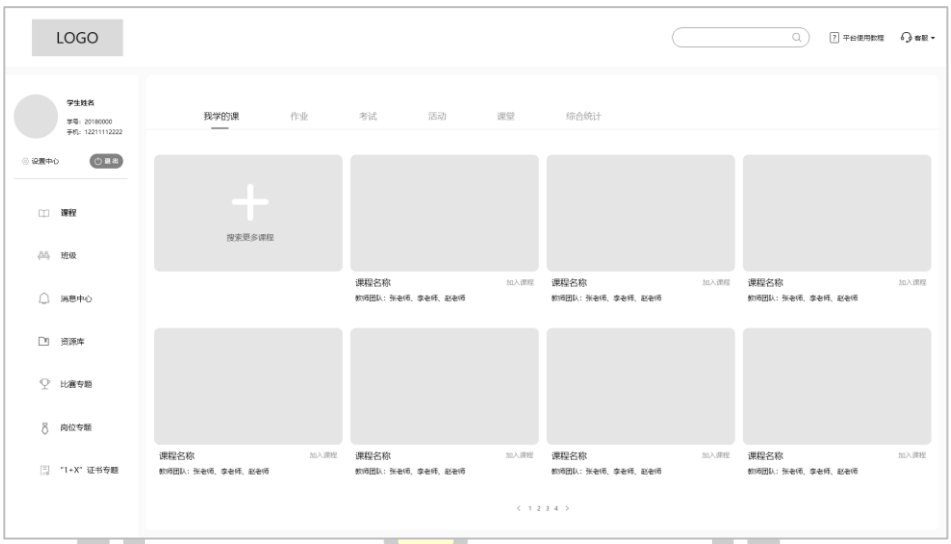


Figure 56 Course Level 1 Interface 1- My Courses

The picture below shows the student's personal homework display page.In other words, the job details page. This shows the deadline for submission and the number of days from the end. The left side shows the details of the homework that students have submitted, and the right side shows the scores and evaluations of teachers and students. If you are not satisfied with this homework, you can resubmit it, provided that the teacher has not scored before the deadline for submission.

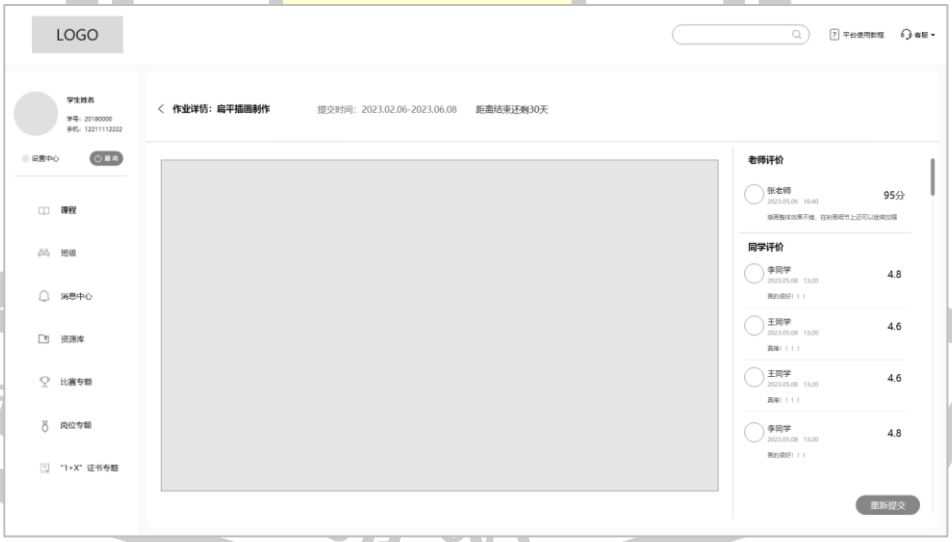


Figure 57 Course Level 3 Interface-Homework Details (My Homework)

Because the rest of the pages are not much different from the teachers' pages in content, we don't show them here. Generally speaking, the layout and typesetting of the students' and teachers' pages are basically the same, but the content is slightly

adjusted to meet the needs of users with different identities. When designing the prototype, we mainly use the user-centered design principle, fully consider the frequency and usage habits of users' common functions in the use process and simplify the designed content to minimize the page hierarchy to ensure that users can use it as soon as possible.

4.11 Visual manuscript display

The following is a visual design draft, which makes some differences in color. The key point here is to distinguish buttons, important tips, icons and other contents. In addition, the level of fonts should be distinguished, and different colors and thicknesses can be used to distinguish. In terms of color, a light color version and a dark color version are designed, and the color tendency can be selected, so that users can choose their favorite user interface and improve their pleasure. The following are some visual design drafts. There is no complete display here, but some pages are selected for display.

Figure 58 "New Course" Page

In the following "New Course" page, users can select the cover provided by the system or add the cover manually. The color of buttons in the visual design draft is comfortable blue, and the newly-built courses are designed with pop-up windows, which can reduce the anxiety caused by page jumping.

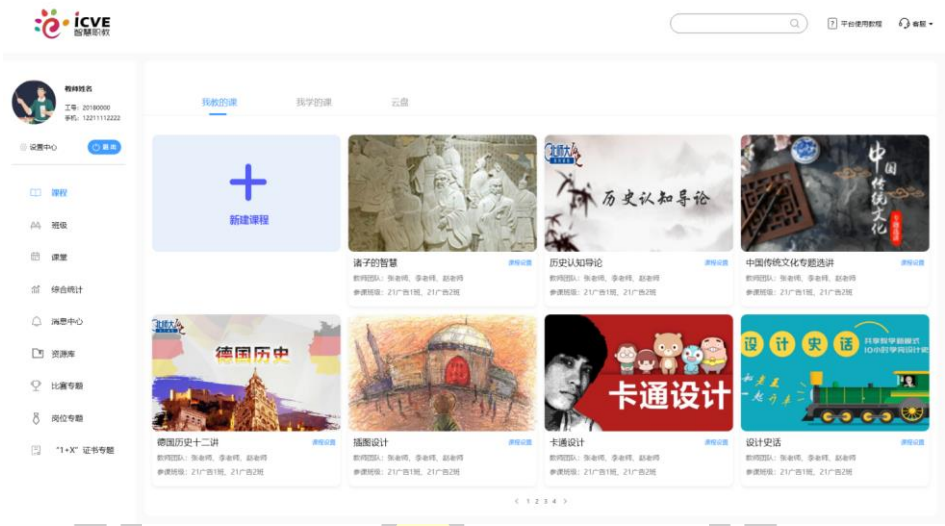


Figure 59 "Classes I Teach" Page

On the page of "Courses I Teach" , the button for creating a new course is designed in the first position, which is the same size as the cover of the course and has an eye-catching "+"symbol, so that users can find it quickly and form a memory.

Figure 60 Dark version of "Statistics of this Course" page

Users can change their favorite background color according to their own needs. This is a version with dark background (Figure 55), which meets users who often need to use it at night and avoids eye discomfort caused by too bright screen.

Chapter 5
The Evaluation of the Optimized ICVE

We evaluated the user satisfaction with the designed prototype drawing and visual design draft and obtained the satisfaction data before and after the revision of the ICVE platform in terms of function, interaction and beautiful interface by means of questionnaire survey. By comparing the data, we learned whether users were satisfied with the prototype drawing and visual design draft after the revision, so as to determine whether the revision design was successful.

5.1 The evaluation of use the ICVE and the optimized ICVE

For the functional improvement before and after the revision, we compare the satisfaction scores of 115 respondents before and after the revision by descriptive analysis, and the results are shown in Table 17. The results of the analysis before and after the functions in Table 17 show that for the seven functions of the platform, the average satisfaction scores before the revision are all below 3.000, and the average satisfaction scores after the revision are all above 4.300. By comparison, it can be seen that the average satisfaction scores of 115 respondents for the seven functions have been significantly improved after the revision, and the functions have been greatly improved.

Table 17 Function description analysis before and after revision —— Student.

Functions	the ICVE		the optimized ICVE	
	Mean	SD.	Mean	SD.
Live and playback of the course	2.667	1.291	4.467	0.516
The diversified method of job evaluation	2.867	0.915	4.600	0.507
Diversified customer service channels	2.333	1.113	4.533	0.516
Competition topic module	3.000	1.195	4.467	0.516
Post thematic module	2.733	1.163	4.333	0.488
"1+X" Certificate Thematic Module	2.400	1.352	4.533	0.516
Personalized settings	2.800	1.014	4.733	0.458

For the questionnaire survey before and after the revision of the platform, we focus on analyzing the platform's interactive experience and interface beauty. In this regard, we conducted relevant description statistical analysis, as shown in Table below, from the average analysis of the following table below, analysis below analysis below It can be seen that the average value of the interaction process of the ICVE platform before the revision is above 3.2, and the average value of the interface of the ICVE platform before the revision is above 2.6. Experience is greater than the beauty of the interface. After the revision, the average degree of use of the interaction process of the ICVE platform is above 4.3. After the revision, the average value of the interface of the ICVE platform is above 4.0. It can be seen that the interactive experience and interface of the ICVE platform after the revision will be seen. Satisfaction scores of beauties have improved significantly.

Table 18 Descriptive analysis of interactive experience before and after revision —— Students.

Functions	the ICVE		the optimized ICVE	
	Mean	SD.	Mean	SD.
Live and playback of the course	2.53	0.499	3.49	0.500
The diversified method of job evaluation	2.59	0.492	3.59	0.492
Diversified customer service channels	2.54	0.498	3.52	0.500
Competition topic module	2.45	0.497	3.49	0.500
Post thematic module	2.44	0.496	3.53	0.499
"1+X" Certificate Thematic Module	2.54	0.498	3.47	0.499
Personalized settings	2.43	0.495	3.49	0.500

Table 19 Descriptive analysis of interactive experience before and after revision —— Teachers.

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The usability of the interaction process for creating a new course in the ICVE platform.	3.40	0.507	4.60	0.507
The usability of the interactive process of constructing course syllabus in the ICVE platform.	3.67	0.488	4.40	0.507
The usability of adding interactive flow of course chapter content in the ICVE platform.	3.27	0.458	4.47	0.516
The usability of the interaction process for uploading course resources in the ICVE platform.	3.60	0.507	4.53	0.516
The usability of the interactive process of creating a new class and importing a student list in the ICVE platform.	3.53	0.516	4.73	0.458
How easy is the interactive process of exporting student list in ICVE platform.	3.73	0.458	4.33	0.488
The usability of the interaction process for deleting or modifying student lists in the ICVE platform.	3.47	0.516	4.73	0.458
The usability of the interaction process for publishing notifications or announcements in the ICVE platform.	3.40	0.507	4.47	0.516
The usability of the interactive process for publishing attendance on the ICVE platform.	3.20	0.414	4.40	0.507

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The usability of the interactive process for posting assignments in the ICVE platform.	3.67	0.488	4.40	0.507
The usability of the interactive process for publishing discussions in the ICVE platform.	3.53	0.516	4.87	0.352
The usability of the interaction process for publishing group tasks in the ICVE platform.	3.40	0.507	4.53	0.516
The usability of the interactive process of releasing a quick response in the ICVE platform.	3.53	0.516	4.47	0.516
The usability of the interactive process for publishing polls in the ICVE platform.	3.27	0.458	4.53	0.516
The usability of the interactive process for editing exam papers in the ICVE platform.	3.40	0.507	4.60	0.507
The usability of the interactive process for publishing exams in the ICVE platform.	3.53	0.516	4.53	0.516
The usability of the interactive process for viewing courses from other vocational colleges in the ICVE platform.	3.47	0.516	4.47	0.516
The usability of the interaction process for importing course content from other teachers in the ICVE platform.	3.27	0.458	4.33	0.488

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The usability of the interactive process for starting course live streaming in the ICVE platform.	3.47	0.516	4.73	0.458
The usability of the interactive process for publishing professional-related competition information in the ICVE platform.	3.47	0.516	4.53	0.516
The usability of the interactive process of the course feedback mechanism in the ICVE platform.	3.60	0.507	4.67	0.488

Table 20 Descriptive analysis of interactive experience before and after revision —— Students.

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
How easy is the interactive process of adding a course to ICVE platform?	3.560	0.496	4.48	0.500
How easy is the interactive process of viewing the course outline in ICVE platform?	3.53	0.499	4.5	0.500
How well is the interactive process of watching course content in ICVE platform?	3.49	0.500	4.45	0.497
How easy it is to watch the interactive process of course resources in ICVE	3.41	0.492	3.44	0.496

platform.				
The usability of the interactive process of joining classes and checking the list of students in the same class in ICVE platform.	3.43	0.495	3.5	0.500
How easy is the interactive process of deriving the list of students in the same class in ICVE platform?	3.47	0.499	3.47	0.499
How easy is the interactive process of deleting or modifying personal student information in ICVE platform?	3.43	0.495	3.52	0.500
The usability of the interactive process of participating in notification or announcement in ICVE platform.	2.738	0.407	4.683	0.397
The usability of the interactive process of signing in on ICVE platform.	2.708	0.410	4.703	0.397
How easy is the interactive process of participating in homework in ICVE platform?	2.668	0.411	4.653	0.394
The usability of the interactive process participating in the discussion in ICVE platform.	2.588	0.403	3.643	0.393
How well is the interactive process of participating in group tasks in ICVE platform?	2.608	0.406	3.703	0.397
The usability of interactive process in ICVE platform.	2.648	0.410	3.673	0.396
How easy is the interactive process of voting in ICVE platform?	2.608	0.406	3.723	0.397
The usability of the interactive process of taking the exam in ICVE platform.	2.699	0.392	4.669	0.381

How easy is the interactive process of submitting exams in ICVE platform?	2.683	0.395	4.689	0.381
How easy it is to watch the interactive process of courses in other vocational colleges in China on ICVE platform.	2.643	0.396	4.639	0.378
How well is the interactive process of adding other teachers' course content to ICVE platform?	2.563	0.388	3.629	0.377
How easy is the interactive process of participating in the live broadcast of the course in ICVE platform?	2.583	0.391	3.689	0.381
The usability of the interactive process of participating in professional related competition information in ICVE platform.	2.623	0.395	3.659	0.380
The usability of the interactive process of curriculum feedback mechanism in ICVE platform.	2.583	0.391	3.709	0.381

Table 21 Descriptive analysis of interface aesthetics before and after revision—Teachers.

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The aesthetic level of the interface design for creating a new course in the ICVE platform.	3.000	0.845	4.400	0.507
The Aesthetic Degree of Interface Design of Curriculum Outline in ICVE Platform	2.933	0.884	4.867	0.352
Aesthetic Degree of Interface Design for	3.067	0.799	4.800	0.414

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
Adding Course Chapters in ICVE Platform				
Aesthetic Degree of Interface Design for Uploading Curriculum Resources in ICVE Platform	2.800	0.775	4.600	0.507
The aesthetic degree of the interface design of creating new classes and importing student lists in ICVE Platform.	3.000	0.926	4.533	0.516
Aesthetic degree of interface design for exporting student list in ICVE platform.	3.200	0.862	4.267	0.458
Aesthetic degree of interface design for deleting or modifying student list in ICVE platform	3.000	0.756	4.533	0.516
Aesthetic degree of interface design for issuing notices or announcements in ICVE platform.	3.067	0.704	4.533	0.516
The aesthetic degree of the interface design of issuing check-in in ICVE platform	2.933	0.799	4.467	0.516
Aesthetic degree of interface design of publishing job in ICVE platform	3.533	0.640	4.533	0.516
Aesthetic degree of interface design published and discussed in ICVE platform	2.600	0.737	4.533	0.516
Aesthetic degree of interface design for publishing group tasks in ICVE platform	2.733	0.799	4.333	0.488
Aesthetic degree of interface design for	3.000	0.926	4.333	0.488

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
publishing and answering questions in ICVE platform				
Aesthetic degree of interface design for issuing votes in ICVE platform	2.867	0.834	4.667	0.488
Aesthetic degree of interface design for editing examination papers in ICVE platform	3.067	0.799	4.800	0.414
Aesthetic degree of interface design for issuing exams in ICVE platform	3.000	0.756	4.400	0.507
Aesthetic degree of interface design for watching courses in other vocational colleges in China on ICVE platform.	2.800	0.775	4.600	0.507
The aesthetic degree of interface design for importing other teachers' course content in ICVE platform.	2.867	0.743	4.533	0.516
Aesthetic degree of interface design for opening live course in ICVE platform	3.133	0.834	4.467	0.516
Aesthetic degree of interface design for publishing professional competition information in ICVE platform	2.867	0.834	4.400	0.507
Aesthetic degree of interface design of course feedback mechanism in ICVE platform	3.000	0.845	4.533	0.516
Personalized setting of interface color	3.400	0.986	4.533	0.516
Personalized setting of interface font size	3.267	1.335	4.667	0.488
Personalization of interface icon size	3.400	1.183	3.000	1.134

Table 22 Descriptive analysis of interface aesthetics before and after revision —— Students.

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The aesthetics of a course's interface design in the ICVE platform	2.1	0.831	4.4	0.490
View the aesthetics of the interface design of the course outline in ICVE platform	1.94	0.835	4.48	0.500
The aesthetics of the interface design for viewing course content in ICVE platform	2.08	0.770	4.52	0.500
View the aesthetics of the interface design of course resources in ICVE platform	2.06	0.881	3.45	0.497
The aesthetics of the interface design for joining classes and viewing the class list in the ICVE platform	1.91	0.814	3.49	0.500
The aesthetics of the interface design for exporting the class student list in ICVE platform	2.1	0.768	3.54	0.498
The aesthetics of the interface design for deleting or modifying personal student information in the ICVE platform	2.06	0.846	3.42	0.494
The aesthetics of the interface design for notifications or announcements in the ICVE platform	2.07	0.875	4.49	0.500
The aesthetics of the interface design of the check-in in ICVE platform	2.01	0.806	4.55	0.497
The aesthetics of the interface design involved in the ICVE platform	2.02	0.824	4.52	0.500

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The aesthetics of the interface design discussed in the ICVE platform	1.96	0.799	3.47	0.499
The aesthetics of the interface design for participating in group tasks in the ICVE platform	1.87	0.783	3.49	0.500
The aesthetics of the interface design in the ICVE platform	2.02	0.800	3.53	0.499
The aesthetics of the interface design for voting in the ICVE platform	1.8	0.800	3.51	0.500
The aesthetics of the interface design in the ICVE platform for taking the exam	1.93	0.840	4.47	0.499
The aesthetics of the design of the interface submitted for examination in the ICVE platform	2	0.837	4.49	0.500
ICVE platform to see the aesthetic degree of interface design of other vocational college courses in the country	1.88	0.816	4.48	0.500
How aesthetically pleasing the interface design of the ICVE platform is in addition to the course content of other teachers	1.89	0.835	3.5	0.500
The aesthetics of the interface design for attending live courses in ICVE platform	2.06	0.835	3.45	0.497
The aesthetics of the interface design for participating in professional-related competition information in the ICVE platform	2.12	0.803	3.54	0.498

Question	Average value (Before design)	Standard deviation (Before design)	Average value (After design)	Standard deviation (After design)
The aesthetics of interface design of course feedback mechanism in ICVE platform	2.02	0.812	3.47	0.499
Interface color customization	2.1	0.831	4.4	0.490
Personalization of the interface font size	1.94	0.835	4.48	0.500
Personalization of interface icon size	2.08	0.770	4.52	0.500

5.2 Comparison of satisfaction results before and after revision design

In order to explore whether the satisfaction of function, interaction and beautiful interface has been significantly improved after the revision, we made relevant analysis and comparison, and obtained the following results.

Table 23 Comparison analysis before and after the revision—Teacher.

Items	Paired (M±SD)		Mean difference	*t*	*p*
	Mean and SD. Before	Mean and SD. After			
Interaction experience before the redesign	3.47±0.09	4.93±0.26	-1.46	-20.567	0.000
Satisfaction with the functionality before the revision	3.42±0.56	4.03±0.42	-0.61	-6.850	0.000
The aesthetic level before the revision	3.03±0.22	4.27±0.70	-1.24	-6.698	0.000

The table 18 reveals that there is a significant difference at the 0.01 level between the interaction experience before the revision and the interaction experience after the revision (p=0.000). The average value of the interaction experience before the revision (3.47) is significantly lower than the average value of the interaction experience after the revision (4.93). The significance level between the satisfaction

with the functionality before the revision and the satisfaction with the functionality after the revision is 0.01 (p=0.000). The average satisfaction with the functionality before the revision (3.42) is significantly lower than the average satisfaction with the functionality after the revision (4.03). The level of aesthetics before the revision and after the revision showed a significant difference at a level of 0.01 (p=0.000). The average aesthetic level before the revision (3.03) was significantly lower than the average aesthetic level after the revision (4.27). Therefore, it can be seen that the satisfaction of teachers has significantly improved after the revision.

Table 24 Comparison analysis before and after the revision—students.

Items	Paired (M±SD)		Mean difference	*t*	*p*
	Mean and SD. Before	Mean and SD. After			
Interactive experience before revision. Interactive experience after revision.	2.50±0.06	3.51±0.04	-1.01	-46.586	0.000
Functional satisfaction before revision; Functional satisfaction after revision.	2.92±0.41	4.04±0.51	-1.12	-7.586	0.000
Aesthetic degree before revision; Aesthetic degree after revision.	2.00±0.09	3.99±0.51	-1.99	-19.203	0.000

Using paired t test to study the differences, we can see from the above table that there is a 0.01 level significance between the functions before and after revision (t=-46.586, p=0.000), and the specific comparison shows that the average value of the functions before revision (2.50) will be significantly lower than the average value of the functions after revision (3.51). There is a significance of 0.01 level between the pre-interactive experience and the post-interactive experience (t=-7.586, p=0.000), and the specific comparison shows that the average value of the pre-interactive experience (2.92) will be significantly lower than that of the post-interactive experience (4.04). There is a significance of 0.01 level between the front interface aesthetics and the rear interface aesthetics (t=-19.203, p=0.000), and the specific comparison shows that the average value of the front interface aesthetics (2.00) will be significantly lower than the average value of the rear interface aesthetics (3.99).

5.3 Four dimensions of satisfaction with the revised "post-class-competition-certificate"

Table 25 Four Dimensions of Satisfaction of "Post-class-competition-certificate" after Revision-Teachers

Items	Sample size	Min	Max	Mean	Std. Deviation	Median
Post dimension	15	3.667	4.667	4.356	0.266	4.333
Certificate dimension	15	3.667	5.000	4.489	0.353	4.667
Competition dimension	15	4.000	5.000	4.378	0.353	4.333
Curriculum dimension	15	3.556	4.667	4.296	0.322	4.222

From the description and analysis in the above table, we can draw the following conclusions: In addition to the course dimension, the newly revised platform has also added the competition dimension, certificate dimension and post dimension (Table 19). By analyzing the average values of these four dimensions, we can know that the minimum score of respondents' satisfaction with these four dimensions is 4.222, and the maximum is 4.667. It can be seen that teachers are highly satisfied with the function of the revised platform.

Table 26 Four dimensions of satisfaction of "post-class-competition-certificate" after revision-students

Items	Sample size	Min	Max	Mean	Std. Deviation	Median
Curriculum dimension	100	3.222	4.750	4.050	0.275	4.056
Competition dimension	100	3.000	5.000	3.987	0.506	4.000
Certificate dimension	100	3.000	5.000	3.993	0.476	4.000
Post	100	2.333	5.000	3.818	0.724	4.000

Items	Sample size	Min	Max	Mean	Std. Deviation	Median
dimension						

From the description and analysis in the above table, it can be concluded that the average satisfaction degree of students about the course dimension, competition dimension, certificate dimension, post dimension and service dimension after the revision of the student-side prototype of ICVE platform is above 3.8, indicating that students are highly satisfied with the revised platform.

5.4 Investigation on the New Visual Design Draft of ICVE Platform

5.4.1 Investigation on the New Visual Design Draft of ICVE Platform for Teachers —— Teachers' Edition

Table 27 Satisfaction Survey of Teachers' New Visual Design Draft on ICVE Platform

Project	Sample size	Min	Max	average value	standard deviation	median
1. How beautiful is the revised interface design?	15	4.000	5.000	4.667	0.488	5.000
2. What is the aesthetic degree of the revised interface element size?	15	4.000	5.000	4.333	0.488	4.000
3. Is the interface button size clear after revision?	15	4.000	5.000	4.533	0.516	5.000
4. Is the meaning of the revised icon accurate?	15	4.000	5.000	4.600	0.507	5.000
5. Is the revised icon beautiful?	15	4.000	5.000	4.400	0.507	4.000
6. Is the font size clear after revision?	15	4.000	5.000	4.600	0.507	5.000
7. Is the typesetting clear after revision?	15	4.000	5.000	4.333	0.488	4.000
8. Is the typesetting beautiful after revision?	15	4.000	5.000	4.467	0.516	4.000
9. Is the overall color matching beautiful after the revision?	15	4.000	5.000	4.533	0.516	5.000

Table 27 Satisfaction Survey of Teachers' New Visual Design Draft on ICVE Platform

Project	Sample size	Min	Max	average value	standard deviation	median
10. How beautiful is the personalized setting after revision?	15	4.000	5.000	4.333	0.488	4.000
11. How beautiful is the revised course module?	15	4.000	5.000	4.733	0.458	5.000
12. How beautiful is the revised competition module?	15	4.000	5.000	4.467	0.516	4.000
13. How beautiful is the revised certificate module?	15	4.000	5.000	4.733	0.458	5.000
14. How beautiful is the revised post module?	15	4.000	5.000	4.667	0.488	5.000
15. How beautiful is the revised service module?	15	4.000	5.000	4.333	0.488	4.000
16. How beautiful is the overall visual draft after revision?	15	4.000	5.000	4.467	0.516	4.000

Through the investigation of the new visual design draft of the teachers of the Intelligent center of vocational education platform, we analyzed the satisfaction of visual design from 16 questions. The results show that the average satisfaction of 15 teachers with the new visual design is above 4.3, which is very high.

5.4.2 Investigation on the New Visual Design Draft of Intelligent center of vocational education Platform for Students —— Student Edition

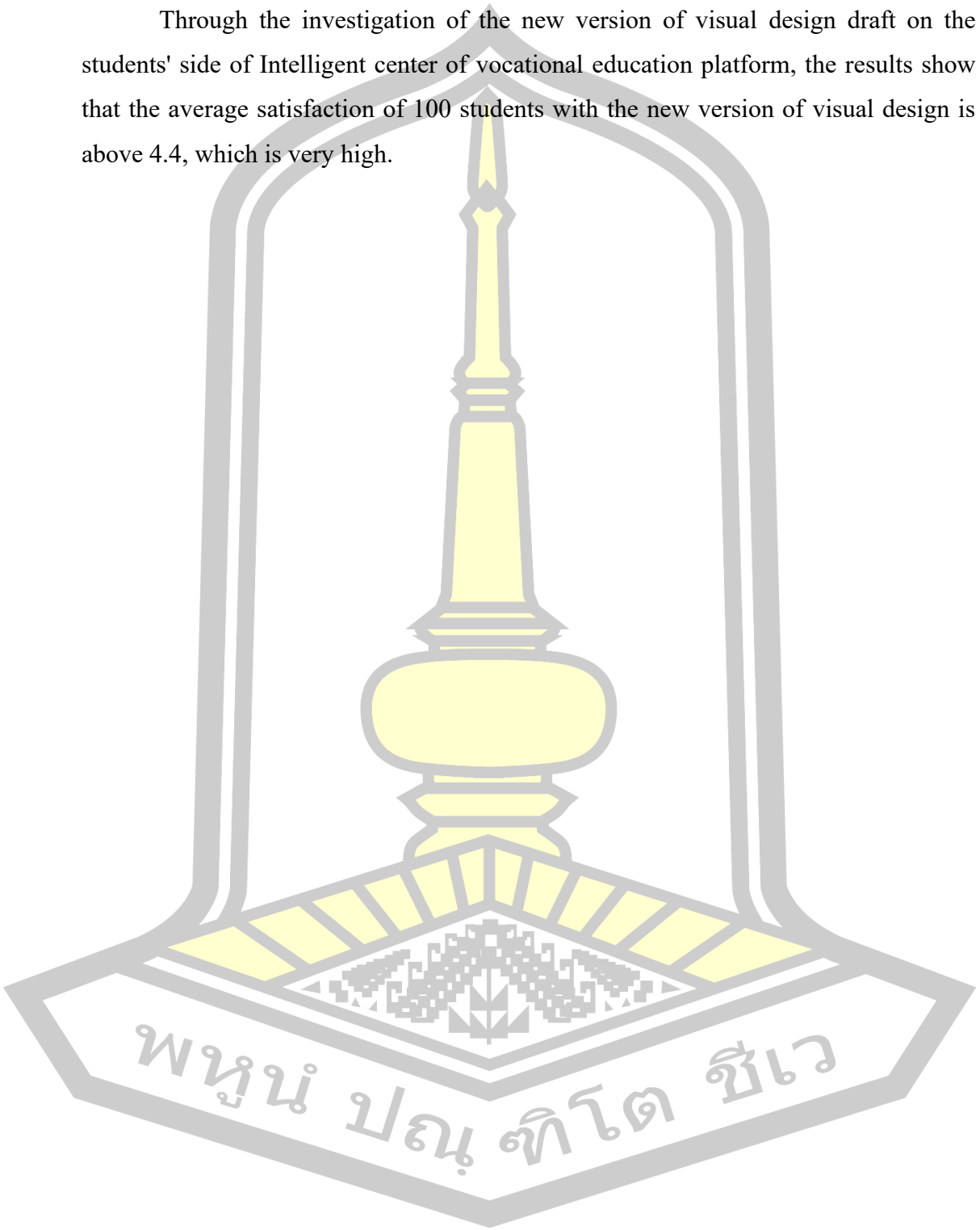
Table 28 Satisfaction Survey on the New Visual Design Draft of ICVE Platform Students

Project	Sample size	Min	Max	average value	standard deviation	median
1. How beautiful is the revised interface design?	100	4.000	5.000	4.510	0.502	5.000
2. What is the aesthetic degree of the	100	4.000	5.000	4.500	0.503	4.500

Table 28 Satisfaction Survey on the New Visual Design Draft of ICVE Platform Students

Project	Sample size	Min	Max	average value	standard deviation	median
revised interface element size?						
3. Is the interface button size clear after revision?	100	4.000	5.000	4.530	0.502	5.000
4. Is the meaning of the revised icon accurate?	100	4.000	5.000	4.460	0.501	4.000
5. Is the revised icon beautiful?	100	4.000	5.000	4.430	0.498	4.000
6. Is the font size clear after revision?	100	4.000	5.000	4.550	0.500	5.000
7. Is the typesetting clear after revision?	100	4.000	5.000	4.420	0.496	4.000
8. Is the typesetting beautiful after revision?	100	4.000	5.000	4.490	0.502	4.000
9. Is the overall color matching beautiful after the revision?	100	4.000	5.000	4.600	0.492	5.000
10. How beautiful is the personalized setting after revision?	100	4.000	5.000	4.480	0.502	4.000
11. How beautiful is the revised course module?	100	4.000	5.000	4.510	0.502	5.000
12. How beautiful is the revised competition module?	100	4.000	5.000	4.410	0.494	4.000
13. How beautiful is the revised certificate module?	100	4.000	5.000	4.610	0.490	5.000
14. How beautiful is the revised post module?	100	4.000	5.000	4.540	0.501	5.000
15. How beautiful is the revised service module?	100	4.000	5.000	4.480	0.502	4.000
16. How beautiful is the overall visual draft after revision?	100	4.000	5.000	4.500	0.503	4.500

Through the investigation of the new version of visual design draft on the students' side of Intelligent center of vocational education platform, the results show that the average satisfaction of 100 students with the new version of visual design is above 4.4, which is very high.



Chapter 6
Conclusion and discussion

6.1 Results

Through the analysis of interview results and questionnaire data, we can draw the following conclusions: for the original ICVE platform, higher vocational teachers and students have greater demand for the improvement of ICVE platform functions, and they pay more attention to the interactive function of the platform. Teachers and students are very dissatisfied with the function of ICVE platform, and think that the platform lacks some necessary functions, including post information function, post-specific training function, whiteboard function, shortcut key prompt function, classroom live broadcast and playback function, game information and special training function, etc. At the same time, teachers and students also put forward some improvement requirements for platform interactivity and interface aesthetics.

After the revision of the platform, higher vocational teachers and students' satisfaction with the function, interactive design and interface design of the ICVE platform has been significantly improved. At the same time, we compare and analyze the satisfaction of the platform after the revision with that before the revision, and we can see that the scores of interactive experience, functional satisfaction and aesthetics after the revision are statistically significant different from those before the revision, teachers and students' satisfaction scores for the platform are significantly improved after the revision. After the revision, new modules have been added to the platform. In addition to the curriculum dimension, there are also new dimensions such as competition dimension, certificate dimension and post dimension that the ICVE Platform did not have. Through the scoring survey of these four dimensions, 15 teachers and 100 students scored high on the average satisfaction of these four dimensions. It can be seen that the functionality, interactivity and aesthetics of the revised platform have been significantly improved.6.2

6.2 Conclusion

By combining the demand of blended teaching with the user experience survey of teachers and students, qualitative and quantitative analysis methods are used to study the data. Through the feedback data, we can get the following conclusions.

1.The three learning platforms have their own characteristics. ICVE platform focuses on vocational education, Muketang platform focuses on undergraduate education, and Xuexitong platform is a comprehensive learning platform. When designing ICVE platform, we should pay attention to the cooperation between schools and enterprises. There are differences between teachers and students in the experience of using the three online learning platforms. It is generally believed that the interactive design of Xuexitong is the best, and that the interface design of Muketang is the best, while ICVE platform is poor in function, interaction and visual aesthetics, which needs to be improved.

2.We compared the positioning, advantages, disadvantages and functions of ICVE platform and the other two learning platforms in detail, explored the areas that can be improved by analyzing competitors, and made a detailed investigation on the actual user needs, user satisfaction and user interaction behavior of ICVE platform through interviews and questionnaires, and made portraits of teachers and students through these results, and the user portraits are set as the target group, and the product frame diagram and flow chart are designed for them. According to the frame diagram and flow chart, the prototype design is designed.

3.The questionnaire survey is used to investigate the user satisfaction of the prototype design, mainly from the aspects of function, interaction and beautiful interface, and the different dimensions of curriculum construction are also investigated, It shows that the prototype of the revised design is more acceptable to users, and then the visual design draft is designed, and the user satisfaction survey of the design draft shows that users are satisfied with the visual design draft. After adjusting the details, we finally completed the design of the visual design draft.

6.3 Discussion and Recommendation

This part analyzes the needs and user experience of teachers and students using ICVE platform. From their perception of using this platform, teachers and

students have a strong desire to improve ICVE platform. The limitation of this study is only to investigate the situation of teachers and students in Guangxi, but not in developed areas. Therefore, this study has certain limitations.

The use of blended teaching platform mainly serves the construction and development of blended courses.The benign development of online and offline mixed teaching needs the joint efforts of all parties. On the one hand, the state should vigorously support the construction of relevant online and offline platforms and characteristic professional courses in vocational colleges, so that the platform can effectively iterate and promote the construction of online and offline mixed courses. On the other hand, schools and enterprises should form the practice exchange of hybrid courses, incorporate new technologies, new materials and new norms at the forefront of enterprises into the curriculum system, and enrich the curriculum construction with cutting-edge enterprise resources.

REFERENCES

Education and teaching column. (2022, October 23**). The Development Background, Current Situation, Competition and Prospect of Online Education Industry in China Vocational Education**. 265 School Education Network. http://www.265xx.com/w416/42351.html

Encyclopedia, (2023). **Massive open online courses**. https://baike.baidu.com/item/%E5%A4%A7%E5%9E%8B%E5%BC%80%E6%94%BE%E5%BC%8F%E7%BD%91%E7%BB%9C%E8%AF%BE%E7%A8%8B/6821056?fr=aladdin

Gao, Z. C. (2016). **Research on User Experience Optimization Strategy of Mobile APP** (master's thesis, Shanghai University Of Engineering Science).

Garrett, J. J. (2002). The Elements of User Experience. Peachpit Press.

Gong, H. P., Zhou, J. Y., Zhang, X. B., & Zhang, J. (2020). Research on User Experience Evaluation of Mobile Museum Based on APEC Model Framework. **SHANXI ARCHIVES**, 252(4), 132.

Guo, H., Li, S. Y., Song, Z. W., & Lin, S. Y. (2021). Design and Practice of PBL Project-Based Learning Method in blending Teaching Mode: Taking the Hotel English Course of Sanya Swiss Hotel Management Vocational College as an Example. **Journal of Multimedia and Network Teaching in China (Mid-monthly)** (06),86-88. doi: CNKI: SUN: DMWJ.0.2021-06-028.

He, B., & Cao, Y. (2015-03-10).SPOC: MOOC-based Innovation of Teaching Processes. **China Educational Technology** (03),22-29. doi: CNKI: SUN: ZDJY.0.2015-03-006.

Hua, M. L., & Qiu, H. (2008, November). The prototyping in interaction design. In 2008 9th International Conference on Computer-Aided Industrial Design and Conceptual Design (pp. 468-471). **IEEE**. DOI: 10.1109/CAIDCD.2008.4730612

INSIGHT AND INFO. (2022, July 2). **Research Report on the Development Trend and Investment Prospect of Online Education Industry in China** (2023-2030). https://www.chinabaogao.com/baogao/202207/603420.html

ISO 9241-210:2010(en) 2010. Ergonomics of human-system interaction – Part 210: Human-centred design for interactive systems. **Standard. International Organization for Standardization**, Brussels.

Kong, X. Y. (2020). **SPOC teaching mode in "post-massive open online course era"**. Higher Education Development and Evaluation.

Li, W. H., Pang, Q. H., & Zhang, S. (2022). Practice and Evaluation of Microbiology Project-based Discussion Classes in blending Online and Offline Teaching - Taking the Chapter of "Microbial Ecology" as an Example. **Research on Biology Teaching in Higher Education (Electronic Edition)** (02),29-35. doi: CNKI: SUN: GWJY.0.2022-02-007.

Liu, Y. (2021, June 08). **Quality Control of Online Education. People's Political Consultative Conference Network**. https://www.rmzxb.com.cn/c/2021-06-08/2876159.shtml

Lv, F. F. (2023). Research on the Integrated Education Model of "Job Course Competition Certificate Creation" in Higher Vocational Colleges. **Science and Education Guide.**,43-45. doi: 10.16400/j.cnki.kjdk.2023.7.014.

Ministry of Education of the People's Republic of China. (2019, September 19) **Guiding opinions of the Ministry of Education and other eleven departments on promoting the healthy development of online education.** http://www.moe.gov.cn/srcsite/A03/moe_1892/moe_630/201909/t20190930_401825.html?eqid=eba0a47e0003d5010000000264609b99

Morville, P. (2004, JUNE 21). **User Experience Design**. Semantic Studios. http://tinyurl.com/nvxrgjd

National business daily net. (2022, August 28). **All schools will be connected to the Internet in 2022! The State Council vigorously promotes "Internet+Education" and encourages all kinds of subjects to develop online education**. https://www.nbd.com.cn/rss/zaker/articles/1367002.html

Norman, D. A., & Draper, S. W. (1986). **User centered system design: New perspectives on human-computer interaction**. Lawrence Erlbaum Associates.

Qing, C. (2022, November21).**What are the characteristics of mooc course?.ChuangkeJiangren** website.https://www.ckjr001.com/newsdetail/854.html

Rajeshkumar, S., Omar, R., & Mahmud, M. (2013, November). Taxonomies of user experience (UX) evaluation methods. In 2013 international conference on research and innovation in information systems (icriis) (pp. 533-538). **IEEE**. DOI: 10.1109/ICRIIS.2013.6716765

Wang, J. Y., & Qi, Y. H. (2021). Blending Teaching in Higher Vocational Education: An Analysis of the Path to Deep Learning. **Chinese Journal of Vocational and Technical Education**. (23),64-70. doi: CNKI: SUN: ZONE.0.2021-23-011.

Xie, Y. R. (n.d.). **Wisdom classroom teaching**. https://www.icourse163.org/course/icourse-1001978001?from=searchPage&outVendor=zw_mooc_pcssjg_

Yang, Z. Y., & Zheng, Q. (2014). A preliminary study on online education models such as MOOC. **Science-Technology & Publication** (02),9-12. doi: 10.16510/j.cnki.kjycb.2014.02.004.

Zhong, Y. X., & Zhou, B. F. (2022). **Research on the Reform of blending Teaching Mode in the Course of Business Data Analysis**. (eds.) Innovation and Practice of Teaching Methods Academic Research Exploration, (pp.141-144). DOI: 10.26914/c.cnkihy.2022.015518.

APPENDIX

1)Investigation on User Experience of Three Learning Platforms

Investigation on User Experience of ICVE, Xuexitong and Muketang Platform

Hello! In order to compare the user experience of online and offline hybrid learning platforms, this questionnaire survey is conducted. I hope you can take some time out of your busy schedule to participate in this questionnaire survey. Your participation is very important to us. This questionnaire is anonymous, only for investigation and research, and will not be leaked. Please feel free to fill it out! Thank you again for your cooperation and help.

1. (Multiple choices) What kind of online and offline hybrid learning platform have you used?

A. ICVE B. Xuexitong C. Muketang D.other

2. Will you choose to study on multiple platforms at the same time?

A.Yes B. No

3. (Multiple choices) If you choose to study on multiple platforms at the same time, what are the main reasons?

A. Want to get more learning resources B. Want to get more certificates C. Want to get more competition experience D. Want to compare the curriculum differences of different platforms. E. other

4.In terms of functions, which platform do you think is the best?

A. ICVE B. Xuexitong C. Muketang

5.In terms of interaction, which platform do you think is the best?

A. ICVE B. Xuexitong C. Muketang

6.In terms of beautiful interface, which platform do you think is the best?

A. ICVE B. Xuexitong C. Muketang

7.At present, which platform do you think gives you the highest comprehensive experience?

A. ICVE B. Xuexitong C. Muketang

2) Investigation on User Satisfaction of ICVE Platform

Hello! Thank you very much for participating in this survey. The purpose of this questionnaire is to investigate ICVE user experience satisfaction. Please fill in according to your real feelings. The questionnaire is anonymous, and the information you fill in is only for reference purposes of academic research and system environment development. Please feel free to fill it in.
Is ICVE easy to operate? □Very simple, □simple, □ordinary, □not simple, □very not simple. In the process of using the check-in function, what is the sense of experience? Why? □Very satisfied, □satisfied, □common □dissatisfied, □very dissatisfied. _____ In the process of discussing the use of functions, what is the sense of experience? Why? □Very satisfied, □satisfied, □common □dissatisfied, □very dissatisfied. _____ In the process of using the questioning function, what is the sense of experience? Why? □Very satisfied, □satisfied, □common □dissatisfied, □very dissatisfied. _____ How do you feel about using the upload job function? Why? □Very satisfied, □satisfied, □common □dissatisfied, □very dissatisfied. _____ How do you feel about the use experience in the process of modifying the job? Why? □ very satisfied □ satisfied □common □ dissatisfied □ very dissatisfied. _____ How do you feel about using the courseware? Why? Very satisfied, satisfied, generally dissatisfied, very dissatisfied. _____ How do you feel about the experience when you log in? Why? Very satisfied, satisfied, generally dissatisfied, very dissatisfied. _____

What other functions do you think the product should add? Why?

_____

Do you think the aesthetic degree of ICVE's overall interface design meets your expectations? If not, please tell me the answer.

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Do you think the color of ICVE interface meets your expectations? Why?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Do you think the font and size of ICVE interface meet your expectations? Why?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Do you think the layout of ICVE interface meets your expectations? Why?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Where do you think the interface design needs to be improved?

_____

3)Research on the User Needs of ICVE Platform —— Teachers

Research on the User Needs of ICVE Platform —— Teachers
1、In actual use, do you think the functions of this ICVE intelligent vocational education platform can meet your needs? A Can B Can't C Average. 2.Among the following options, do you think there is anything worth improving in Vocational Education Cloud? What is it? [multiple choices] A interaction process is simplified, B function design is reasonable, C interface design is beautiful and clear, and all above D are E others. 3、What do you think can be improved in function? [multiple choices] A. Competition module B. course module C. post module D. textual research module E. service module f others

4、What do you think can be improved in interaction? [multiple choices]

A simplifies the operation flow, B Increases the interesting interactive effect, C Increases the interactive visual effect, D Other.

5、What do you think can be improved in the interface design? [multiple choices]

A concise interface design b optimized color matching c optimized button design d optimized icon design.

6. If you encounter problems when using our products/services, which of the following ways do you want to solve them? [multiple choices]

A. Online customer service B. Telephone customer service C. Email feedback D. WeChat customer service E. Online message F Other participating services

7. What do you think our products/services need to be improved in the following aspects? [multiple choices]

A. perfect function B. simpler operation C. more beautiful interface D. faster response E. higher safety F. more affordable price G. better after-sales service H. others, please specify.

8. Where do you want to know the information notice? [multiple choices]

A opens the app and pops up information. B classmate or teacher reminds C that mobile phone information automatically prompts D other.

9. Do you want to start the or cut-off (live broadcast, homework, sign-in) function?

A. It doesn't matter if you need B or C.

10. How often do you want to remind?

A remind B every day, close the reminder C and set the time to remind D others.

11.Which of the following do you want to improve? [multiple choices]

A homework page B signs in C live broadcast D replay function E message notification F course interactive function G course module H qualification examination information module I life encyclopedia (such as health, weather, etc.) J news information K recruitment employment information module

12. Which of the following support do you want in the teaching process? [multiple choices]

A. Teacher-student communication B. Communication with other teachers C. More teaching materials D. Others

4)Research on User Needs of ICVE Platform —— Students

Research on User Needs of ICVE Platform —— Students
1、In actual use, do you think the functions of this ICVE intelligent vocational education platform can meet your needs? A .can. B Can't. C. Average. 2.Among the following options, do you think there is anything worth improving in Vocational Education Cloud? What is it? [multiple choices] A. the interaction process is simplified. B. the functional design is reasonable. C. the interface design is beautiful and clear. D. all the above are. E. others. 3、What do you think can be improved in function? [multiple choices] A competition module B course module C post module D textual research module E service module F others 4、What do you think can be improved in interaction? [multiple choices] A simplifies the operation flow. B. Increases the interesting interactive effect. C.increases the interactive visual effect. D. Other. 5、What do you think can be improved in the interface design? [multiple choices] A.concise interface design. B. Optimized color matching. C. Optimized button design. D.optimized icon design. 6. If you encounter problems when using our products/services, which of the following ways do you want to solve them? [multiple choices] A. Online customer service. B. Telephone customer service. C. Email feedback. D. WeChat customer service. E.Online message. F.Other participating services 7. What do you think our products/services need to be improved in the following aspects? [multiple choices] A. Perfect function. B. Simpler operation. C. More beautiful interface. D. Faster response. E. Higher safety. F. More affordable price. G. better after-sales service. H. Others, please specify. 8.Where do you want to know the information notice? [multiple choices] A.Opens the app and pops up information. B.Classmate or teacher reminds. C.That mobile phone information automatically prompts. D. Other.

9. Do you want to start the or cut-off (live broadcast, homework, sign-in) function?

A. Need. B. Don't need. C.It doesn't matter

10. How often do you want to remind?

A. Remind me every day. B. Remind me as soon as possible. C. Remind me at my own time. D. Others.

11. Which of the following do you want to improve? [multiple choices]

A. Homepage. B. Sign in. C. Live broadcast. D. Replay function. E. Message notification. F. Course interactive function. G. Course module. H. information module of qualification examination. I. encyclopedia of life (such as health and weather). J. News information. K. Information module of recruitment and employment.

12.Which presentation method do you think is the best for learning? [multiple choices]

A. Text. B. Pictures. C. Audio. D. Video. E. PPT. F. Web page links. G. Synthesis.

13. What auxiliary tools do you think ICVE platform should provide to help you study better? [multiple choices]

A. Study notes. B. Course notes. C. Course notes. D. Course videos. E.Others.

14. Which of the following support do you want to get in the learning process? [multiple choices]

A. The guidance of course instructors. B. Communication with other learners. C. More study materials. D. Detailed explanation of course handouts. E. Others.

5)Satisfaction Survey of Revised Design Prototype Drawings

Hello! Thank you very much for participating in this survey. The purpose of this questionnaire is to investigate the user satisfaction of ICVE's design prototype after revision. Please carefully check the design prototype and fill it out according to your real feelings. The questionnaire is anonymous, and the information you fill in is only for reference purposes of academic research and system environment development. Please feel free to fill it in.

Does the home page in ICVE's prototype revision meet your expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the course center page in ICVE's prototype revision meet your expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the job page in the revision of ICVE's design prototype meet your expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the off-campus course resource page in ICVE's prototype revision meet your expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the personal center page in ICVE's prototype revision meet your expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Do you think the page layout in the revision of ICVE's design prototype meets your expectations? Why?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Do you think the functional layout in the revision of ICVE prototype meets your expectations? Why?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Do you think the page jump logic in the revision of ICVE's design prototype meets your expectations? Why?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

What do you think needs to be improved in the design prototype revision of ICVE?

_____

6)Satisfaction degree of visual design after revision

Hello! Thank you very much for participating in this survey. The purpose of this questionnaire is to investigate the user satisfaction of ICVE's revised visual interface design. Please check the design prototype carefully and fill in according to your real feelings. The questionnaire is anonymous, and the information you fill in is only for reference purposes of academic research and system environment development. Please feel free to fill it in.

Does the overall aesthetic degree of ICVE's revised visual interface design meet your expectations? If not, please tell me the answer.

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the style in ICVE's revised visual interface design meet your expectations? Why?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the color in ICVE's revised visual interface design meet your expectations? Why?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the font and size in ICVE's revised visual interface design meet your expectations? Why?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Is the size and color of buttons in the visual interface design of ICVE clear and easy for users to see? Why?

Very clear, clear, general, unclear, very unclear

_____

Does the homepage in ICVE's revised visual interface design meet your expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the course center page in ICVE's revised visual interface design meet your

expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the job page in ICVE's revised visual interface design meet your expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the off-campus course resource page in ICVE's revised visual interface design meet your expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

Does the personal center page in ICVE's revised visual interface design meet your expectations?

□ Very consistent □ Consistent □ General □ Not consistent □ Very inconsistent.

_____

What do you think needs to be improved in the revised visual interface design of ICVE?

_____

7) ICVE Platform Task Table

The main purpose of this experiment is to understand the operation path, operation behavior, interactive feedback and other information when you use ICVE. During the whole experiment, you should complete different sub-tasks. Please feel free to express your thoughts during the completion. We will record the whole operation, and we will not disclose your private information without your permission.		
Name:	Major:	Gender:
Required operating tools used:		Brand and model of mobile phone:
Mobile phone usage time:		Mobile phone operating system
1) Students complete the following subtasks on ICVE website: Task 1, log on to ICVE Task 2, Enter the Setup Center		2) The teacher completes the following subtasks on ICVE website: Task 1, log on to ICVE Task 2, Enter the Setup Center

Task 3, Change Password Task 4: Join the class where the course is located. Task 5: Watch and learn learning resources such as courseware and videos. Task 6, Upload Job Task 7, Participation in Activities	Task 3, Change Password Task 4, Create a New Course Task 5: Create a new class and add a student list. Task 6: Upload courseware, videos and other learning resources in ICVE. Task 7, Assigning Homework Task 8: Review the assignments and grade them. Task 9, Launching Activities

8)Student task record form

A. Student task record form			
Task 1, log on to ICVE			
Interface display	User operation path	Emotions/attitudes/feelings	Remarks
Task 2, Enter the Setup Center			
Interface display	User operation path	Emotions/attitudes/feelings	Remarks
Task 3, Change Password			
Interface display	User operation path	Emotions/attitudes/feelings	Remarks
The following is omitted			

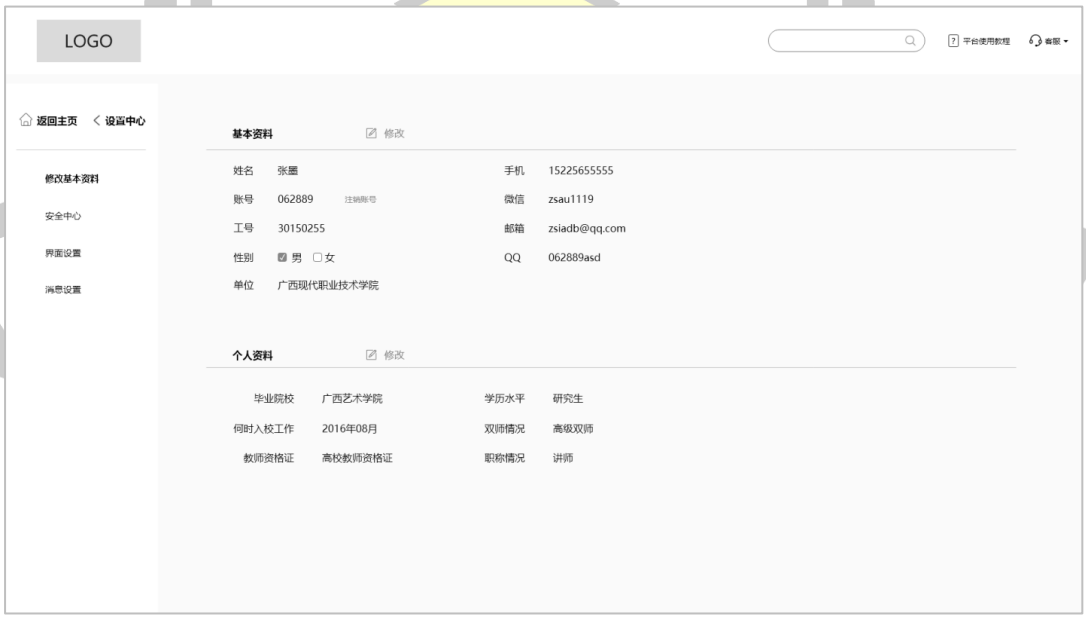
9) Teacher task record form

B. Teacher task record form			
Task 1, log on to ICVE			
Interface display	User operation	Emotions/attitudes/feelings	Remarks

	path		
Task 2, Enter the Setup Center			
Interface display	User operation path	Emotions/attitudes/feelings	Remarks
Task 3, Change Password			
Interface display	User operation path	Emotions/attitudes/feelings	Remarks
The following is omitted			

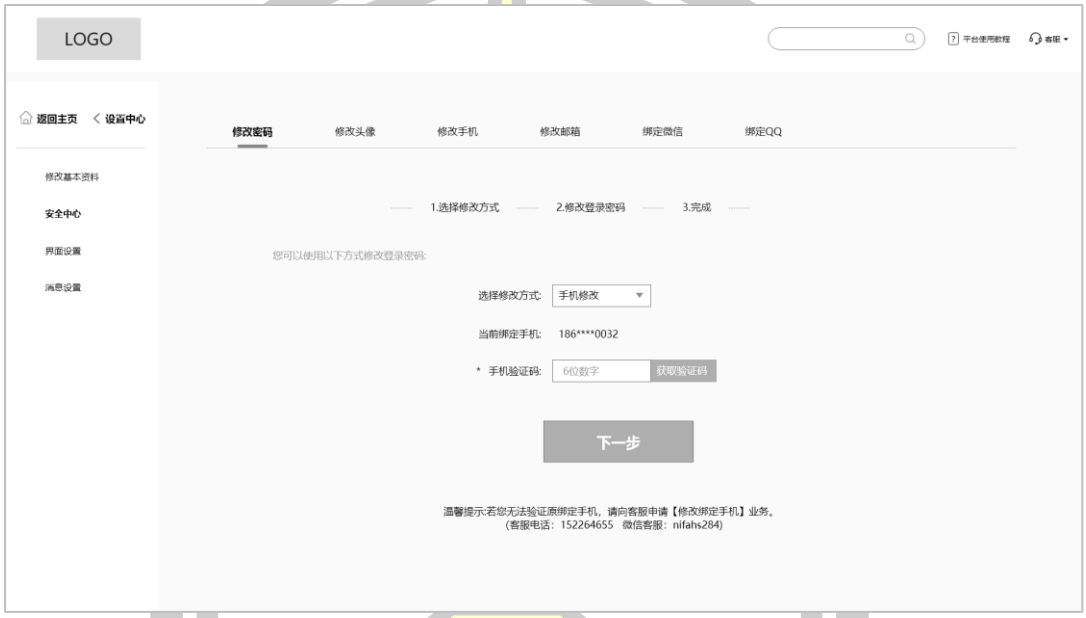
The following is the design manuscript of the prototype, and all of them are placed in the appendix due to limited space.

The following figure shows the page for modifying basic information, which is divided into basic information and personal information. The basic information includes the teacher's name, account ID, job number, gender, contact information, etc. Personal information includes the graduate school, academic qualifications, professional titles and teacher qualification certificates of teachers. As shown below.



Set Center 1- Modify Basic Information

The Security Center page contains security operations such as password modification, avatar modification, mobile phone modification, email modification, WeChat binding and QQ binding. As shown below.



Setup Center 2- Change Password

The following figure shows the brightness setting. You can modify the brightness and contrast by adjusting the slider.

Setting Center 4- Brightness Setting

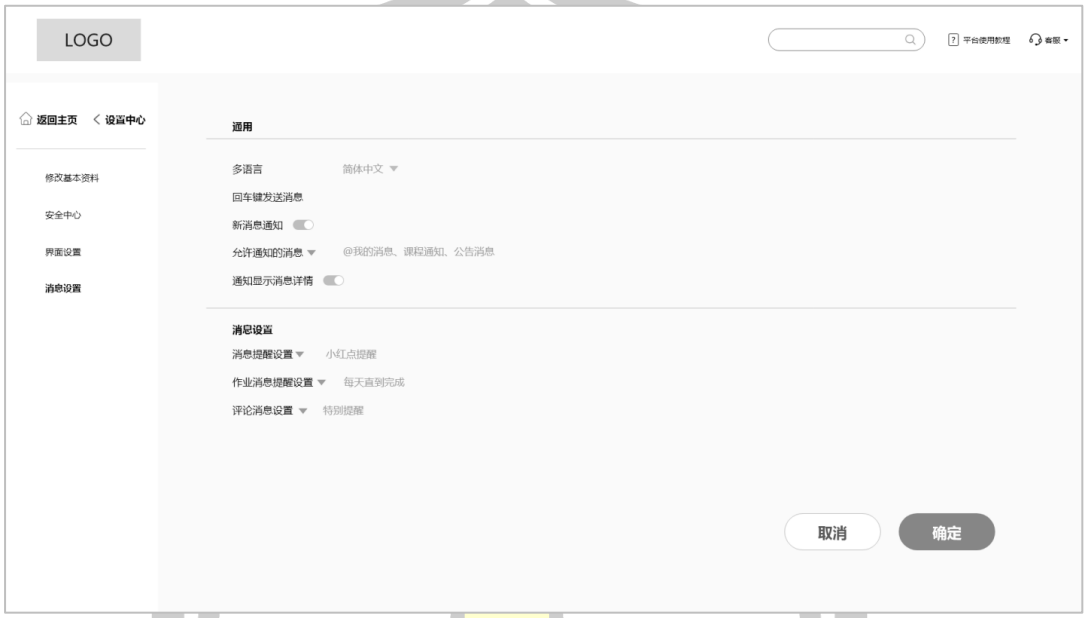
The following picture shows the font setting page, where you can choose the font and font size. This design mainly takes into account the eyesight of older teachers and can bring convenience to older teachers.

Centering 5- Font Settings

The following figure shows the UI scaling settings. Here, you can set the icon size separately or scale the overall UI interface. The overall UI interface scaling includes both the icon size and font size.

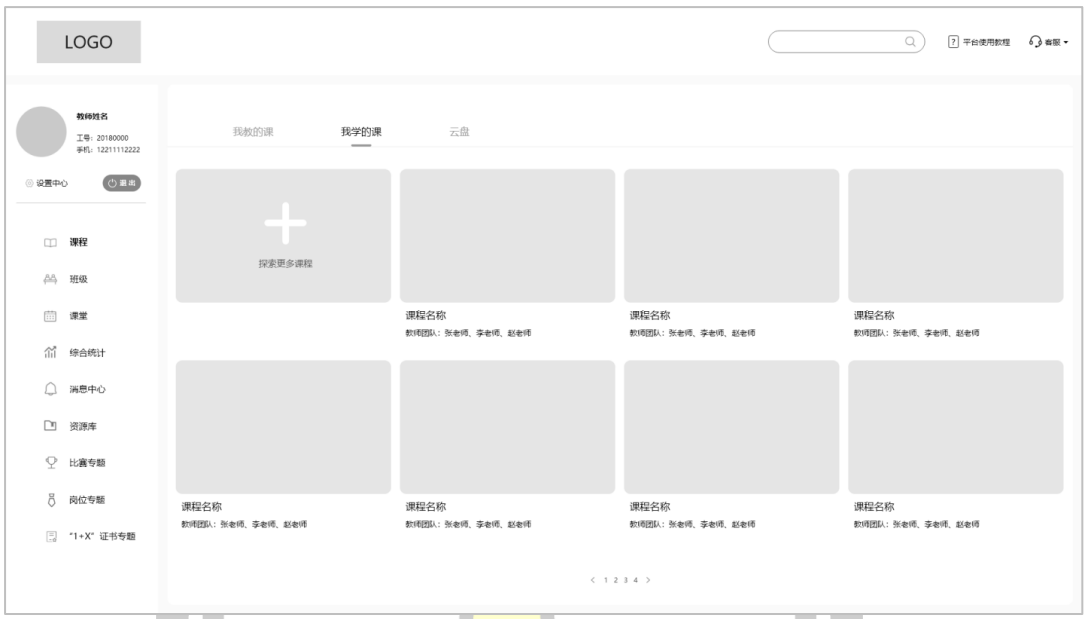
Set Center 6-UI Zoom

The following figure shows the message settings, where you can set the language, shortcut keys for sending messages, the switch for message notification, and the reminder time setting of messages.



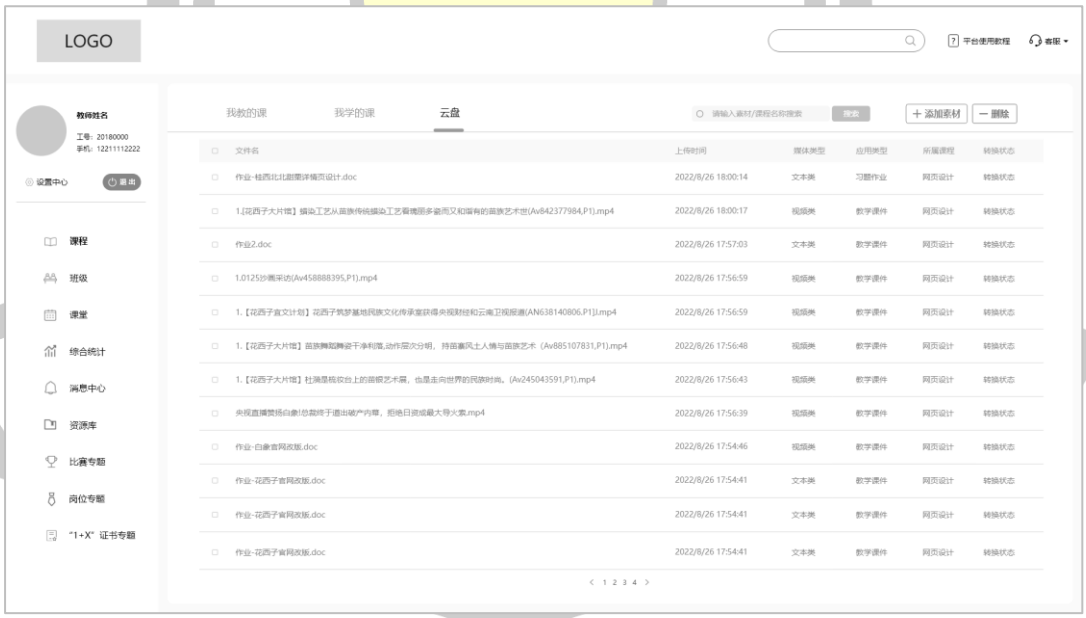
Setup Center 7- Message Settings

The following page is my courses. Teachers should not only teach students knowledge, but also learn new knowledge and new technology themselves. Therefore, teachers are not only teachers, but also students. In this page, teachers can learn the course contents of other excellent teachers and explore more interesting courses to learn. In the design format, it is consistent with the design style of the class I teach.



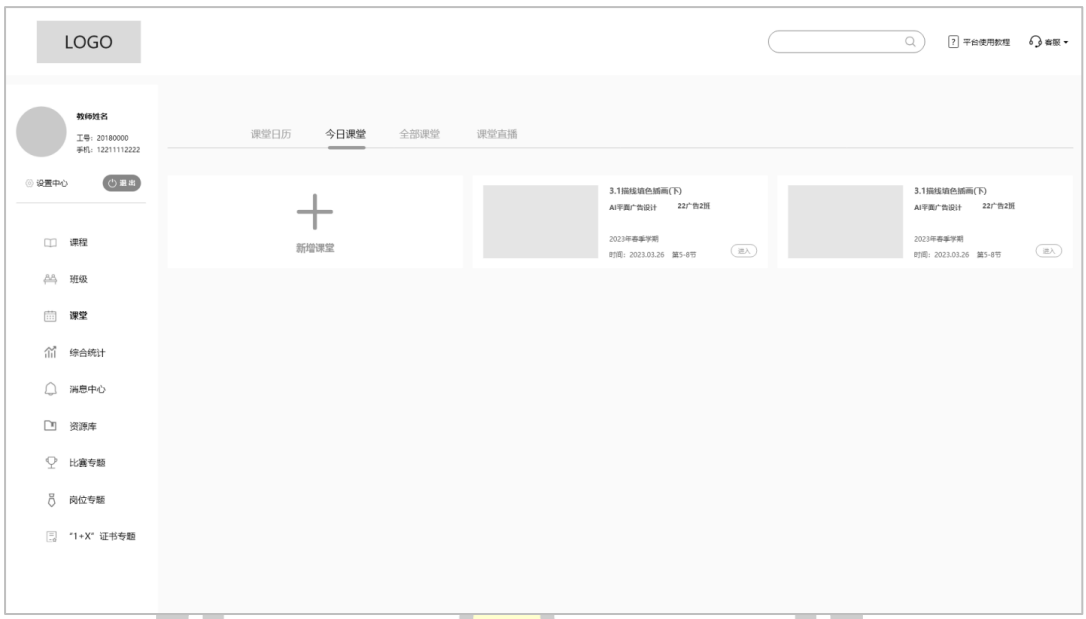
The first-level interface of the course-the course I studied.

The following page is the cloud disk, in which all the materials uploaded by teachers will be displayed, and they will be automatically saved to the cloud disk. Even if teachers delete a built course, the materials of this course can still be found in the cloud disk.



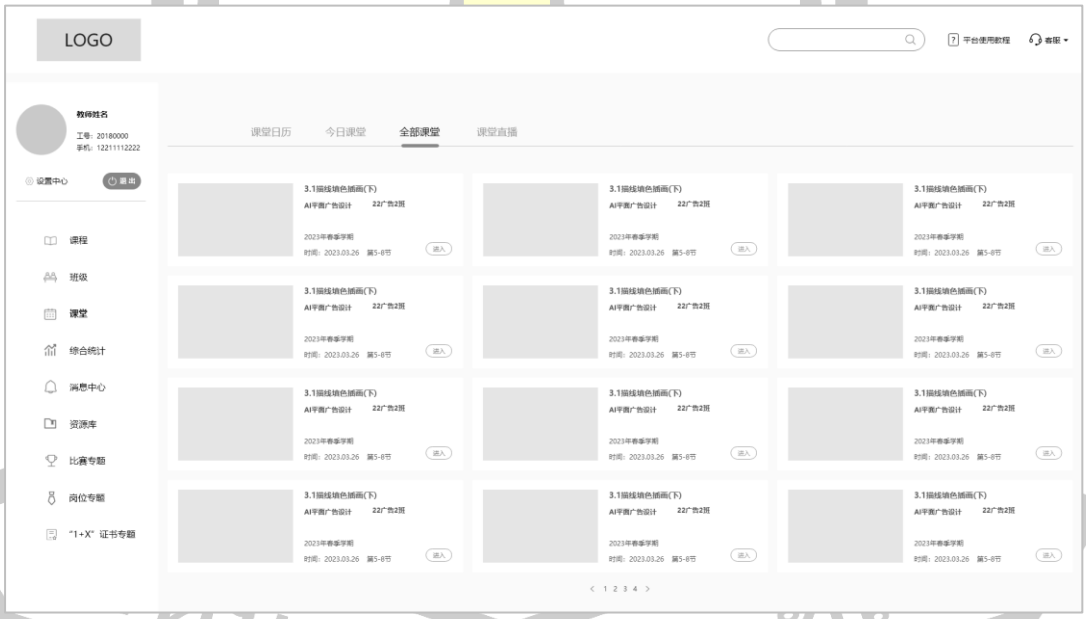
The first-level interface of the course-Cloud Disk

The picture below shows the "Today's Classroom" module, where only the "Today's Classroom" is displayed.



Class 2- Today's Class

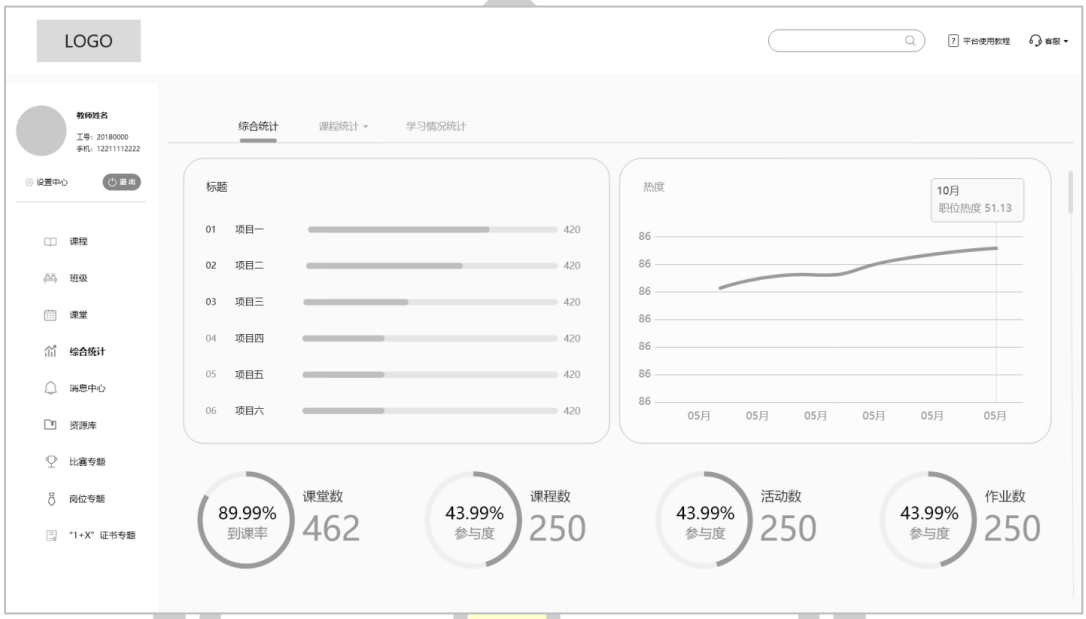
The picture below shows all the classes, arranged in chronological order. It will be very helpful for teachers who don't want to click on the dates one by one.



Class 3- All Classes

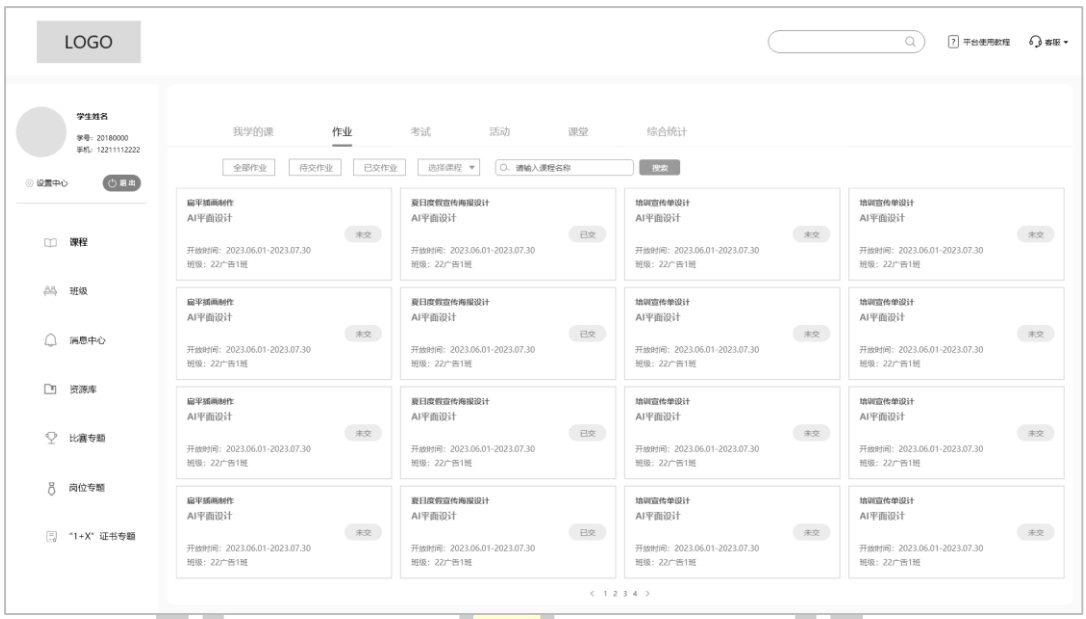
The following figure shows the page of "Comprehensive Statistics" in the first-level menu bar. The second-level menu bar of this page is divided into three contents, namely, comprehensive statistics, course statistics and learning statistics. The comprehensive statistics section includes the statistics of teachers' curriculum resources and broadcast volume, as well as the statistics of students' learning

situation. The course statistics section can choose a specific course. Learning statistics can be selected to a specific class.



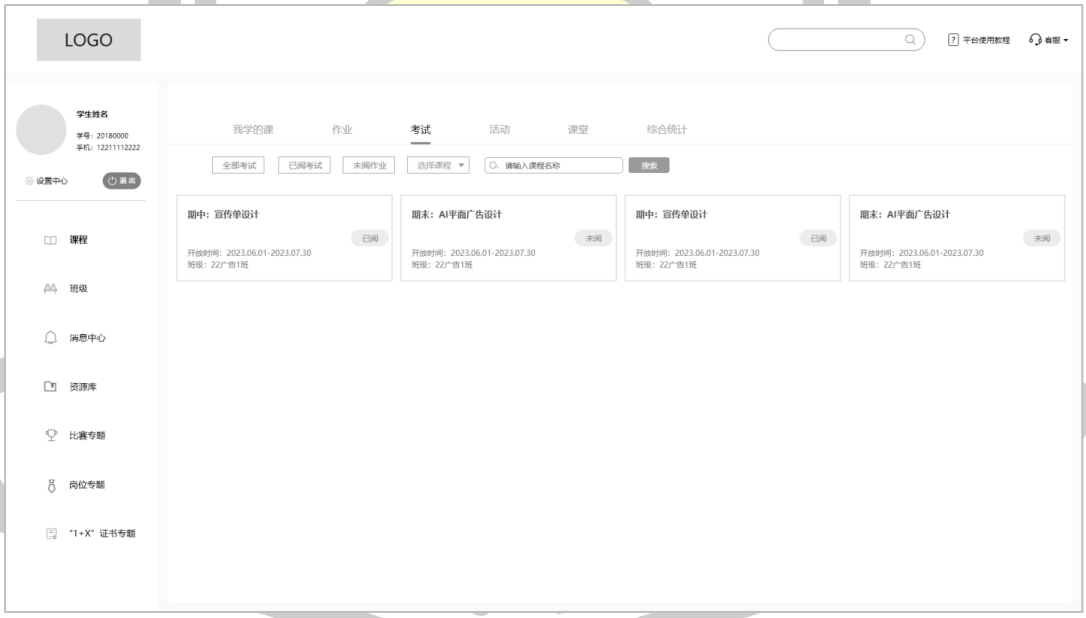
Comprehensive statistics

The secondary menu bar of the course page is divided into six contents, which are my lessons, homework, exams, activities, classes and comprehensive statistics. The following figure shows the second content, the "Homework" module. In the three-level menu bar on this page, students can select all homework, homework to be handed in and homework handed in with one click, and they can also search for a specific homework after selecting a course. In the homework card, the words "handed in" or "not handed in" are marked, which can help students quickly see whether the corrected homework has been handed in.



Course Level 1 Interface 2- Homework

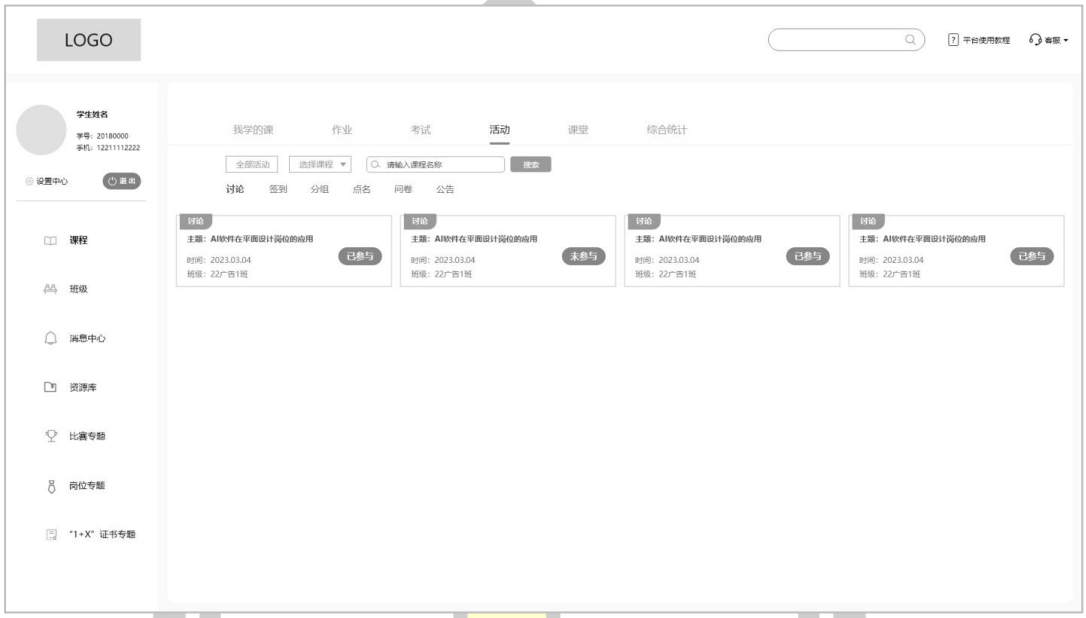
The following figure shows the Exam content module in the Course module. In its three-level menu bar, you can select all exams, exams that the teacher has read and exams that have not been read with one click, and you can also search the course name to find the corresponding exam card.



Course Level 1 Interface 3- Exam

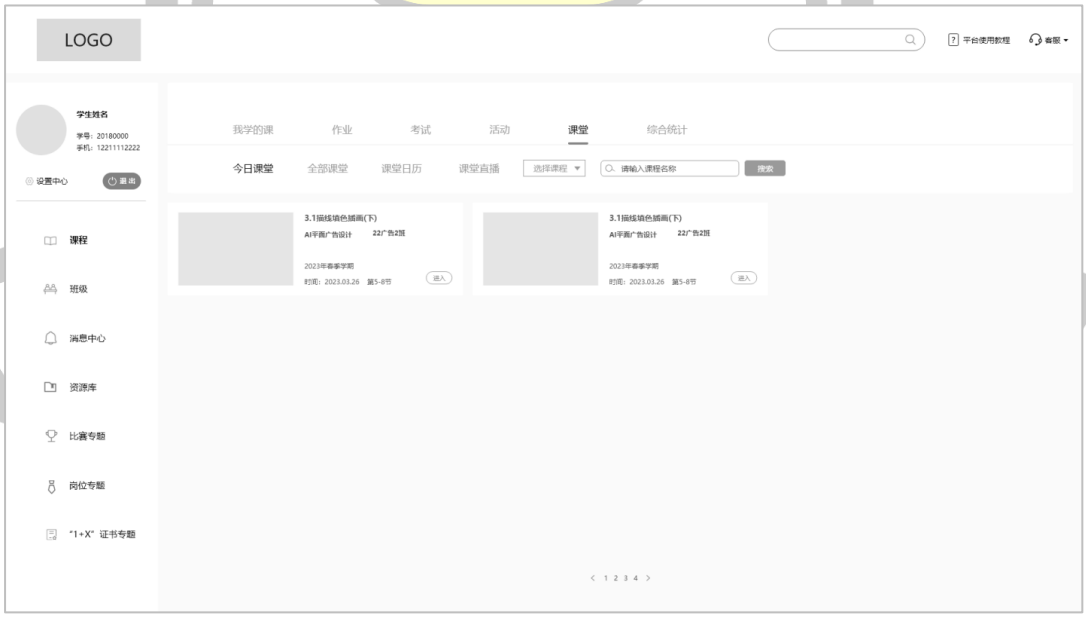
The following figure is the fourth content of the course module, the activity module. In this module, students can participate in the activity by clicking the activity

card, and the card will also show whether the students have participated in the activity.

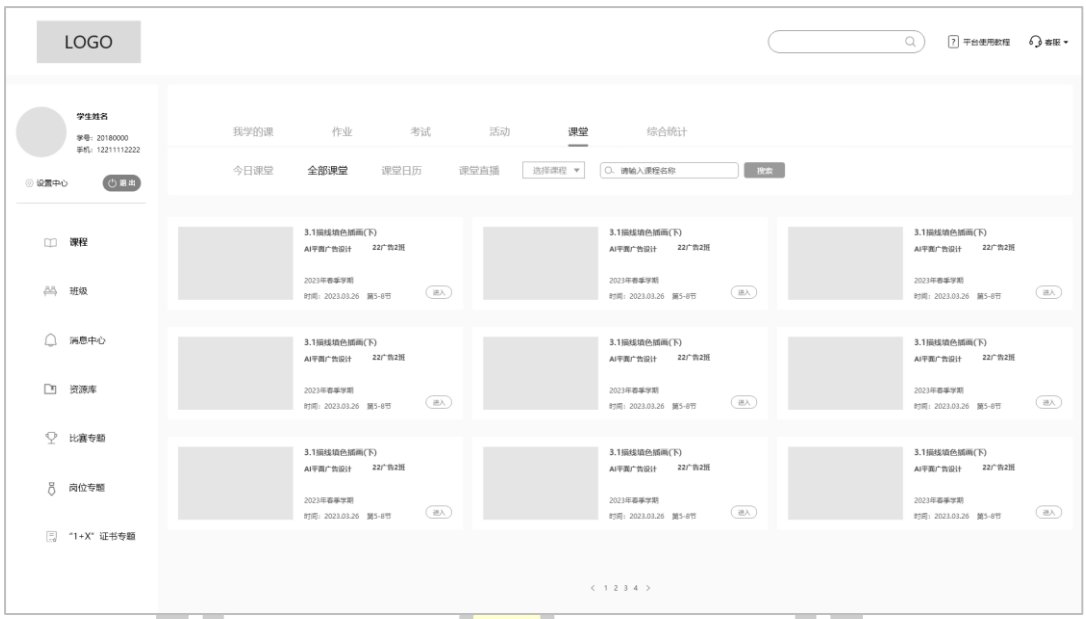


Course Level 1 Interface 4- Activities

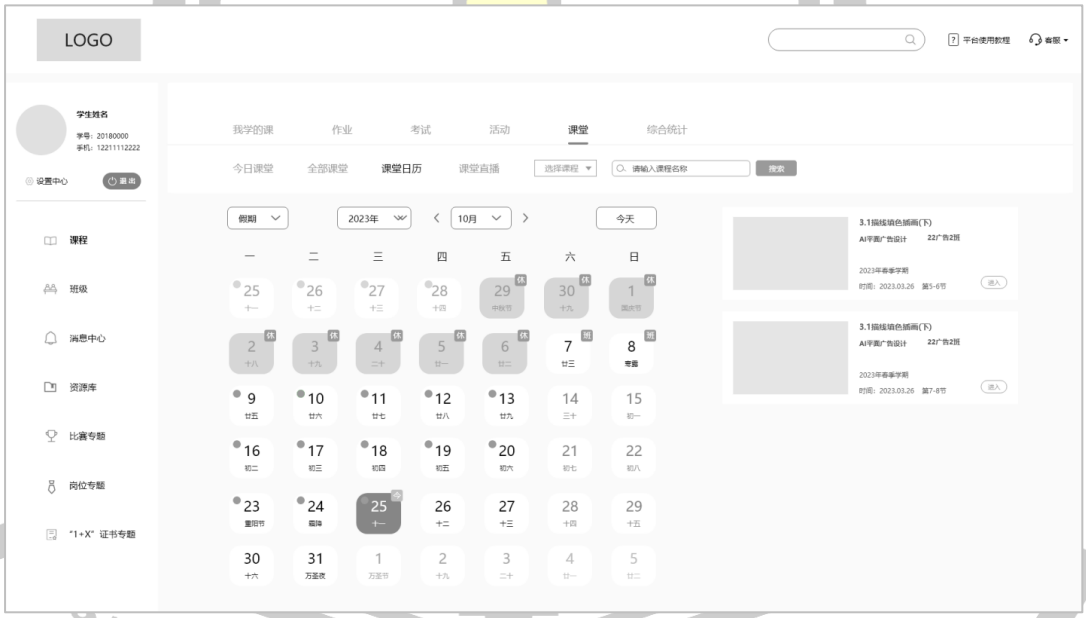
The following four pictures (Figure 70-Figure 73) correspond to the four contents of the "Classroom" module, namely "Today's Classroom", "All Classes", "Classroom Calendar" and "Classroom Live Broadcasting". At the same time, there is a search box to help students choose the class they want to watch.



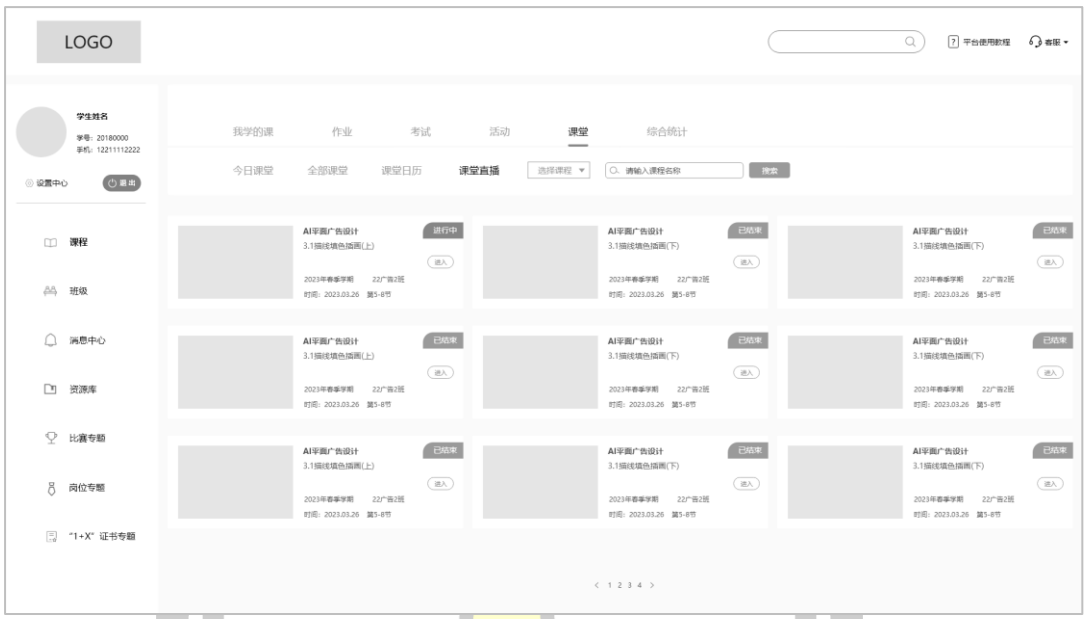
Course Level 1 Interface 5.1- Today's Class



Course Level 1 Interface 5.2- All Classes

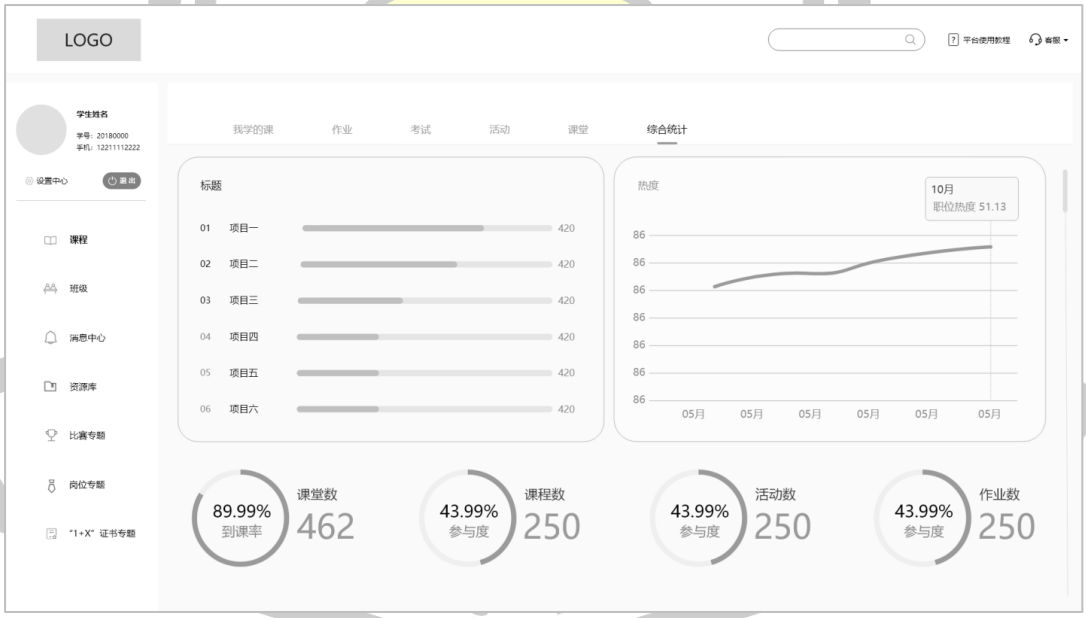


Course Level 1 Interface 5.3- Class Calendar



Course Level 1 Interface 5.4- Classroom Live Broadcasting

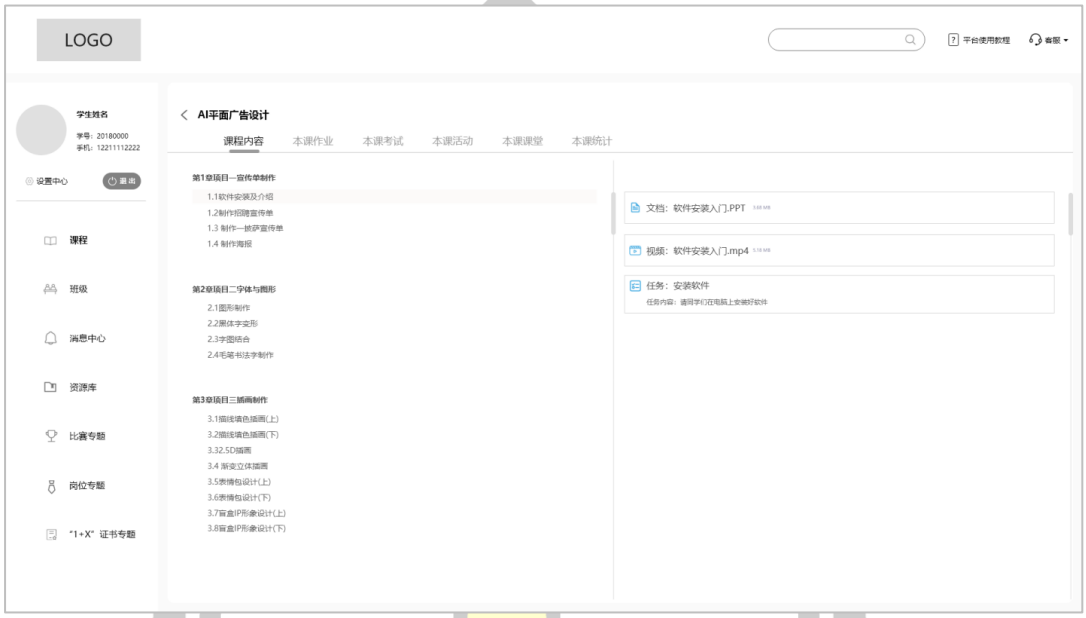
The figure below is the sixth content of the "course" module, the "comprehensive statistics" module, which counts the number of classes, courses, activities, assignments and other contents that students participate in. Secondly, there is a curve display of course learning level.



Course Level 1 Interface 6- Comprehensive Statistics

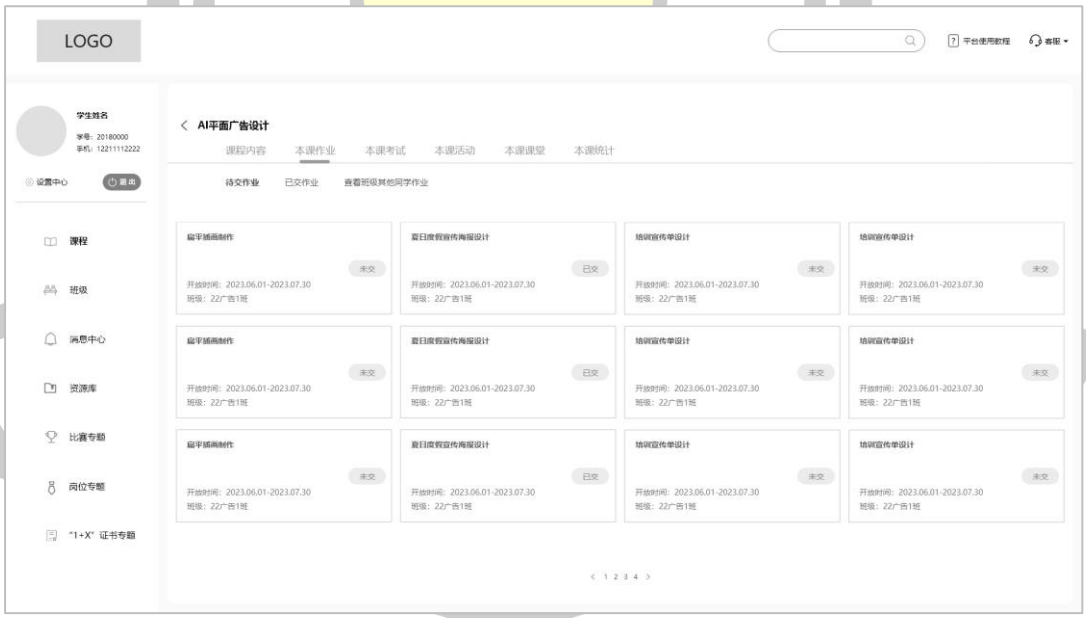
The following figure shows the detailed page of the course after clicking a course card in the Course module. The course content, homework, exam, activity,

class and statistics of the course are displayed in the secondary menu bar. Like the teacher, all the contents are aimed at this course.



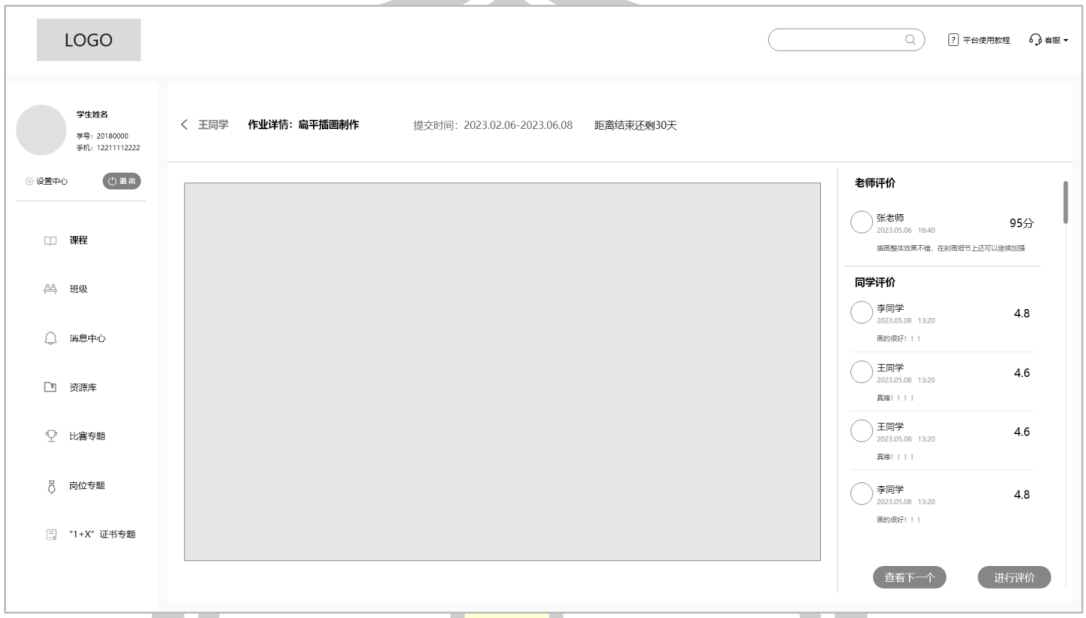
Course Secondary Interface 1- Course Content

In the "Homework for this lesson" module, you can see the unpaid and handed-in homework, and you can also view the homework of other students in the class.



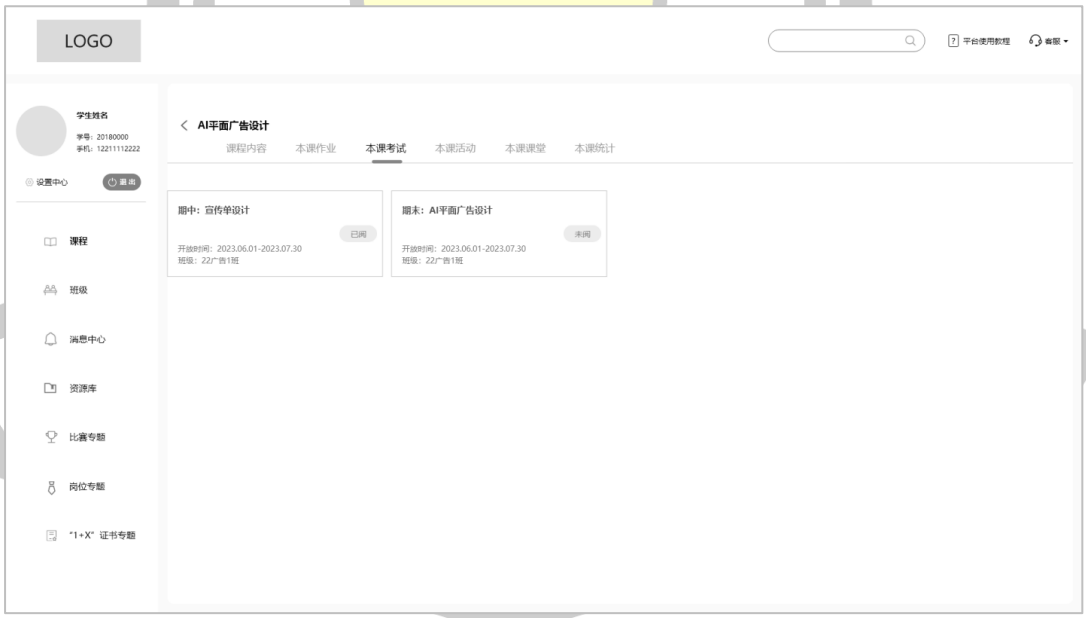
Course Level 2 Interface 2- Homework for this lesson

The following page is to view the details of other students' homework, and you can comment and grade the classmates' homework by clicking the "Evaluate" button.



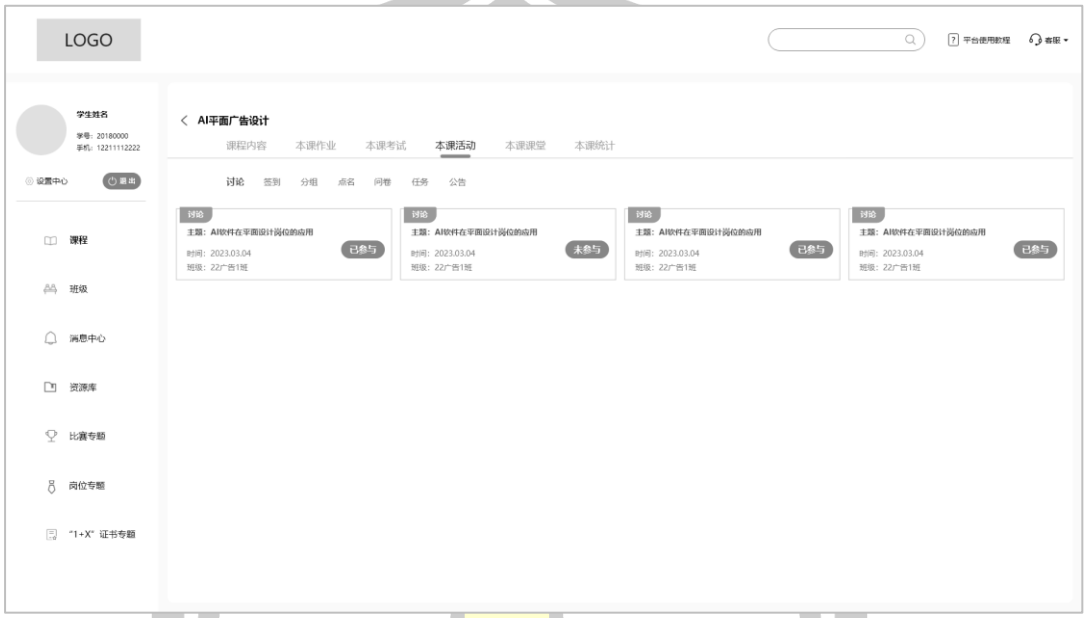
Three-level interface of the course-homework details (classmates' homework)

The "Exam of this Course" page shows the exam content of this course. Students can check whether the teacher has scored.



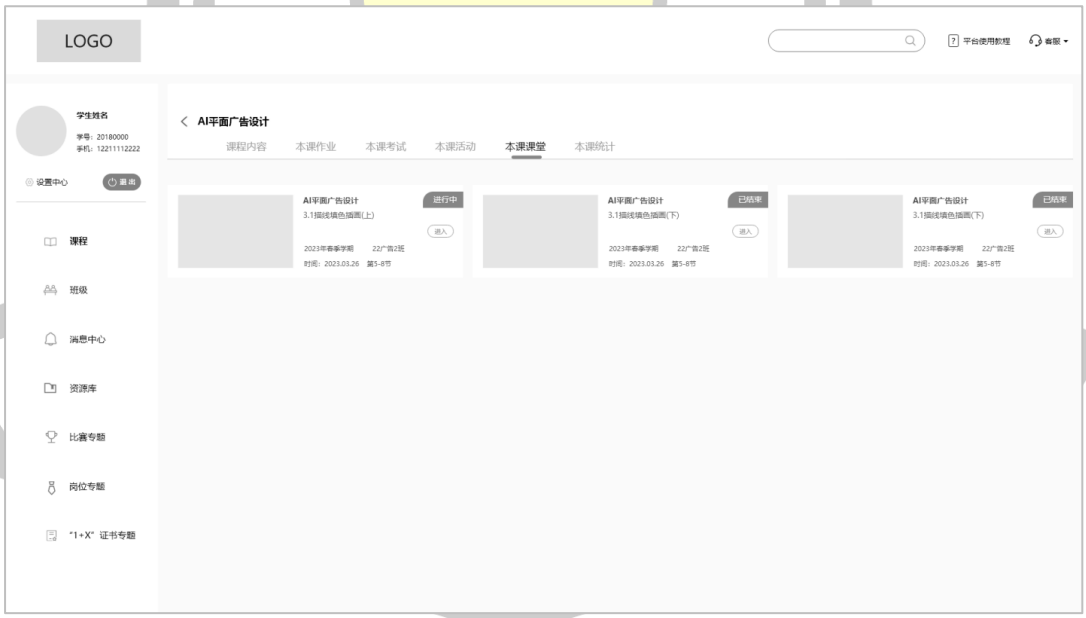
Course Level 2 Interface 3- Exam of this course

The "Activities of this Course" page in the figure below shows all the activities of this course, and shows whether the students have participated in the activities. If not, you can click the activity card to participate.



Course Level 2 Interface 4- Activities of this lesson

The "This Class" page in the figure below shows all the classes in this course, and the class cards indicate the classes in progress and the classes that have ended.



Course Level 2 Interface 5- This Class

The "Statistics of this Course" page in the figure below shows the statistics of this course, including the statistics of the course itself and the statistics of the students' learning situation.

Course Secondary Interface 6- Statistics of this course

BIOGRAPHY

NAME	Fanghui Quan
DATE OF BIRTH	1st July,1990
PLACE OF BIRTH	Dongbao District, Jingmen City, Hubei Province, China
ADDRESS	Biguiyuan, Jinchengjiang District, Hechi City, Guangxi
PLACE OF WORK	Guangxi Modern Polytechnic College
EDUCATION	2009-2013 Art design Hubei Institute of Fine Arts 2021-2023 M.Sc. Creative Media Faculty of Informatics, Mahasarakham University, Maha Sarakham Province, Thailand
Research grants & awards	1.Host "The Application and Exploration of China Ancient Patterns in Modern Composition Art Design Teaching",Project number: GXXDYB202123, Funded by 3,000RMB 2.Participate in "Research on the Application of AR/VR Technology in the Inheritance and Development of Maonan Ethnic Culture", Project number: 2021KY1418, Funded by 10,000RMB
Research output	1.“Teaching reform of integrating ancient patterns into composition design based on cultural inheritance”. 2.“Course Reform of Web Design under Informatization”. 3.”User Experience of Intelligent Center of Vocational Education Platform Based on Blended Teaching: The Perspective of Higher Vocational Teachers”. 4.The utility model patent "a drawing storage rack", patent number ZL20212 0961533.1.