Highlights in Art and Design
ISSN: 2957-8787 | Vol. 11, No. 3, 2025

Research Strategies for Age-Friendly Museum Exhibition Navigation Systems

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Abstract: With the world entering an aging society, the cultural needs of the elderly are becoming increasingly important. Museums, as key platforms for public cultural services, face the challenge of adapting to these needs by providing age-friendly services. This paper explores the physiological and psychological characteristics of elderly visitors, examines the shortcomings of current museum navigation systems, and proposes age-friendly design strategies that focus on accessibility, ease of operation, and personalized experiences.

Keywords: Age-Friendly Design; Navigation Systems; Museums; Elderly; Exhibition Experience.

1. Introduction

Since the late 20th century, the world has experienced rapid aging. According to the United Nations' 'World Population Prospects 2019,' by 2050, the global population aged 65 and older will account for 16% of the total population, with a significant increase in elderly populations in developing countries. In China, the aging phenomenon is particularly pronounced. According to data from the National Bureau of Statistics, the population aged 60 and above now accounts for 18.1% of the total population, and this percentage is expected to continue rising in the coming decades. [1] The arrival of an aging society has led to a growing demand for elderly people's participation in social activities and cultural experiences. As an important cultural dissemination platform, museums are facing the urgent issue of providing adequate services to elderly groups.

2. Characteristics of Elderly Groups and Age-Friendly Needs

2.1. Physiological Characteristics and Needs of the Elderly

With the increase in age, elderly people typically face vision and hearing deterioration, reduced physical mobility, and memory decline. These characteristics place higher demands on the design of age-friendly museum navigation systems. For example, the deterioration of vision may make it difficult for elderly visitors to read exhibition labels, and hearing loss may affect their ability to hear audio guides. Therefore, museums need to consider providing large-font maps and exhibition descriptions, using high-contrast color schemes, and incorporating volume control or auxiliary hearing devices for audio guides. For visitors with limited mobility, museums should ensure that all exhibition areas have accessible pathways, wide aisles, and appropriate seating in rest areas.

2.2. Psychological and Cultural Participation Needs of the Elderly

Elderly people often have a deep emotional connection to history and cultural heritage, and museums can meet this emotional need by curating exhibitions related to their life experiences. Furthermore, elderly people have a strong social need, and museums can foster this by organizing lectures, interactive workshops, or interest groups to enhance their sense of social participation and belonging. Therefore, museums should not only provide physical facilities but also offer cultural activities that fulfill elderly people's psychological and social needs.

2.3. Information Access and Service Support Needs

Elderly individuals often prefer traditional ways of accessing information, such as printed materials. Although modern digital navigation systems offer convenience, they can also increase operational difficulty, particularly for elderly visitors who are unfamiliar with smart devices. Therefore, when designing navigation systems, museums should balance traditional and modern service methods by providing both printed exhibition handbooks and easy-to-use electronic interfaces. This ensures that elderly visitors can choose the method that best suits their preferences.

3. Current Status and Challenges of Museum Navigation Systems

3.1. Overview of Current Museum Navigation Systems

At present, museum navigation systems include various methods such as human-guided tours, self-service navigation devices, and intelligent navigation systems. Human-guided services provide direct interaction, but the service time and coverage are limited. Self-service navigation devices and intelligent systems, using technologies like RFID and QR codes, provide flexible and convenient navigation, especially for elderly visitors through voice and mobile phone guides. However, these technologies also present challenges such as complex operations and device incompatibility, which hinder their use by some elderly visitors.

3.2. Major Challenges Faced by Elderly Visitors

Despite the potential of intelligent navigation systems in providing personalized services, their complex interfaces and the high level of technical knowledge required remain

obstacles for elderly visitors. The digital divide is particularly prominent among the elderly population, and many elderly visitors are not familiar with smart devices, making it difficult for them to use these systems. Furthermore, many museums' navigation facilities have not adequately considered the needs of elderly visitors, particularly in terms of lighting, seating arrangements, and accessible pathways.[2]

4. Key Points of Age-Friendly Design for Museum Navigation Systems

4.1. Ease of Operation

The design of navigation systems should ensure that interfaces are simple and intuitive, with easily readable fonts and appropriate font sizes. Operation buttons should be highly contrasted to facilitate easy recognition and accurate operation. In addition to traditional touchscreen interaction, other modes of interaction, such as voice commands and gesture recognition, should be introduced to allow elderly visitors to choose the most convenient operation method according to their habits.

4.2. System Consistency and Compatibility

Museum navigation systems should ensure uniformity and compatibility between new and old facilities. All museum facilities, including electronic devices, signage, and seating, should adhere to a consistent design style and operational logic. Ensuring compatibility between new and old systems reduces the adaptation cost for elderly visitors unfamiliar with new equipment. Furthermore, various system modules should connect seamlessly to ensure continuity and consistency in information delivery.[3]

4.3. Attention to Special Needs

When designing museum navigation systems, particular attention should be paid to the special needs of elderly visitors. For example, to accommodate visual and hearing impairments, the system should provide voice navigation. Additionally, portable magnifiers or reading glasses should be made available to help elderly visitors clearly read exhibition labels. Museums should also design rest areas that are strategically located with comfortable seating, allowing elderly visitors to take breaks as needed.

5. Age-Friendly Design Strategies for Museum Navigation Systems

5.1. Text and Signage Design

In the strategy section of the age-friendly museum design, attention should first be given to the design of texts and signage, ensuring that elderly visitors can easily read and understand the displayed information. To accommodate the gradually declining vision of older adults, museum text design should use clear, simple sans-serif fonts, and ensure that the font size is large enough, with high contrast color schemes between text and background to enhance readability. In addition, signage should avoid using overly complex language and should incorporate intuitive symbols and icons to quickly convey information. For technical terms or unfamiliar expressions, pinyin annotations or simple explanations should be provided to help elderly visitors understand more easily.

5.2. Lighting and Illumination Design

Lighting design also plays an essential role in age-friendly museum design. As elderly visitors experience vision decline, museums should adopt soft, even lighting while avoiding strong or direct light that may cause discomfort. At the same time, it is important to ensure key areas and exhibits receive focused lighting so elderly visitors can clearly view the exhibits and information. The lighting design should also consider adjustability to accommodate different visitors' needs and varying environmental conditions. Proper lighting can not only reduce eye strain but also enhance the museum atmosphere, making the space more welcoming and accessible.

5.3. Navigation System and Accessibility Design

The design of the museum navigation system should comprehensively consider accessibility and the specific needs of elderly visitors. By using high-contrast directional signage, large font exhibit information, and clear indicators, museums can effectively guide elderly visitors within the premises. Voice-guided tours and tactile navigation technologies will significantly enhance the experience for visually impaired elderly visitors, while smart devices and touchscreens can help elderly visitors easily access and understand the exhibits. All paths and exhibition areas should be designed with accessibility in mind, providing wheelchair-friendly routes, rest areas, and seating spaces to ensure elderly visitors are comfortable throughout their visit.

5.4. Auxiliary Equipment and Services

Regarding auxiliary devices and services, museums should provide various devices, such as voice guides, portable magnifiers, and hearing aids, to meet the visual, auditory, and mobility needs of elderly visitors. Additionally, museums can offer personalized services, such as reservation-based tours or private guides, to ensure elderly visitors receive more attentive and exclusive services. These measures not only enhance elderly visitors' experience but also make them feel respected and cared for within the museum. Thoughtfully designed rest areas with comfortable seating should be strategically placed throughout the museum, allowing elderly visitors to take breaks when needed.

With technological advancements, age-friendly museum design should also keep up with the times by integrating modern interactive technologies. Augmented Reality (AR) and Virtual Reality (VR) technologies will offer elderly visitors more dynamic and immersive exhibit experiences. These technologies will especially benefit elderly visitors with physical limitations, allowing them to interact with cultural and historical exhibits through virtual environments, gaining a greater sense of participation and immersion. The use of AI-powered systems and mobile applications can offer personalized, real-time recommendations and interactive guidance to further improve the experience for elderly visitors.

6. Conclusion

Age-friendly design in museum navigation systems is not only a reflection of technological progress but also an expression of respect and care for elderly visitors. By optimizing the design to improve ease of use, comfort, and intelligence, museums can offer a better experience for elderly visitors and encourage greater cultural participation.

The society as a whole should pay attention to the age-friendly design of museums, ensuring cultural services are accessible and inclusive to all, and fostering a stronger sense of community and belonging for elderly populations.

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