A PRELIMINARY DESIGN THINKING APPROACH TO REQUIREMENTS GATHERING FOR A MASTER'S ADMISSION INFORMATION MANAGEMENT SYSTEM: A CASE STUDY OF TOP FIVE UNIVERSITIES IN FUJIAN PROVINCE

Ying ZOU[1] and Panchit LONGPRADIT[2*]

1 Master of Educational Management (International Programme), Department of Education, Faculty of Social Sciences and Humanities, Mahidol University, Thailand; zoezou2021@163.com

2 Department of Education, Faculty of Social Sciences and Humanities, Mahidol University, Thailand; panchit.lon@mahidol.ac.th (Corresponding Author)

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ABSTRACT

This study aimed to investigate the current situation of master's degree admission and user requirements for the information management system by following the Empathize and Define stages of Design Thinking. Based on semi-structured interviews of qualitative design with 15 key informants, including students, admission staff, and tutors, an empathy map was created, and the functional and non-functional requirements were determined. The findings revealed that China's National Unified Entrance Examination for Master's Degrees was found to suffer from issues of unfairness and inefficiency, while the admissions information management system faces problems such as instability, inconvenient operation, and incomplete information. The contribution of this study relies on its suggestion for improving both the admissions test and the admissions information management system.

Keywords: Design Thinking, Chinese Master's Degree Admission, Admission Information Management System, Empathy Map

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INTRODUCTION

With the rapid pace of social and economic development and the increased demand for high-quality talents, the number of admission of master's degree students has been rising year by year (Yang, 2024). According to China Education Online, the number of applicants increased from 15.11 million in 2011 to 4.74 million in 2023 (China Education Online, n.d). Despite the progress of the admission system reform, there are still problems such as unequal power among enrollment subjects, excessive government intervention, and insufficiently scientific admission standards (Xiao, 2016; Ma, 2021). The enrollment system needs to be adjusted for fairness and efficiency, and the cooperation of the admission information management system is needed.

In addition, Liu et al. (2023) pointed out that admission information management faces the problems of complex data and irreversible policies, while traditional manual management methods are no longer applicable (Yang et al., 2019). The current admission system suffers from fragmented information, which causes candidates to miss important information (Liu, 2019). Therefore, there is a need to establish more user-friendly and effective information management systems that not only can help administrative staff but also support students in processes such as school selection and admission.

Design Thinking (DT) is a human-centered approach focusing on understanding users' needs and developing creative solutions through iterative design (Brown, 2009). It is typically divided into five phases. The first phase, *Empathize*, concerns understanding users. The second phase, *Define*, focuses on articulating users' needs and identifying key problems. *Ideate*, the third phase, encourages brainstorming a wide range of potential solutions. *Prototype*, the fourth phase, involves creating simplified versions of the proposed solution. Finally, the *Test* phase includes evaluating these prototypes with users to gather feedback and refine the solution. Based on the Empathize and Define stages of Design Thinking, this study investigated the current status of master's degree admission and user needs for information management systems in the top five universities in Fujian Province.

LITERATURE REVIEWS

This paper outlines three main areas of study that this research focuses on.

The Master's Degree Admission System in China

At present, China's master's degree admission methods mainly include the national unified examination, separate examination and the recommended exemption method. The national unified examination is the most significant admission method, accounting for more than 80% of admissions (Xue et al., 2022). There are some problems in the current admission process. These include regional disparities in recommended exemptions, information asymmetry, inconsistent examination difficulty, and weak supervision of the reexamination process (Xu, 2023). Candidates can only apply to one institution, and limited communication may result in high-scoring students being rejected. Additionally, variations in examination content and evaluation standards raise concerns about fairness (Li et al., 2023).

These challenges in China's admission system highlight the growing need for better policies and strategies to manage the increasing complexity of postgraduate enrollment.

Current Status of Information Management System for Chinese Master Degree Admission

One such response to these challenges has been the development of digital systems to support the admission process. Since China's Ministry of Education launched the online registration system for National Postgraduate Entrance Examination in 2005, it has helped alleviate pressure on the admission process, though there is still a need for a standardized admission system. The current system consists of platforms for information announcements, college administrative tasks, and dedicated admission processing (Wang, 2007).

The need for digital systems in postgraduate education has increased alongside the growing scale of student admissions. While two levels of postgraduate admission systems exist in China—the Information Management System for Postgraduate Admission of the China Research Recruitment Network (CRN), managed by China's Ministry of Education, and the graduate admission information management system developed by the universities themselves—these systems remain incomplete, with issues such as limited coverage of the full admission workflow and user interface problems (Liu et al., 2023).

Although these systems have improved operational efficiency, their limitations underscore the need for more user-centered approaches in managing postgraduate admissions.

Studies on Design Thinking

In educational contexts, design thinking has emerged as a promising approach to foster innovation and address complex challenges, including those found in higher education systems. Pan (2020) designed and implemented an AI course for elementary school students using the design thinking model, addressing current issues in AI education for young learners. Thakur et al. (2021) explored the use of rapid design thinking during the COVID-19 pandemic to create innovative solutions for challenges in medical education, while also identifying its limitations in modern health care and educational contexts. Lewrick et al. (2020) presented the results of a global survey, explaining the design thinking process and how it could foster cultural transformation within companies and beyond.

Bender-Salazar (2023) refined the design thinking process based on IDEO's Time Brown's key themes—*inspiration*, *ideation*, and *implementation*—creating a hybrid model by embedding learning and reflective practices into the framework. Baričević and Luić (2023) conducted a survey and experiment to assess the impact of learning the design thinking process on students' innovative thinking. Their study confirmed that active engagement with design thinking enhances students' ability to recognize innovation, conduct critical assessment, and fosters diverse approaches to thinking.

Drawing from these insights, this study adopts design thinking as a framework to explore new solutions for improving the master's degree admission system and information management system in China. However, this paper reports only the results of the Empathize and Define stages of design thinking process as a preliminary study.

RESEARCH METHODOLOGY

In order to investigate the current situation of master's degree admission and user requirements for information management systems, this study adopted a qualitative research design based on the Empathize and Define stages of the Design Thinking (DT) process. Semi-structured interviews were conducted with fifteen key informants. Although the sample size was relatively small, it was deemed sufficient to reach data saturation and to capture the perspectives of key stakeholder groups in the admission process, including students, tutors, and admission staff. This is consistent with the findings of Guest et al.'s study (2006), who suggested that 12 to 20 participants are often sufficient to achieve data saturation in qualitative interview studies. These key informants were selected through purposive sampling based on their direct experience with the master's admission process in China, either as applicants, university staff, or decision-makers involved in admissions. The research instrument was a semi-structured interview script, consisting of eleven questions, validated by three educational management experts, with an Index of Item-Objective Congruence (IOC) of 0.66 for each item, indicating acceptable content validity. The questions covered their personal experiences related to examinations or admissions (Q1-Q2), explored the current admission process for master's students in China (Q2-Q5), and gathered their views on the existing admission information management system, along with their suggestions for system improvement (Q6-Q11). The qualitative data collected from the interviews were analyzed using content analysis. All interviews were transcribed and

reviewed several times to ensure the researchers' familiarity with the data. Key points related to user experiences, problems, and needs were then coded and grouped into categories. Common patterns were identified as themes, which were used to create an empathy map. From these themes, both functional and non-functional requirements were defined, based on repeated ideas and user expectation. The outputs from this phase of study will be used as inputs for designing a prototype of an admission information management system, with the goal of improving admission practices in China's higher education.

RESEARCH RESULTS

This section presents the following findings.

Basic Personal Information

A total of 15 key informants were interviewed for this study, purposively sampled from the top five universities in Fujian (ABC Consulting, 2024). These included Xiamen University, Fuzhou University, Fujian Normal University, Huaqiao University, and Fujian Agriculture and Forestry University. Among the 15 key informants, 5 were teachers—4 were master's tutors who had not directly used the admission information management system, as their roles focused on academic duties. The other teacher, working in admissions, had experience using the system. Among the 10 student key informants, 9 had previously taken the Chinese National Unified Entrance Examination for Master's Degrees and used the admissions information management system, while the remaining student was preparing for the exam and had also used it to search for relevant information.

Perception of China's Unified Examination Policy for Master's Degree Students

This section summarizes key informants' perceptions of the current national unified examination for Chinese master's degree students. Table 1 presents these findings.

Table 1 Perception of the Key Informants on China's Unified Examination Policy for Master's Degree Students

Informants Questions	Students	Admission staff	Tutors
What are the current policies of unified postgraduate examination that need to be improved?	1) Only one school and one major can be applied for. 2) Optimize preliminary examination subjects by reducing rote memorization and focusing more on core knowledge, research skills, logical thinking, and communication 3) Marking standards vary across regions, especially in retest and scoring; greater consistency is needed 4) Strengthen examination supervision and prevent cheating in both the preliminary and retest stages to ensure fairness.	The time difference between the first-choice application and the adjustment process is not well managed.	The questions of the examination should be designed to be conducive to the selection of innovative talents, and to select individuals with real academic potential.

Regarding areas for improvement in the master's admissions process, students emphasized the limitations of being allowed to apply to only one school and one program, as well as concerns about examination content and scoring rubrics. Tutors highlighted the importance of assessment of applicant's competencies in the selection process. Admissions staff pointed out

the issue of time lag during the adjustment stage. Overall, key informants agreed that the admissions examination should be fairer and more efficient.

Survey Results on Information Management of Master's Degree Admission in China

This section summarizes the key informants' experiences, perceptions, and suggestions for improvement regarding the current master's degree admission information management system in China. The details are shown in Table 2.

Table 2 Survey Results on Information Management of Master's Degree Admission in China

Informants Questions	**Students**	**Staff**
What are the difficulties encountered by users when using Chinese master's admission information management system?	1) The system does not run smoothly on mobile; the interface is not adaptable. 2) The system often lags during peak hours. 3) The system is slow at peak times, requires strict file formats, and is complicated for first-time users. 4) Photo uploads are difficult; some are rejected for issues like ear positioning. 5) Too many pirated websites make it hard to find the official site, and application information there is often incomplete and time-consuming to access. 6) The system provides incomplete information, and it is hard to find institutions, bibliographies, or past admission ratios.	Admission Staff: The timing between the first-choice application and the adjustment is not well managed. Tutor: No direct use of the system.
Which of the following criteria do you think is (are) important characteristic(s) to include in the later stages of prototype design development?	Quality of Information: 9(60%) System Quality: 11(73.3%) Service Quality: 9(60%) User Satisfaction: 7(46.67%) Intention to Use: 7(46.67%); Net Benefit: 0(0%)	
In the existing Chinese master's admission information management system, what additional functions or services do you think are needed to improve efficiency?	1) The functions provided by the system need to cover the whole admission process. 2) At important time points, the system needs to have a reminder function. 3) Photo uploading and reviewing should be smooth. 4) The search function should be more user-friendly, refined, and convenient, with features that allow easier access to comprehensive information. 5) The system need to be stable. 6) The operation interface needs to be convenient and fast, the data should be reliable, and the system and performance should be stable. 7) The interface needs to be simple.	Admission Staff: Satisfied with the system; no further suggestions for the system improvement given Tutor: Do not use the system directly; only admission staff use it.
What suggestions do you have for improving the existing	1) A unified information interaction platform and coordination office platform is suggested between graduate admissions offices of	-

Informants Questions	Students	Staff
Chinese master's admission information management system?	universities, college admissions offices and candidates. 2) Add reminder functions such as email and message notifications. 3) Use AI to recommend suitable institutions and majors based on candidate profiles; add data analysis for past scores and competition ratios; and develop a mobile app for tracking applications and receiving notifications. 4) Open a column for candidate experience sharing and discussion, and another for tutors' responses.	

Regarding the Chinese Master's Degree Admission Information Management System, students reported problems of poor compatibility, lagging during peak times, difficulties in uploading photos, and a lack of complete official information. Admission staff also noted issues with time lags in the admission process. Tutors, on the other hand, did not comment, as they had not directly used the system. Students put forward user requirements such as smoother application and review process, more comprehensive search functions, enhanced system stability, and more user-friendly features such as AI support and a Q & A section. These improvements aim to enhance the efficiency and overall user experience of the system.

Empathy Map

The results gathered from the interviews are presented in an empathy map, as shown in Figure 1, which illustrates what users say, think, do, and feel regarding the current admission system. Users said that the current examination policy and information management systems had various limitations, such as limited choices, unclear processes, and technical issues. They thought both systems could be improved to be fairer, more efficient, and more intelligent. They reported searching for information across platforms, rechecking details, and struggling with unclear instructions. Emotionally, they felt stressed, confused, and unsure due to inconsistent scoring, operational issues, and lack of clear support. These findings help deepen the understanding of user needs and support the design of a more user-centered admission system.

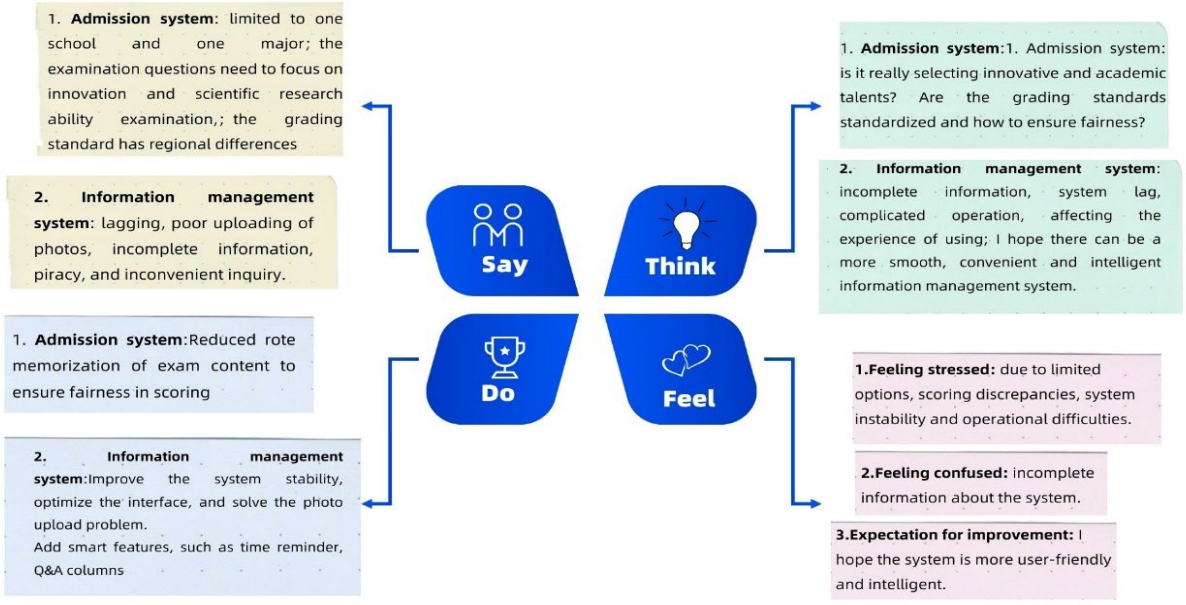

Figure 1 Empathy Map

User Requirements

The user requirements were synthesized from the interview results and the empathy, and are presented in Table 3. These are grouped into functional and non-functional requirements based on the needs expressed by the key informants.

Table 3 User Requirements for the Admission Information Management System

User Type	Requirement Type	Requirements
All	Non-functional requirements	- Stable system performance, even during peak times - Concise, time-saving interface to reduce user stress - Device adaptability (phones, tablets, computers
Staff	Functional requirements	- Ensure that there is no overlap in the timing of admission sessions
Student	Functional requirements	- Quick and convenient search function - Reminder alerts for important deadlines - Smooth photo uploading and reviewing

All in all, non-functional requirements focus on stable performance during peak times, a concise and time-saving interface, and device compatibility. For staff, a key functional need is to prevent overlaps in admission schedules. For students, main needs include fast search, reminder alerts, and smooth photo uploading and review. Overall, user experience is prioritized through reliable performance, a user-friendly design, and practical features that reduce stress and better support both staff and students**.**

DISCUSSION & CONCLUSION

This section presents the discussion and conclusion of the study.

Analysis of the Examination System

According to the interview findings, several issues were identified in China's National Unified Entrance Examination for Master's Degrees. Students, tutors, and admission staff shared concerns about fairness, efficiency, and the rigid structure of the system. A common complaint among students was the policy allowing only one university and one program application, which they felt limited opportunities and increased stress. This constraint also reduced flexibility for highly qualified candidates. Students further criticized the examination's reliance on rote memorization and suggested shifting toward assessments of core knowledge, research ability, logical thinking, and communication skills. Regional inconsistencies in scoring, particularly in subjective areas like essay writing, were also noted as a fairness concern. Tutors emphasized the need to identify students with real academic potential and innovation, rather than those skilled in memorization. Admission staff highlighted poor coordination between initial applications and the adjustment phase, which created workflow inefficiencies and uncertainty.

Taking these findings together, there is a clear need to include fairness and efficiency as main goals in reforming the examination system. Improving examination structure, updating content to reflect key competencies, strengthening scoring consistency, and enhancing process coordination may help build a more equitable and effective admission system. These findings align with earlier studies by Xu (2023) and Xue et al. (2022), which also highlight challenges in scoring consistency and examination fairness across region

Analysis of the Current Chinese Master's Degree Admission Information Management System

In addition to the examination system, key informants shared their experiences with the Chinese Master's Degree Admission Information Management System. Students reported several technical and usability problems, including unstable system performance during peak hours, difficulty accessing the platform via mobile devices, and complicated procedures for first-time users. Problems with photo uploads and incomplete information on official websites were also common. Students expressed frustration about pirated websites and the difficulty in finding important admission data. Staff members shared concerns about timing management between application and adjustment phases, while tutors had limited feedback since they do not use the system directly.

To develop a more user-friendly information management system, students suggested improvements such as intelligent search functions, reminder notifications, smoother uploads, and artificial intelligence features like Q&A support and personalized recommendations. They also recommended creating a centralized platform to better link universities' official admission systems. In response to these findings, the empathy map and the functional and non-functional user requirements were identified. All users emphasized the need for stable performance, a time-saving interface, and device adaptability. Staff users focused on avoiding scheduling conflicts, while students prioritized better search tools, deadline reminders, and ease of uploading. These results align with Liu et al. (2023) and Yang et al. (2019), who identified similar challenges in usability and system isolation.

Overall, this study concludes and recommends that improvements are needed in both the examination policy and the information management system. Users, especially students, are seeking a fairer and more efficient admission process, along with a more user-friendly system that reduces stress, improves accessibility, and supports tasks completion. Based on insights from the empathy map and interviews, practical suggestions include allowing applications to more than one institution, adopting competency-based assessments, and improving scoring consistency and supervision to promote fairness and transparency. For the information management system, recommended features include smarter search tools, personalized reminders, stable performance during peak times, and smoother uploads. Integrating AI functions like smart recommendations and Q&A, along with a centralized platform linking official university systems, would further enhance usability and improve access to reliable admission information.

The contribution of this work lies in its user-centered approach, using empathy mapping and interview data to generate practical recommendations for improving the fairness and efficiency of the admissions examination system, and for developing a more user-friendly information management system. Unlike previous studies that focused only on either policy or system design, this research highlights how examination reform and system development can work together to better support user needs and enhance the overall admission experience.

While purposive sampling offered valuable insights, it also limited generalizability. The next phases of the study will address this by including a broader participant group to capture more diverse perspectives using both qualitative and quantitative methods. The next stages—Ideate, Prototype, and Test—will begin with a diagrammatic design proposal, validated through a focus group with experts. A prototype system will then be developed and tested through a survey with 105 users to assess usability, relevance, and implementation potential. The final design can serve as a reference for commercial systems and be adapted by other provinces to improve admissions in higher education.

REFERENCES

ABC Consulting. (2024, January 2). *2024 ABC China University Ranking*. CNUR. Retrieved from https://www.cnur.com/rankings/1350.html

Akin, M. (2019). Cultural, social, emotional and cognitive aspects of corruption in Turkey. *Journal of Economy Culture and Society, 59*, 1-12.

Bender-Salazar, R. (2023). Design thinking as an effective method for problem-setting and need finding for entrepreneurial teams addressing wicked problems. *Journal of Innovation and Entrepreneurship, 12*(1), 24.

Baričević, M., & Luić, L. (2023). From active learning to innovative thinking: The influence of learning the design thinking process among students. *Education Sciences, 13*(5), 455.

Brown, T. (2009). *Change by design: How design thinking creates new alternatives for business and society*. Harvard Business Press.

China Education Online. (n.d.). *Home*. Retrieved from https://www.eol.cn.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods, 18*(1), 59-82.

Lederer, A. L., Maupin, D. J., Sena, M. P., & Zhuang, Y. (2000). The technology acceptance model and the World Wide Web. *Decision support systems, 29*(3), 269-282.

Lewrick, M., Link, P., & Leifer, L. (2020). *The design thinking toolbox: A guide to mastering the most popular and valuable innovation methods*. John Wiley & Sons.

Li, Y., Jiang, X., & Li, G. (2023). Construction of the enrollment model of "dual choice + national unified examination" for master's students. *Education and Examinations,* (6), 47-53.

Liu, X., Huang, J., Li, Z., Chen, T., & Yu, X. (2023). Research on new generation of postgraduate enrollment exam information management system: Taking Tsinghua University as an example. *Modern Education Technology, 39*(9), 110-117.

Liu, Y. (2019). *Research on the evaluation index system of postgraduate website from the perspective of users*. Master's thesis, Hebei University.

Ma, C. (2021). *Research on Chinese postgraduate enrollment system based on institutional vicissitude theory*. Master's thesis, Huanan Normal University.

Pan, J. (2020). *Design and implementation of design thinking (DT) based on artificial intelligence curriculum for elementary school students*. Master's thesis, Zhejiang University. China National Knowledge Infrastructure.

Thakur, A., Soklaridis, S., Crawford, A., Mulsant, B., & Sockalingam, S. (2021). Using rapid design thinking to overcome COVID-19 challenges in medical education. *Academic Medicine, 96*(1), 56-61.

Xiao, J. (2016). Transmutation and reform tendency of master's degree recruitment policy in the stage of massification. *Education and Examination,* (05), 77-80.

Xu, K. (2023). Research and suggestions on improving the master's degree admission management system from the perspective of educational equity. *China Construction Education,* (02), 126-131.

Xue, W., Zhang, H., Li, X., & Zhao, J. (2022). Study on problems of national postgraduate entrance examinations in China and the corresponding solutions. *Journal of Shijiazhuang Tiedao University (Social Science Edition), 22*(3), 104-110.

Wang, W. (2007). The establishment of information management platform for master's degree admission. *China Education Innovation Herald,* (16), 175-176.

Yang, J., Song, R., Lv, Y., Chen, P., & Pan, S. (2019). Brief probe into postgraduate enrolment work and information construction. *Education Modernization, 6*(18), 210-213.

Yang, L. (2024). Potential public opinion crises in master's admissions exams and response strategies. *Administrative Science Forum,* (05), 31-35.

Yang, H. D., & Yoo, Y. (2004). It's all about attitude: revisiting the technology acceptance model. *Decision support systems, 38*(1), 19-31.

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