Design and Analysis of a Campus Service Platform Based on WeChat Mini Program

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Abstract: This paper explores the design and analysis process of a campus service mini program. As known, an increasing number of mini program platforms are emerging in the market, and the unique community of schools, consisting of teachers and students, also requires a dedicated mini program to cater to their needs. This paper covers aspects such as the functional design, page layout, technical implementation, market analysis, and future planning of the mini program. Through our research, we have found that the design and development of a mini program is a complex and meticulous task, requiring thorough consideration of user needs, technical implementation capabilities, and market demands. Utilizing front-end development technologies, the mini program achieved a simple and user-friendly interface, consolidating multiple scattered platforms commonly used by users, enhancing the platform's practicality, and improving user experience. This research article provides a detailed introduction to the design philosophy, functional modules, technical implementation, and market analysis of the mini program. Additionally, the paper outlines future development trends and offers development recommendations, enabling the mini program to better face future challenges.

Keywords: campus service, mini program, front-end development

1. Introduction

With the widespread popularity of mobile internet and the extensive use of smartphones, WeChat has become an indispensable part of our daily life and work. In campuses, there are various service platforms available for teachers and students to choose from. However, a significant drawback of the majority of these platforms is their scattered functionality and insufficient promotion. In order to better meet the information needs of campus teachers and students, and address the drawbacks of the current campus service platforms, we have decided to launch this campus WeChat service mini program. The aim is to provide a more convenient and efficient service for the vast number of teachers and students. This paper discusses the design and analysis of the mini program's functionality, explores the required technologies for implementation, and outlines a clear plan for the future development of the mini program. It is our hope that through the exploration and planning of these issues, we can achieve the goal of designing a convenient mini program.

2.   Product Overview

2.1.   Product Background

The college student demographic spends a significant amount of time engaging in online activities such as socializing, learning, and shopping. Their needs are becoming increasingly diverse.

For instance, having relevant guidance or navigation in a new environment would greatly facilitate the daily lives of students and faculty members newly entering the campus. A platform for buying and selling second-hand items within the campus would alleviate or solve the problem of accumulating unused items for graduating students. If there were a platform for academic exchange and postgraduate planning for the entire student body, along with a platform where professors from various colleges could address difficult questions, students' thirst for knowledge would be satisfied. Consolidating the above functions into one platform would be convenient for numerous university students [1].

2.2.   Product Development Strategy

The development of this product is planned to be carried out in three stages: the pre-development stage, mid-development stage, and post-development stage. In the pre-development stage, we plan to complete various technical research and market investigations. The mid-development stage will primarily focus on product development, while the post-development stage will be responsible for product maintenance and the development of customer resources.

The positioning of the mini program in this project is as a campus service mini program, with the development goal of serving the school's faculty and students. Therefore, we have set the market to be limited to our school only. The targeted service scope includes but is not limited to all students, faculty, and staff of the school, extending to groups visiting the campus for academic or tourism purposes.

3.   Product Introduction

3.1.   Product Name and Product Logo

Product Name: Yueyun Life - Campus WeChat Service Mini Program

Product Logo: Comprising a cloud and the character "悦" (Yue) (see Figure 1), the product logo embodies the name "Yueyun Life." The transformation of the character "悦" conveys the idea that this mini program aims to bring the entire school community's campus life to the "cloud," symbolizing a wholesome and fulfilling experience. The logo emphasizes the mini program's mission to make campus life more convenient and user-friendly.

Figure 1: logo of mini program

3.2. Product Introduction

Product Design Philosophy Origin: Consider the following four common scenarios:

1. On the way to the campus as a new student, A asks, "Where is Building 2?" B responds, "You can use the campus navigation." A continues, "What is campus navigation?"

2. While tidying up unused items in the dorm, A remarks, "Ah, graduation is approaching, and many of the items I bought are still new. I can't take them home, but it's a waste to throw them away. What should I do?" B replies, "Don't you know we have a second-hand trading group, flea market group, and campus market? Quickly, let me recommend a few to you."

3. In the library, A complains, "It's troublesome to check my book borrowing information on the library website every time." B responds, "Why don't you use Enterprise WeChat to check? It not only allows you to view book borrowing information but also provides campus services like checking schedules and exam arrangements!" A says, "I'm already in my sophomore year and didn't know about this."

4. While playing with their phone, A says, "Ah, I have to download this and that for each day of school. If it's not following this group, it's following that group. If it's not following this mini program, it's following that mini program. It's a lot of effort, and it still doesn't achieve the university life I want. Without a phone, I can't even attend university. It would be great if all these troubles in campus life could be solved by following just one mini program."

Yes, **"It would be great if there's a mini program that can solve everything!"** We often encounter the above four scenarios, but is there always someone like B to answer questions and provide guidance? It's hard to know. The Yueyun Life mini program is born from many such troubling scenarios. We hope to replace many mini programs and service group chats with one mini program, making campus life more convenient. When faced with difficulties, we want everyone to think of the Yueyun Life mini program - **"In difficulties, Ask Yueyun for help."**

Innovative Product Features: The main functions of this mini program are divided into four points: Campus Encyclopedia, Campus Navigation, Buying and Selling Leasing, and Academic Exchange and Postgraduate Planning, catering to the needs of university students' study and life. When users enter the mini program, it will request access to the user's nickname, avatar, and region. After logging in, users need to complete personal information such as gender, university affiliation, student ID/employee ID, major, etc. Through the WeChat mini program, the developer management background can preliminarily design the program [2].

(1) New Student Services::Tailored for freshmen, teachers, or staff entering the school, we have designed the "Campus Encyclopedia" and "Campus Navigation" sections. The "Campus Encyclopedia" integrates various issues encountered by new students in recent years, such as campus history and maps. Users can also post questions online in the "Campus Encyclopedia" section. The "Campus Navigation" section primarily provides map functions and includes campus guidance to help new students better understand the school.

(2) Food Delivery Service: There are two types of food delivery platforms available to university students. One type is a mini-program that connects to campus cafeterias. However, these programs face the drawback that new students may not be familiar with them, indicating insufficient promotion and inconvenient program locations. On the other hand, though food delivery platforms like Meituan have a variety of food options and are widely accepted, they cannot provide on-campus delivery. This mini-program's food delivery function combines on-campus and off-campus platforms, allowing faculty and students to choose their preferred ordering channels, thus efficiently saving time when selecting meals.

(3) Resale and Rental of Idle Items: This service aligns with the call for energy conservation and emissions reduction. In the initial phase, we focus on the resale of second-hand books and bicycles,

addressing the issue of on-campus bicycles and electric bikes piling up after graduation and preventing a large number of books from being discarded as waste paper. In the second phase, we gradually extend to the transfer of other idle items and selectively advertise for some on-campus businesses. This will be the main revenue-generating component of our project. Compared to other similar platforms, we provide more guarantees for the quality and process of traded items, avoiding issues like not receiving goods after payment or not paying after receiving goods.

(4) Academic Exchange Service: This service caters to the fundamental needs of students. In this section, communication is the foundation. We will set up a discussion feature, similar to Zhihu. Students with questions can propose queries related to their studies, as well as inquiries about postgraduate studies, certifications, and more. In the first phase, we will create regular topic-driven activities. In the second phase, we will involve teachers to conduct offline lectures or online Q&A sessions. In the third phase, we will collaborate with external companies or organizations to provide job-seeking or internship information. This will expand students' avenues for knowledge acquisition, contribute to the realization of "Double First-Class" goals, and serve as one of our distinctive features in providing services to higher education institutions.

3.3. Product Advantages

Compared to existing mini programs, which mostly have single functionalities, and where students need to navigate to different mini programs or platforms for various aspects of campus life, Yueyun Life's greatest advantage lies in its centralized functionality. It consolidates services such as Campus Encyclopedia, Campus Navigation, Takeout Ordering, Buying and Selling Leasing, Academic Exchange, and Postgraduate Planning onto one platform. With just one mini program, all aspects of campus life can be taken into consideration, providing comprehensive services and enhancing the overall happiness and joy of campus life.

4. Page Design and Development Technology

4.1. Page Design

4.1.1. Home Page

On the home page, we have incorporated a campus image as the background, creating a sense of familiarity and belonging for teachers and students. Below the background, there are icons corresponding to eight functions: Campus Navigation, Takeout Ordering, Buying and Selling Leasing, Learning and Academic Exchange Platform, Joyful Campus, "Shan Da Campus Pass," "Intelligent Joy Campus," and "Smart Sports." Each icon represents a different function (details to be explained below). Beneath the function buttons, there is a section for campus news, providing real-time updates on important campus events. Finally, an advertisement section is placed at the bottom of the home page, showcasing selected ads beneficial to teachers and students. This not only allows users to obtain relevant information but also contributes to our revenue.

4.1.2. Campus Navigation

Upon entering the Campus Navigation function, three modules are visible: Campus Encyclopedia, Campus Introduction, and Campus Map. Clicking on the "Campus Encyclopedia" module provides information on the school's basic details, development history, and historical background, all officially provided by the school. Clicking on the "Campus Introduction" module displays detailed overviews of each campus, including the affiliated colleges, specific addresses, and other basic

information. Clicking on the "Campus Map" module prompts the selection of a campus, displaying the corresponding map based on the user's choice.

4.1.3. Takeout Ordering

After entering the Takeout Ordering function, users need to select the campus first. Two modules are then visible: On-Campus Ordering and Off-Campus Ordering. Clicking on the "On-Campus Ordering" module redirects to the on-campus ordering platform (not available for some campuses without corresponding services). Users can place orders after providing specific addresses. Clicking on the "Off-Campus Ordering" module redirects to the Meituan Takeout platform, allowing users to order food by providing specific addresses.

4.1.4. Buying and Selling Leasing

Upon entering the Buying and Selling Leasing function, users need to choose the campus first. Two modules are then visible: Buyer and Seller. Clicking on the "Buyer" module displays various second-hand items available at the user's campus, which can be filtered using the search bar. After selecting desired items, users can communicate with sellers. Clicking on the "Seller" module allows users to post their own second-hand items for sale with prices. In the chat interface, sellers can see inquiries from buyers and negotiate prices. In case of disputes over item quality post-purchase, a "judicator" approach is implemented. Five buyers and five sellers are randomly invited, and after both sides present their statements and upload evidence, a voting process begins, with the majority deciding the outcome.

4.1.5. Learning and Academic Exchange Platform

Upon entering the Learning and Academic Exchange Platform, three modules are visible: Learning Resource Sharing, Study Group Discussion, and Academic Paper Sharing. These modules function similarly to forums. Learning Resource Sharing Module: Users can share various learning resources such as course materials, e-books, and video tutorials. Resources can be categorized by subject area, difficulty level, etc., facilitating user searches and learning. Study Group Discussion Module: Users can create or join study groups based on interests, hobbies, or academic fields. Discussions and exchanges take place among group members, enhancing interaction, collaboration, and knowledge sharing. Academic Paper Sharing Module: The platform provides a function for sharing academic papers. Users can share outstanding papers they have read, promoting academic exchange and knowledge dissemination.

4.1.6. Joyful Campus

Upon entering the Joyful Campus function, users encounter a forum-like interface. At the top is a search bar for users to search for topics of interest. In the middle are push notifications for trending topics, which, when clicked, reveal the content and comments below. At the bottom is a menu bar with "Home," "Private Messages," and "Messages." "Home" corresponds to the first page introduced earlier, while "Private Messages" allows users to communicate privately with other campus users. "Messages" display system notifications for likes or comments on published topics or comments.

4.1.7. For the "Shan Da Campus Pass," "Intelligent Joy Campus," and "Smart Sports" functions

We mainly provide integrated services, linking these platforms to the "Yueyun Life" mini program platform. Users can simply click on the corresponding function without any additional steps, making

it convenient for teachers and students to use, avoiding difficulties such as "not finding it when needed" or "inconvenient operation when opened."

4.2. Development Technology

4.2.1. Commonly Used Compilation Languages and Their Introductions

In the process of mini-program development, three languages are utilized: wxss, wxml, and JavaScript.

WXML: WXML (WeiXin Markup Language) is a tag language developed by Tencent for the design of mini-program frameworks.

WXSS: WXSS (WeiXin Style Sheets) is a set of styling languages developed by Tencent, exclusive to WeChat mini-programs. It is similar to CSS in web development, possessing most of CSS's functionalities. Primarily used to describe the styling of WXML components, WXSS determines how WXML components should be displayed [3].

JavaScript: JavaScript (abbreviated as "JS") is a lightweight, interpreted, or just-in-time compiled programming language with a focus on functions. While renowned as a scripting language for developing web pages, JavaScript is also employed in many non-browser environments. JavaScript is based on prototype programming, a multi-paradigm dynamic scripting language supporting object-oriented, imperative, declarative, and functional programming paradigms. In this context, JavaScript is mainly used for the development of mini-program scripts [4].

5. Industry and Market Analysis

5.1. Market Outlook Analysis and Target Market

According to the survey results (Appendix 1), 48% of the students believe that campus service platforms are too singular, requiring repeated switching during use, while 38% find the platform settings cumbersome. Only 37% of students have encountered dormitory-based food delivery groups, and 47% are aware of the existence of campus navigation mini-programs. This indicates that the majority of students lack information sources. Even if they post information on campus market platforms, they may not necessarily reach the channels they need. Various platforms are responsible for different sections, leading to functional dispersion. Therefore, the introduction of a comprehensive mini-program platform is deemed necessary.

Regarding the launch of a comprehensive campus service mini-program, survey results show that over 55% of students are willing to use it. This indicates significant market demand for the launch of such a mini-program, which can greatly facilitate students' lives.

In summary, the WeChat mini-program of this project precisely addresses these market demands, creating a distinctive campus service mini-program that stands out and satisfies the needs of the target audience.

University students constitute the primary market for this mini-program, with nearly seventy thousand students in the university. The data is sourced from Shandong University's official website (data as of October 2021), demonstrating substantial market potential. This project serves as both an academic exchange platform and a provider of personalized services for Shandong University students.

5.2. SWOT Analysis

Table 1: SWOT Analysis Table

Strengths (S): Strong targeting, third-party platform, low cost, simple operation.	**Weaknesses (W):** Technical shortcomings and lack of operational experience.
Opportunities (O): Good market prospects.	**Threats (T):** Intense competition.

Strengths (S): Integrating multiple functions, better catering to the needs of Shandong University students; developing an app is challenging and more expensive, while choosing a WeChat mini-program can significantly reduce development costs; WeChat mini-program operation and maintenance are comparatively simple.

Weaknesses (W): Due to an imbalance in talent structure, there may be significant differences in marketing compared to other competitors.

Opportunities (O): The mini-program aligns with user needs, effectively meeting market demands. Additionally, compared to cumbersome apps, mini-programs are favored by a large user base due to their simple operation and no need for downloading and registration, indicating a promising market outlook.

Threats (T): Similar platforms already exist in the market, mostly developed by listed companies. Competitors have mature operational mechanisms, posing a potential threat [5].

6.   Future Planning

6.1. "Yueyun Life" Plus

Through continuous upgrades and replacements, the mini-program can be expanded in several directions, incorporating corresponding services. This represents the specific application of cutting-edge technology, which can strive to meet the needs of both teachers and students.

Intelligentization: The mini-program can integrate AI technologies such as voice assistants, smart reminders, personalized recommendations, etc., to assist users in more intelligent and convenient use. Shandong University is renowned for its beautiful campus, and we can offer campus scenic images as options for personalized settings. For instance, the user interface of the mini-program can be set with exclusive wallpapers featuring our university. Through AI analysis, combining personal preferences and interests, the mini-program can recommend corresponding elective courses, enabling students to flexibly choose courses aligned with their needs and interests.

Socialization: The mini-program can introduce richer social features, such as online gaming, team formation for games, meal appointments, online gatherings, etc., facilitating better communication, interaction, and socialization among students. As the epitome of youth and vitality, university students' preferences include social and entertainment needs. A well-designed mini-program should meet these demands, providing an excellent opportunity to attract more potential users.

Data Analysis: The mini-program can analyze teacher and student data, including course schedule usage, assignment completion, and student learning status. This analysis can assist schools and teachers in adjusting teaching methods and progress, thereby enhancing teaching quality and effectiveness.

Internet of Things (IoT): The mini-program can connect with campus IoT, incorporating features such as self-service book borrowing, smart access control, and intelligent classrooms. This enhances the user experience for students and teachers, improving the quality of campus life. For example, if the current library on the campus of Shandong University does not have a seat reservation function, students often face the challenge of finding a seat for studying. Similarly, borrowing books may

require multiple communications with teachers to obtain the desired books. Implementing campus IoT would provide significant convenience to teachers and students, reducing wait times.

Blockchain: The mini-program can apply blockchain technology to achieve functions such as course grade and credit certification, student attendance, educational certificates, etc. This facilitates more convenient management and certification of academic achievements for both students and teachers.

6.2. Market Expansion

Promotional Activities: Conduct promotional activities at school or educational exhibitions, introducing the features and advantages of the mini-program to students and teachers. Offer promotional strategies such as discounts or coupons upon registration to attract users. The discount activities can be coordinated with the school's cultural and creative product store, promoting both the campus's cultural and creative products and enhancing students' understanding of Shandong University.

User Feedback Optimization: Continuously conduct user feedback surveys and promptly respond to and address user feedback. Meet user needs and expectations, improve user satisfaction with the mini-program, thereby increasing user retention and word-of-mouth publicity to attract more users.

Partnership Promotion: Collaborate with schools, educational institutions, student organizations, etc., to promote the functionality and value of the mini-program. Provide the partner with certain student or technical resources, enabling them to help promote the mini-program, achieving a win-win situation.

Social Media Promotion: Post articles or advertisements on social media platforms to promote the features and characteristics of the mini-program, attracting user attention and downloads. Simultaneously, advertise the mini-program on Shandong University's official website to promote it to a wider audience, including students, faculty, and alumni, providing significant convenience.

Word-of-Mouth Marketing: Utilize user testimonials for promotion. By building a positive reputation, attract more users to download and use the mini-program. This emphasizes the importance of considering issues from the user's perspective during the development of the mini-program to achieve positive word-of-mouth marketing and have users help promote the mini-program.

6.3. Marketing Plan

6.3.1. Initial Stage

In the initial stage, the mini-program will be primarily launched as a trial at Shandong University. We will collaborate with some on-campus stores or cultural and creative product shops, followed by conducting surveys to assess satisfaction among teachers and students. Simultaneously, we will assess the revenue generated from transactions with on-campus stores. Multiple channels will be utilized to investigate the practicality and revenue performance of the mini-program. At this point, the mini-program is in the development, testing, and promotion phase, with simple functionality and a limited user base. In this phase, the mini-program needs to carve out its space in the market, enhance user stickiness and loyalty, and, through continuous optimization and improvement, make more users aware of and engage with the platform.

6.3.2. Growth Stage

Upon the successful trial at Shandong University, the mini-program will enter the growth stage, expanding its usage to other universities in Shandong. This is a crucial stage where, having collected information from Shandong University, we will now broaden our scope to gather data from other

universities in the province. Due to differences among students from various universities, surveys on satisfaction and revenue become vital. During this stage, the mini-program's features will be refined, the user base will grow, and user stickiness and retention rates will increase. The mini-program needs to continually gather feedback and conduct research on user needs, constantly improving the product and updating service content to provide users with more convenient, high-quality, and useful services, thereby solidifying its position in the market.

6.3.3. Mature Stage

The final stage for the mini-program is to become a universally applicable platform nationwide. By then, a comprehensive information collection system will be in place, assisting our team in rapidly collecting data from universities and users. Tailored template modules for different universities can be introduced to enhance the user experience. At this point, the mini-program should aim for the following goals on a technical level:

(1)Stable Growth in User Numbers with High Satisfaction: After a period of user accumulation, the user base should stabilize at a high level, and user satisfaction with the mini-program should be high.

(2)Stable Functionality and High User Habituation: With increasing use, the functionality of the mini-program should stabilize rather than frequently change. Users should have fully habituated to using the mini-program.

(3)Stable Economic Benefits: The developers need to analyze the business model and adjust strategies to ensure the mini-program consistently generates stable business revenue during its promotion.

(4)Strong User Stickiness and High Retention Rates: After some time of use, users should develop a certain stickiness to the mini-program, meaning they have a high frequency of use. The mini-program should have become an essential tool for users.

(5)Gradual Formation of Overall User Data Analysis: The mini-program should evolve into a data center role, providing intelligent assistance to the school through the collection and analysis of user data. For example, data collection and analysis can help the school understand its current status and trends comprehensively, aiding in better human resource management and decision-making.

7. Conclusion

The above constitutes the complete content of the design, development, and subsequent planning for the "Yueyun Life" campus service WeChat mini-program. In the future, with the continuous evolution of technology and the ongoing expansion of application scenarios, "Yueyun Life" will encounter both challenges and opportunities. The effective utilization of these opportunities and the adept handling of challenges promise long-term development. Therefore, it is imperative to remain vigilant across all aspects of development, continuously learn, and explore new technologies and methods. This approach aims to better meet user needs and enhance the quality of the application in order to stay abreast of the ever-changing landscape.

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