

Research on the Reconstruction and Expansion of Public Library Spaces Based on User Experience

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ABSTRACT

With the advancement of the times, traditional public library spaces are unable to fully meet modern readers' diverse and high-quality demands for cultural learning and exchange. Against this backdrop, the concept of "user experience" offers a meaningful perspective for the innovation and transformation of public library spaces to address the emerging demands. This paper proposes several approaches for the reconstruction and expansion of public library spaces across three dimensions: sensory experience, interactive experience, and emotional experience. Combined with existing cutting-edge and classic cases in China, the paper aims to provide meaningful reference for the transformation and upgrading of modern public libraries and for the research and practice of modern public cultural services.

KEYWORDS

Public library spaces; Reconstruction and expansion; User experience

1 Introduction

Public libraries, as institutions safeguarding citizens' fundamental cultural rights and enhancing citizens' scientific and cultural literacy, shoulder the responsibility of disseminating cultural knowledge and conducting social education to the public. *The 14th Five-Year Plan for the Development of the Public Cultural Service System (2021)* issued by the Ministry of Culture and Tourism of China proposes that to build people-centered public libraries and promote the transformation and upgrading of public library functions. By optimizing the library environment and functions, expanding and deepening library service innovation, and exploring and innovating operating models for basic-level libraries, the *Plan* aims to establish modern libraries that are open, intelligent, inclusive, and shared.

Based on the *Plan*, provinces and municipalities have successively introduced corresponding local regulations. Represented by Shanghai and Jiangsu, the regulations on the one hand emphasize utilizing modern information technology to advance digital, networked and intelligent development, establish smart libraries and enhance online service capabilities, so as to meet readers' demands in the digital age. On the other hand, they place significant emphasis on improving the inclusiveness and equality of services, safeguarding the reading rights of all members of the public, and providing more user-friendly and equitable services (*Jiangsu Provincial Public Library Regulations, 2025; Shanghai Public Library Regulations, 2024*).

2 Problems and Challenges for Traditional Public Library Spaces

Space constitutes a vital foundation for public libraries to conduct activities and provide services. A well-designed spatial experience enables readers to enjoy knowledge and information services with greater pleasure, effectively improving their satisfaction (Wu et al., 2024).

Traditional public library spaces mainly comprise functional spaces such as book storage areas, reading areas, and lending areas, supplemented by ancillary spaces like lecture halls and exhibition rooms. The spatial forms often exhibit monotonous and similar, primarily designed to fulfil basic practical functions. The supporting facilities are often simplistic and inadequate, lacking user-friendly design and sufficient interactivity.

With the advancement of the times and the evolving demands of readers, traditional public library spaces are increasingly unable to fully meet modern readers' diverse, personalized, high-quality demands for cultural learning and exchange. New methods and approaches are urgently needed to foster the innovation and transformation of public library spaces in order to address emerging requirements and challenges.

3 User Experience Perspective

Against this backdrop, the concept of "user experience" offers a meaningful perspective and direction for the reconstruction and expansion of public library spaces to meet readers' evolving demands.

User experience, also called "customer experience" in the commercial field and abbreviated as "UX" in the digital

domain, is commonly defined as person's perceptions and responses resulting from the engagement/use of a product, system or service (Pine & Gilmore, 1998, 2013). It is considered to be personal and subjective, and its responses involve cognitive, emotional, behavioral, sensorial, and social level (Weidig et al., 2024). Within the context of the "experience economy" (Pine & Gilmore, 1998, 2011), the design of user experience—a human-centered approach to innovation—makes rich, engaging and profound perceptions and impressions for users/customers through enriching experiential formats, creating experiential activities and innovating experiential modes. It provides a meaningful perspective for developing innovative and differentiated solutions in various fields, not only in commercial sector but also in social service sector.

Integrating the idea of user experience with the reconstruction and expansion of public library spaces can uncover richer, more diverse and innovative design directions and elements, significantly enhancing modern readers' positive feelings and responses of cultural learning and exchange. By focusing on readers' needs for the public learning context, to create a range of targeted experiential formats, activities and modes centering on the environments, functions, and services of the library, continuously supplementing and refining the extended and specialized functions and evolving the library into a cultural destination that everyone aspires to visit.

4 Pathways for the Reconstruction and Expansion of Public Library Spaces Based on User Experience

User experience encompasses multiple dimensions. Three important dimensions are widely applied and highly valued: (1) sensory experience based on five-sense (visual, auditory, olfactory, tactile, gustatory) cues or stimuli; (2) interactive experience based on interactions between humans and environmental media; and (3) emotional experience based on affective arousal and affective empathy. The shaping of these three forms of experience offers valuable directions for the reconstruction and expansion of public library spaces, promoting the innovation, transformation and upgrading of modern public libraries.

4.1 The Reconstruction and Expansion Based on Sensory Experience

4.1.1 Aesthetics-oriented Sensory Experience

The reconstruction and expansion of public library spaces can be approached through a perspective of aesthetics-oriented sensory experience, transforming the library from a serious information warehouse into a visually pleasing aesthetic field.

Specifically, in terms of site selection, selecting locations with scenic natural or urban landscapes. This ensures that readers, from the moment they enter the library or the moment when gazing out of windows during breaks, are treated to pleasant scenery that delight their eyes. Take Qinhuangdao's Seaside Library for instance: the introduction of the grand ocean view brings the library with a stunning beauty that draws countless readers to experience it specifically.

In terms of spatial form and layout, creating varied and novel spatial volumes or rhythmically arranged spatial composition, to break away from monotonous spatial forms and infuse spaces with vitality and readers with inspiration. Taking Tianjin Binhai Library as an example: its unique and imaginative spatial image, composed of a series of winding and twisting "mountains of books", offers readers a refreshing and memorable spatial impression.

In terms of spatial elements, emphasizing the expressive power of architectural aesthetics and focusing on the harmonious combinations of spatial shape, color, texture, light and shadow. By employing elegant shapes (such as gentle curved lines), decorating with textured materials and soft colors, pairing with graceful furnishings and accessories, as well as incorporating lively natural light and shadow, a pleasant and comfortable learning environment can be jointly created. Take Beijing Liyuan Library for instance: it features rustic tree branches as exterior features, cozy-toned and warm-textured cedar panels as interior finishes, and beautiful outdoor scenery and dappled natural light as spatial embellishments, collectively cultivating an elegant reading atmosphere in the mountains.

Through visual pathways, the library can be transformed into an aesthetically pleasing "urban garden", ensuring each visit for readers becomes a delightful and profound aesthetic practice.

4.1.2 Multi-sensory Experience

The reconstruction and expansion of public library spaces can transcend the consistent visual paradigm of the "silent book repository", evolving the library into a vivid multi-sensory field that activates readers' diverse senses.

On the visual level, beyond environmental aesthetics, various display forms such as printed graphics, digital screens, digital projections and art installations can be integrated to create rich, dynamic and diverse visualsapes that fully engage the visual sense. On the auditory level, soundscape spaces equipped with professional acoustic systems can be established, flexibly providing white noise, natural sounds, or contextualized audio in non-quiet areas (e.g. public areas, themed sections, exhibition halls, and experience zones) to achieve readers' immersion and relaxation. On the tactile

level, hapticscape—such as interactive exhibits, touchable replicas of cultural relics, as well as natural elements like plants, rocks and water flows—can be incorporated to enrich physical engagement. On the olfactory level, smellscape with odor and scent components can be subtly integrated—for example, pairing specific reading zones with delicate fragrances to soothe and relax readers while enhancing their scene memory.

By comprehensively integrating multi-sensory cues into library spaces, the traditional learning and exchange environment can be transformed into a vivid setting that can be seen, heard, touched, and smelled, leaving readers with a profound impression and lasting memory. For instance, the themed sections within Shanghai Library East—including the Music Section, Design Section, Performing Arts Section, Frontier Technology Section, and Future Reading Experience Section—employ diverse sensory formats such as audiovisual displays, art performances, custom lighting, theme music, and interactive facilities to cultivate multi-sensory themed spaces that bring readers fresh and vivid feelings.

4.2 The Reconstruction and Expansion Based on Interactive Experience

4.2.1 Human-machine Interactive Experience

The reconstruction and expansion of public library spaces can be implemented by deeply integrating technological achievements to construct human-machine interaction experiences, in which readers' interests can be stimulated, their curiosity can be sparked, and their thinking can be invigorated.

At the foundational service level, deploying intelligent book sorting robots, 24-hour self-service book lockers for lending and return, and virtual navigation systems to deliver efficient, autonomous and engaging service processes for readers and liberate staff from repetitive tasks. Examples include the virtual robot assistants at Shanghai Library East enabling consultation, retrieval and guidance, alongside its intelligent bookshelves enabling real-time queries, location tracking, access to reading information, and book borrowing and returning.

At the deep interaction level, creating dedicated immersive interactive spaces (such as VR reading zones or "immersive caves") so as to transform static knowledge into accessible and operable virtual world, enabling readers to explore historical scenes or scientific principles through embodied experience. Take the AR Digital Experience Centre of Inner Mongolia Library, for instance: readers can immerse themselves in the scene of "Space" or "Animal Kingdom" to explore the scientific knowledge. Similarly, the Future Reading Hall of Guangzhou Library employs VR headsets to enable young readers to wander within themed scenes such as Sanxingdui culture, underwater cities, Mars, pyramids, and dinosaurs. Additionally, large interactive digital walls and smart desktops can be introduced to transform library collections, local historical documents, scientific and cultural knowledge, and traditional cultural activities (e. g. Chinese Weiqi and calligraphy) into visual dynamic diagrams or interface games, supporting multiple users exploring through gesture-based interaction.

At the creativity generation level, maker tools such as 3D printing, augmented reality books, and music composition studios (as seen in Shanghai Library East) can be integrated to encourage readers to convert abstract knowledge into tangible models, participate in narrative storytelling, or complete creative music works, thereby evolving readers from information consumers into content creators.

Through the establishment of these three levels of interaction, the library can be evolved from a static knowledge repository into a human-machine collaborative laboratory that supports independent exploration, deep cognition, and creative practice.

4.2.2 Human-to-Human Interactive Experience

The reconstruction and expansion of public library spaces can transform the library from a quiet, individual reading space into a "social interaction container" that stimulates readers' communication, interaction and connection. The core lies in innovating spatial functions to actively promote the flow and collision of knowledge, ideas, and emotions among readers.

Within the library spaces, setting up open "discussion islands" around themed book zones, alongside separate "study hubs" facilitating group collaboration, to provide venues and opportunities for knowledge sharing and in-depth discussions among readers. Take Shanghai Library East, for instance: it features study rooms equipped with basic discussion and learning facilities on each floor, accommodating three or more group members for collaborative learning, discussion and intellectual exchange. Meanwhile, developing diverse public forum spaces, including open-plan stepped seatings with a simple stage and creative workshops suitable for book clubs and handicraft activities, to form interactive places which can effectively gather communities with shared interests. For example, the reading promotion zone of Shanghai Library East frequently hosts new book launches and drama sharing sessions, bringing numerous reading and theatre enthusiasts together for lively interaction and exchange.

Moreover, co-creation projects such as digitizing community archives, documenting local stories can be designed and organized, elevating reader engagement from personal conversations to collective and valuable knowledge-creation activities.

Ultimately, the library can be transformed into a vibrant marketplace of ideas, where its values lie not merely in its book collections but in every dialogue, every connection, and every shared creation—redefining its significance as a new socially-based learning setting.

4.3 The Reconstruction and Expansion Based on Emotional Experience

4.3.1 Narrative Themed Spaces and Emotional Immersion

The reconstruction and expansion of public library spaces can be achieved through the creation of themed, narrative settings. This approach makes the library a touching and interesting setting that can tell stories, immerse mind and evoke inner emotional resonance, guiding readers from visual information input towards emotional engagement with the context.

Specifically, by focusing on constructing storyline around thematic vocabulary and integrating relevant books, documents, audiovisual resources, and other scenario-based design elements, a themed and narrative-driven setting can be created to tell a touching story, which departs from the conventional document display and classification. For example, a themed zone on "Urban Memories" could employ projected old photographs, old objects, and corresponding historical documents to construct a tangible temporal space, enabling readers to "step into" history. Meanwhile, vivid and rich exhibition formats and techniques—such as incorporating dramatic lighting, soundscape narratives (e. g. period background audio), and guided tour route—can be employed to strengthen immersion and narrative pacing of the story. Take Shanghai Library East, for instance: its themed sections periodically host various reading-recommendation themed exhibitions, such as the "Art of Peking Opera" exhibition in the Performing Arts Section, the "Timeless Moments within the Gramophone" exhibition in the Music Section, and the "Art of Crafting: Birds and Animals on Earth" exhibition in the Design Section. Furthermore, numerous interactive forms, such as puzzle-solving games and audio-visual appreciation, can also be introduced to allow readers to become part of the storytelling.

Ultimately, the library can be evolved into a hub for fascinating cultural stories, a place where themed, narrative experiences are created to deepen readers' immersion of mind and awaken their emotional connections.

4.3.2 Regional Cultural Spaces and Sense of Belonging

The reconstruction and expansion of public library spaces can be realized by deeply root in local culture and evoke readers' deep sense of self-identity and belonging, transforming the library into a "spiritual homeland" that carries local cultural heritage and collective memories.

In terms of spatial design, regional images can be actively incorporated, such as employing typical cultural symbols and distinctive local materials, or artistically presenting local dialects and proverbs on walls. For instance, the Suzhou Library (Renmin Road Branch) adopts the highly representative local architectural style of Jiangnan gardens as its primary aesthetic foundation. With white walls, gray tiles, moon gates, lattice windows, as well as classical pavilions and corridors, it fully embodies the local charm of the Jiangnan region. Furthermore, it features carvings of calligraphy and paintings by Suzhou's renowned artists throughout history, reflecting the city's rich cultural heritage, its abundance of talents, and its prosperous cultural landscape.

In terms of functional design, beyond standard reading areas, specialized spaces for regional culture can be created—such as dedicated rooms or shelves for local authors and local historical archives, and dedicated display corners for local intangible cultural heritage crafts—making local knowledge accessible and deeply valued.

Moreover, through encouraging and organizing local residents to donate historical objects, host local art exhibitions, or co-create "city story walls", the library can be evolved into an open cultural platform of the city, converting traditional static, library-led displays into dynamic, community-authored city narratives.

Through such measures, the library can be transformed into a spiritual harbor that unites collective sentiment, strengthens cultural confidence, and enables every reader to find their cultural coordinates.

4.3.3 Family Reading, Peer Exchange, and Emotional Healing

The reconstruction and expansion of public library spaces can be approached through creating emotional healing environments that promote warm interpersonal companionship and interaction, transforming the library into an "emotional bond" that supports emotional connection and emotional comfort.

In spatial design, creating flexible and friendly reading settings to transcend the traditional form of reading alone and maintaining silence. On the one hand, family reading zones equipped with children's picture books and comfortable furnishings can be established, permitting children and their parents to read together and converse softly. Through shared reading among family members, these spaces foster mutual companionship and healing, offering precious emotional comfort to both children and adults. For instance, Tianjin Binhai Library operates family reading areas to provide dedicated venues and services for family members to read together. On the other hand, shared social spaces like salon corners for reading and sharing can be established to facilitate pleasant exchanges among friends and friendly

acquaintances among strangers. These spaces use books as media, offering new places for friends to get-together or go for a relax, while offering opportunities for like-minded strangers to establish connections. Through warm-hearted communications and interactions, stress and loneliness can be gradually released and hearts can be imperceptibly comforted and healed.

Through these designs, the library can transcend its fundamental function as a reading and learning base and become a warm corner that carries family affection, strengthens friendship, and fosters kindness among strangers.

4.3.4 Care, Inclusivity, and Vulnerable Groups

From the perspective of vulnerable groups such as the elderly, the infirm, the disabled, and pregnant women, the reconstruction and expansion of public library spaces can be guided towards creating humanistic care environments. The design should actively eliminate both physical and psychological barriers for vulnerable groups, thereby achieving profound care and inclusivity for them.

In terms of accessibility facilities, ancillary facilities such as Braille guides, smart visual aids, and hearing loop systems can be provided for people with disabilities to ensure spatial accessibility and friendliness. Meanwhile, low-stimulus "silent pods" with safe and protective atmosphere can be set up for individuals with cognitive disorders (such as those with autism) to ensure that they have a proper reading place.

In terms of functional design, dedicated spaces can be created for different vulnerable groups, such as: accessible reading rooms equipped with specialized reading devices for the visually impaired; intergenerational learning corners stocked with books and collections spanning generations for urban seniors and young children; and baby care rooms furnished with comprehensive facilities for parents with infants. For instance, Shanghai Library East incorporates dedicated care spaces like accessible reading rooms, children's reading areas, pushchair parking points, and emergency treatment rooms.

Furthermore, by organizing workshops, service and support activities (such as reading training and salons) tailored for vulnerable groups, the library can be shaped into an "active enabler" for social support and integration. For instance, Shanghai Library East conducts diverse participatory experiential activities for disabled readers (such as equal and comfortable engagement with the touchable painting exhibition) to enhance their sense of social participation and self-worth. Meanwhile, it also organizes experiential activities for non-disabled individuals—such as guiding them to participate in "Braille engraving" and "sign language workshop"—to foster understanding and empathy towards disabled communities among the public.

These designs represent not merely an expansion of physical space, but an elevation of public service ethos. They ensure that every vulnerable reader is seen, respected and empowered, thereby enhancing their emotional value and social participation.

5 Conclusion

The reconstruction and expansion of public library spaces is endeavoring to evolve the library from a static repository of knowledge towards a dynamic, composite, human-centered experiential setting. Based on user experience, flexible, diverse, convenient, and user-friendly designs are created to enhance readers' sensory pleasure, interactive engagement, and emotional comfort. Moving forward, the reconstruction and expansion of public library spaces will start with more precise and thoughtful user experience, deeply integrating environmental aesthetics, scientific technology, and humanistic care, to transform the library into an urban symbiotic platform that fosters learning, exchange, and emotional connection, continually expanding the values of modern public cultural services.

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