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Research on the Design of Campus Wayfinding System

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Abstract: Campus signage systems provide essential functions such as wayfinding and information dissemination, while also playing a vital role in shaping campus culture, showcasing campus identity, and enhancing university recognition. Currently, some domestic university signage systems suffer from functional deficiencies and a weak expression of cultural connotations. This paper systematically investigates the current state of signage systems both domestically and internationally through literature and case study analysis. By analyzing exemplary signage designs from around the world and drawing upon their design principles and methodologies, a series of design principles for campus signage systems is summarized, thereby enriching the understanding of campus signage system design.

Keywords: Wayfinding system; Campus culture; Design principles

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1. Introduction

The rapid development of higher education has driven the continuous evolution of educational concepts, highlighting the dual attributes of campus wayfinding systems. Beyond their basic functions of direction and information conveyance, these systems serve as key representations of a university's image and campus culture. However, the existing wayfinding systems at some universities struggle to meet the diverse needs of students, faculty, and visitors, thereby impeding the sustainable development of campus culture. To address these issues, this study employs a comparative analysis of exemplary cases, both domestic and international, to formulate practical design principles for campus wayfinding systems. The aim is to enhance the positive impact of these systems on campus culture development and to strengthen universities' brand recognition and cultural competitiveness.

2. Relevant concepts

2.1. Campus culture

Campus culture gradually takes shape through a school's long-term education and teaching practices, encompassing spiritual, institutional, and behavioral dimensions. Spiritual culture forms the core of campus

culture, embodying the school's educational philosophy, academic atmosphere, values, traditions, customs, and the ideological awareness of its teachers and students. Institutional culture, primarily referring to the school's internal rules, regulations, and management systems, ensures the orderly execution of various activities. Behavioral culture manifests in student activities, campus lifestyles, and the daily behavioral norms and habits of teachers and students [1].

2.2. Campus wayfinding system

A wayfinding system serves as an information interface, mediating the relationship between people and their environment. It aims to facilitate the quick and accurate acquisition of necessary information within a specific environment through the transmission of visual, auditory, tactile, and other sensory cues, thereby optimizing space utilization and fostering a cultural atmosphere [2]. Campus wayfinding systems employ visual carriers such as text, graphics, and symbols, presented artistically, to provide visitors, teachers, and students with precise and readily understandable campus information, fulfilling both guidance and explanatory roles. Furthermore, they play a vital role in communicating campus identity, cultural essence, shaping the university's image, and enhancing its competitive edge.

3. Development and application of wayfinding systems

3.1. Current status of foreign campus wayfinding system design

The design of campus wayfinding systems abroad has evolved over centuries, its development closely intertwined with urban planning. Particularly in Europe and North America, these systems have moved beyond simply indicating directions. They now serve as a medium for disseminating campus cultural information, playing a significant role in promoting campus culture and establishing the university's brand [3]. For instance, MIT's "MIT Mobile" application provides real-time navigation and conveys the university's commitment to technological innovation through its interface design. Research indicates that wayfinding system design in foreign universities is characterized by the following: (1) Consistency between the wayfinding system and spatial narrative: Many foreign university campuses are integrated into the urban fabric. Consequently, the wayfinding system is not merely an appendage to the campus environment but a crucial element of the overall architectural style and landscape design [4]. Therefore, wayfinding design in foreign universities is consistent with architectural planning and design, exhibiting strong integrity. (2) Richness of cultural expression: Wayfinding systems now serve as a key means of conveying campus culture and spirit. Universities leverage different design styles, concepts, and forms, based on their brand image, to highlight unique aspects of their culture. (3) Innovation and humanization of digital wayfinding: Mature digital wayfinding systems widely incorporate new technologies like digital signage and AR, focusing on a user-centered approach.

3.2. Current status of campus wayfinding system design in China

The development of campus wayfinding system design in China lags behind that of European and American countries. Driven by globalization and modernization, an increasing number of universities are focusing on enhancing campus environments and incorporating humanistic considerations, leading to the rapid development and increased importance of campus wayfinding system design. However, the current state of campus wayfinding systems in China is generally poor, characterized by weak functionality, incomplete systems, a lack of standards and norms, ambiguous signage, monotonous designs, and insufficient representation of campus identity [5].

Campus wayfinding systems are currently transitioning from simply fulfilling basic functions to incorporating intelligence and humanistic elements, but several problems persist: (1) Lack of cultural characteristics: Currently, most universities fail to conduct thorough research into regional and campus culture, resulting in designs that either do not integrate cultural characteristics or only pay lip service to them. (2) Unclear wayfinding information and a lack of humanistic care are prevalent issues. Currently, many universities suffer from ambiguous wayfinding information with unclear directions. Directional signs and maps are often not intuitive enough, which can easily cause confusion [6]. Secondly, insufficient internationalization, manifested in limited or inappropriate language support, makes navigation inconvenient for international faculty and students. In addition, barrier-free design is often lacking; for example, Braille and voice interaction systems are not provided. (3) A low level of intelligence is also apparent: Many campus wayfinding systems are currently lagging behind in technology and have not been updated with digital technologies in a timely manner, resulting in a poor interactive experience.

3.3. Case study of wayfinding system design

3.3.1. Okayama University co-creation and sharing space

The wayfinding system for Okayama University's Co-creation and Sharing Space (**Figure 1**) establishes a campus wayfinding system of paradigmatic significance through in-depth cultural gene translation and artistic experimentation. It exemplifies the Japanese design philosophy of prioritizing detail and a human-centered approach. The signage's form draws inspiration from the lines of the school's iconic buildings and incorporates the school emblem's primary color, subtly conveying the campus culture. Local wood, a material characteristic of the region, was chosen to showcase the charm of the local culture. Moreover, the system employs concise graphics and text, utilizes internationally recognized symbols, and incorporates multilingual signage to ensure clear and easily understandable information, thereby enhancing the wayfinding system's overall recognizability.

Figure 1. Wayfinding system of the Co-Creation and Sharing Space at Okayama University, Japan

3.3.2. University of Technology Sydney

The wayfinding system at the University of Technology Sydney (UTS) has evolved beyond basic navigation, serving as a vital tool for spatial governance and cultural communication. To combat campus dispersion and enhance spatial connectivity, UTS has implemented an intelligent wayfinding system that spans both indoor and outdoor environments. This system utilizes a five-tiered guidance architecture—comprising campus overviews, area identification, building identification, floor directories, and functional space signage—to create a progressive information hierarchy, effectively uniting the previously disparate 13 campuses into a cohesive

whole. Furthermore, students can scan QR codes located in corridors to generate navigation routes on their mobile devices, thereby minimizing the time required to navigate complex pathways (**Figure 2**).

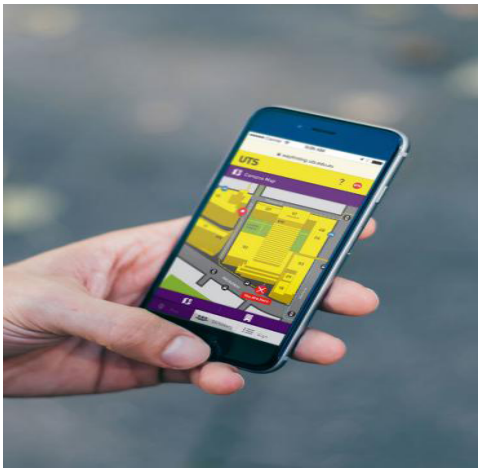

Figure 2. Mobile navigation interface

4. Design principles of campus wayfinding systems

Campus wayfinding systems are designed to guide people quickly and accurately to their destinations within the campus environment through visual elements and information delivery. They also aim to enhance the campus's overall cultural image and operational efficiency. Designs should harmonize with the campus environment, demonstrate humanistic care, and express the campus's spirit and culture. They must encompass all functional areas of the school and cater to the needs of diverse user groups. Therefore, the design of campus wayfinding systems should adhere to the following principles.

4.1. Systematic design principle

Since the beginning of the 21st century, wayfinding systems have evolved from traditional designs to technologically advanced systems. This shift has transformed the single, traditional function of wayfinding into a diversified, standardized, environmentally friendly, and intelligent high-tech information system [7]. The University of Technology Sydney, for example, successfully integrated its dispersed campuses through a five-level guidance architecture in its intelligent wayfinding system, exemplifying systematic design thinking. Designers are required to conduct thorough research on the campus environment, analyze road networks and traffic flow, and integrate information logically. Overall planning should be achieved in the design phase to establish a complete, standardized, and coordinated visual information system.

4.2. Humanized design principle

A humanized design concept is an essential principle in contemporary social development. Campus wayfinding systems serve all teachers, students, staff, and visitors. Therefore, designers must conduct specific analyses based on factors such as age, height, vision, and cultural background to accommodate different user groups. Ergonomic scales should be considered, with particular attention paid to the elderly and people with disabilities. Appropriate accessible wayfinding systems should be integrated into the design to foster effective communication between the

environment and users, reflecting a campus image of humanistic care. The rationality of nighttime lighting should also be considered in the wayfinding system to ensure clear identification at night.

4.3. Principles of identifiability design

A wayfinding system's functionality must be clear and unambiguous. As the most basic function of a campus wayfinding system is identification and guidance, it must be highly identifiable. Factors such as its location, size, shape, color, and materials must be carefully considered to enable users to accurately identify and remember information quickly, even in complex environments. Therefore, the design of the wayfinding system should be simple and clear, with prominent placement, avoiding complex patterns and colors. The visual information should be easily understood and recognized, ensuring the accuracy and intuitiveness of the information conveyed.

4.4. Principles of cultural design

Wayfinding systems are not merely functional tools; they also serve as carriers of campus spirit and culture. They can promote campus culture, enhance the cultural identity of teachers and students, and showcase the campus's cultural image and connotations to the public. When designing these systems, regional cultural characteristics and the campus's cultural connotations should be specifically analyzed. Campus culture can then be interpreted through visual elements such as text, graphics, logos, and colors to create a positive learning atmosphere [8]. Furthermore, the design should be consistent with the campus's architectural environment and maintain harmony and unity with the campus's cultural atmosphere. In this way, wayfinding systems can convey more cultural information, enhancing the campus's cultural value and competitiveness.

4.5. Principles of artistic design

The architectural and artistic style of a campus directly reflects its spiritual and cultural characteristics. Therefore, as a medium for expressing campus culture, the wayfinding system should possess artistic qualities that embody the campus's unique cultural identity and satisfy users' aesthetic preferences. Designers should carefully consider the shapes, colors, and materials to ensure the wayfinding system is not only functional but also enhances the campus's aesthetic appeal. The selection of elements such as location, form, scale, color, material, graphics, and text should harmonize with the campus's overall image and architectural style. Furthermore, visual impact can be amplified through graphic symbols and layout design, enriching the campus's artistic atmosphere [9].

4.6. Digitalization design principles

With the development of digital technology, traditional static signage is no longer sufficient to meet the demands, and digital wayfinding systems have emerged as a trend. To facilitate smoother communication between faculty, students, visitors, and the campus environment, digital wayfinding systems should integrate user needs with available technologies to create intelligent and user-friendly experiences [10]. Functional design should clearly define target user groups and usage scenarios, and should support features such as map visualization and intelligent route planning. The interface design should be clear, concise, and consistent with campus cultural characteristics, with a focus on interactive experience, in order to construct an open and shared digital wayfinding system that enhances the campus image and service levels.

5. Conclusion

From the perspectives of cultural expression and functional requirements, this paper explores the dual functions of campus wayfinding systems in cultural communication and spatial cognition. Through an analysis of exemplary cases both domestically and internationally, it proposes the principles of systematic information integration, humanization with a focus on diverse user needs, identifiability to ensure clear and easily distinguishable guidance, cultural integration of regional and campus elements, artistic coordination with the campus aesthetic, and digitalization to promote intelligent development. The aim is to address the functional and cultural deficiencies often found in campus wayfinding systems. However, this study is limited by the geographical scope of its case samples and a lack of empirical validation for the theoretical framework. Future research will broaden the case selection, incorporate a more comprehensive study of cultural diversity, deepen practical verification to bridge the gap between theory and practice, and ultimately foster the continued advancement of campus wayfinding system design.

Disclosure statement

The author declares no conflict of interest.

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