Developments and Reflections on University Library Space Redesign: Postprint

Authors: Wang Yu, Che Baojing, Liu Sisi

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Abstract

[目的/意义] The spatial renovation of university libraries in China is burgeoning. This study investigates the current state of spatial renovation, analyzes existing problems, and summarizes experiences, aiming to provide references for library spatial renovation and promote its sound development.

[方法/过程] Based on investigations into spatial renovation across various types of university libraries, this paper summarizes and analyzes the current status and problems of spatial renovation, and proposes considerations regarding the philosophy, objectives, purpose, and cultural enhancement for its future development.

[结果/结论] Spatial renovation and services should select appropriate models based on the actual conditions of each university, thereby promoting the sound development and continuous innovation of university library spatial renovation.

Full Text

Preamble

Wang Yu, Che Baojing, Liu Sisi
Shenyang Normal University Library, Shenyang 110034

Abstract

[**Purpose/Significance**] The space reconstruction of university libraries in China is currently in the ascendant. This study investigates the status of space reconstruction, analyzes existing problems, and summarizes experiences, aiming to provide references for library space reconstruction and promote its sound development. [**Method/Process**] Based on investigations of various types of university library space reconstructions, this paper summarizes and analyzes the current status and problems of space reconstruction, and proposes thoughts on

future development regarding concepts, goals, purposes, and cultural enhancement. [**Result/Conclusion**] Space reconstruction and services should select appropriate models according to the actual conditions of each university to promote the sound development and continuous innovation of university library space reconstruction.

Keywords: university library; space reconstruction; sound development; transformation; innovation

With the rapid development of information technologies such as mobile internet and the Internet of Things, reader demands have become increasingly personalized and diversified, posing challenges to traditional library service models. Librarians have proactively adapted to social, cultural, and educational developments by making bold attempts at library space reconstruction and service innovation, integrating and innovating both physical and virtual spaces. This has become a hot topic and important initiative for service transformation in university libraries, developing rapidly in various forms. Through investigation of the current status of university library space reconstruction in China, this paper summarizes and organizes relevant theories and practices to provide reference and inspiration for university library space reconstruction, promoting its transformation and upgrading.

1. Overview of University Library Space Reconstruction Research

In recent years, theoretical and practical research on library space reconstruction has increased annually. Domestic conferences and journals have organized special discussions, such as the "Library Space Reconstruction Special Issue" in *Shanghai University Library and Information Service Research* (2016, Issue 1), which effectively promoted the in-depth development of university library space reconstruction.

1.1 Theoretical Research on Space Reconstruction

To comprehensively understand the domestic research status of library space reconstruction, the authors used CNKI as the data source, limiting document types to journals, dissertations, and conference papers, and conducted a subject search, obtaining 218 documents, with 191 valid documents after screening. Domestic research on library space reconstruction began in 2006, developed slowly, and saw significant growth in published literature by 2012. After 2013, it showed rapid growth, reaching 77 papers in 2017. Through analysis, theoretical research on space reconstruction mainly focuses on the following aspects:

First, the background and trends of library space reconstruction. Industry professionals believe that university library space reconstruction initially concentrated in some large foreign libraries. Against the backdrop of information technology development, library spatial services have been reshaped [1], and

constructing more shared spaces and small discussion rooms will be important work for university library development [2].

Second, library space functions and layout. Xiao Long proposed that new university library spaces should open up spatial service areas, emphasizing the construction of diversified and composite spaces. Yang Wenjian et al. suggested that libraries should allocate space according to optimal service effectiveness, following modular design principles and personalized principles.

Third, case studies of library space reconstruction. Bie Liqian analyzed the characteristics and future development trends of library space transformation using the University of California Library as an example. Zhang Yilong elaborated in detail on the concepts and practices of transforming the Scott Library at York University in Canada into a learning commons.

Fourth, library space reconstruction and service transformation. Zhang Xiao studied the reconstruction and services of library maker spaces from three perspectives: cognitive, planning, and practical [3]. Yan Chunyan demonstrated the significance of library service transformation and proposed adhering to innovative development and building maker centers.

Fifth, evaluation research on library space reconstruction. Zheng Lin introduced how the University of Dayton Library conducted space services through space assessment as a means. Dong Guohua conducted field research at Northeastern University Library, analyzing and summarizing the current status and theoretical framework of space reconstruction evaluation systems [4]. Currently, theoretical research on space reconstruction is becoming increasingly in-depth.

1.2 Practical Investigation of Space Reconstruction

To understand and grasp the practice of university library space reconstruction, this study conducted research investigations. The research methods included network surveys, field visits, case studies, and literature analysis of domestic library space reconstruction. The study also drew on space syntax and Jan Gehl's PSPL survey methods [5] to conduct in-depth investigation and analysis, 梳理 relevant domestic research on space reconstruction in recent years, and understand the current status of university library space reconstruction to provide references for future theoretical research and practical work in China.

The investigation selected 985 university libraries, 211 university libraries, some ordinary university libraries, higher vocational college libraries, and university libraries in Hong Kong, Macao, and Taiwan as research objects. The survey content focused on typical cases of domestic university library space reconstruction, investigating representative spaces after reconstruction, including whether space reconstruction was conducted, reconstruction forms (renovation and new construction), and reconstruction models, as well as funding sources, space layout and positioning, reader needs, operation and management models, and usage effect evaluation. Space reconstruction is a complex process, and China's

university library space reconstruction is still in the exploratory stage overall, with many problems needing resolution. Through specific research, this study summarizes experiences, identifies problems, and attempts to propose corresponding countermeasures, hoping to provide references for China's university library space reconstruction practice and thereby enhance attention to library space value and the necessity of space reconstruction, promoting service transformation and innovation.

2. Analysis of Survey Data on University Library Space Reconstruction

With the convening of various theoretical seminars on library space reconstruction, the concept has been gradually widely accepted by university libraries, and reconstruction projects have been increasing. According to incomplete statistics, space reconstruction has been practiced in various types of university libraries in China (see Table 1).

2.1 Origins of Space Reconstruction Transformation

In 1992, the construction and use of the "Information Arcade" at the University of Iowa Library became the world's earliest space transformation and information commons (IC) benchmark. In 1999, the IC space at the University of North Carolina Library opened, and D.R. Beagle, the IC space director, first proposed the concept of IC space. In 2006, Beagle further pointed out that a well-functioning IC space should consist of three parts: physical space, virtual space, and cultural space. Physical space includes computer hardware, furniture, and traditional library collections; virtual space includes digital collections, online tools, e-learning tools, and portals; cultural space includes environments for learning, discussion, tutoring, and collaborative research [6]. The information commons (IC) was accepted and popularized by libraries in North America, Canada, the UK, and other countries, quickly spreading to South Korea, Singapore, China, and other regions.

China's university library space reconstruction began earliest in some universities in Hong Kong and Taiwan, quickly spreading to mainland China and being accepted and rapidly developed by some innovative libraries. Initially, it evolved from integrating stacks and reading rooms toward large circulation and open-shelf reading, then to information commons, and subsequently from information commons to learning commons (LC). Some libraries directly established learning commons in one step. In 2004, some university libraries in Hong Kong began researching and introducing the IC concept. The University of Hong Kong Library created an information commons to meet readers' needs for independent and collaborative learning. In 2005, Taiwan Normal University Library established the "SMILE" multi-learning area, the first attempt by Taiwan libraries in the IC field, achieving good results. In 2006, the Integrated Technology Workshop of Hong Kong University of Science and Technology Library was

completed. In 2007, the multimedia commons at Peking University Library was completed, followed by Tsinghua University, Fudan University, Shanghai Jiao Tong University, and other university libraries' ICs. Thereafter, various types of space reconstruction gradually began in domestic libraries. After Premier Li Keqiang proposed the "Mass Entrepreneurship and Innovation" strategy at the Summer Davos Forum in September 2014, libraries began constructing maker spaces to support "mass entrepreneurship and innovation," such as Shanghai Jiao Tong University Library and Wuhan University Library. In 2017, scholars proposed the concept of "active learning space" [7], pointing out new development ideas and directions for university library space reconstruction.

2.2 Statistics on Space Reconstruction Quantity

With the progress of the times, traditional library space layouts no longer meet reader needs. Readers not only borrow books and study in the library but increasingly need good spatial environments for learning research, discussion and exchange, practical experience, and innovative development. To realize the people-oriented service concept, a transformation of library physical space has quietly emerged worldwide.

The highest space reconstruction rate is in university libraries in Hong Kong, Macao, and Taiwan, with nearly 70% having undergone reconstruction. As pioneers in China's cultural and educational development, they accept new library concepts much earlier than mainland China. The space reconstruction rate for 985 key university libraries reaches 60%, with libraries such as Tsinghua University, Peking University, and Wuhan University having advanced concepts and early action, serving as benchmarks for domestic university library development. The rate for 211 key university libraries is close to 50%. Among ordinary university libraries, those in economically developed regions can keep pace with the times, while those in backward and remote areas are less optimistic, with some university and higher vocational college libraries still having no space reconstruction. Undoubtedly, reconstructed spaces and their services promote library function expansion, new technology application, reading promotion, cross-boundary cooperation, and other transformation and upgrading efforts, meeting various reader needs and achieving good results.

2.3 Statistics on Space Reconstruction Models

The rise and spread of the first space reconstruction in the United States promoted university library space reconstruction, with diverse space forms but basically moving toward the information commons (IC) model. In April 2005, at the 12th National Conference of the Association of College and Research Libraries, the topic of how to further transform and upgrade from the original "information commons (IC)" to "learning commons (LC)" was proposed. After more than ten years of evolution, university library spaces at home and abroad have experienced continuous innovation. From the perspective of spatial form, information commons (IC), learning commons (LC), knowledge commons (KC), research

commons (RC), and maker spaces have been successively constructed in university libraries, forming a continuously developing and innovative situation [8]. From the perspective of construction methods: first, demolishing and renovating old library spaces, such as Peking University Library and Shenyang Normal University Library, whose space reconstruction achieved integration of old and new, giving deeper spatial value to old buildings. Second, cross-boundary cooperation in building new spaces, such as the "SJTU-JD Maker Space" jointly built by Shanghai Jiao Tong University Library and JD.com, providing space guarantees for student makers. Third, constructing learning spaces in new buildings. Statistics show that from 2005 to 2015, 16 new library buildings were constructed in Shanghai universities. These new buildings changed the traditional layout dominated by stacks and reading rooms [9], keeping pace with the times to construct new service spaces such as information spaces and learning discussion spaces. It is evident that China's university library space reconstruction continues to advance with the times (see Table 2). Although space names continuously evolve and innovate with different forms and connotations, the most important aspects are the reconstruction concept and the goal of service enhancement.

2.4 Distinctions Among Various Space Models

Among the new library reconstruction space models, forms are diverse, service functions vary, and they continuously develop, change, and upgrade. The common feature of all models is the reconstruction and transformation of traditional library space layouts to achieve innovative space service transformation. The distinctions among various space models are: First, information commons (IC) includes reference consultation, printing services, general technical assistance, professional technical help, training courses, software training, writing guidance, research consultation, presentation preparation, academic assistance, statistical consultation, and other services, with librarians as the main body, emphasizing information sharing and transmission. Second, learning commons (LC) focuses on reader learning services, self-management skills (learning lectures, exam preparation, critical reading, teamwork, self-management, etc.), teacher teaching services, instructional design, teaching strategies, providing course management software, digital technology and software, group learning projects, etc., supporting challenging course learning. With readers as the main body, it emphasizes transforming learning methods from knowledge transmission to active learning and knowledge creation, promoting collaborative learning through various effective means, and shifting libraries from places providing materials to places for exchanging ideas. Third, maker spaces provide readers with creative tools, resources, and spaces, bringing together people with common goals to learn, communicate, and create, achieving knowledge learning and innovation in practice, with makers as the main body, emphasizing the improvement of practical abilities [10]. All spaces should reflect the cultivation of readers' active abilities. Their function is to attract, mobilize, and promote readers to actively, consciously, and proactively discuss problems, solve problems, and create products, implementing the principle of "teaching one to fish"

through spatial activities for practical application.

2.5 Problems in Space Reconstruction

The survey shows that key university libraries such as Tsinghua University Library, Wuhan University Library, Peking University Library, and Shanghai Jiao Tong University Library have clear cognition, advanced concepts, and positive attitudes toward space reconstruction, striving to achieve complete or partial transformation and playing good roles. Space reconstruction in ordinary university libraries is slow or unplanned, mainly due to: First, constraints from school leaders' cognition levels. Library construction investment is determined by the university's overall planning. School leaders' cognition determines its rise and fall. If school leaders lack motivation and willingness for space reconstruction, library space reconstruction will be hindered. Second, lack of funding constrains space reconstruction. University library funding mainly comes from school appropriations. Facing costly space reconstruction requiring additional special appropriations and subsequent operation and maintenance funds, the difficulty is immense. Funding shortage is the most important factor constraining space reconstruction. Third, space planning hinders space reconstruction. Space reconstruction requires readjusting library layout and business functions, needing overall planning, rearrangement, massive integration and relocation, and construction, which is cumbersome and complex and will affect normal services. Without proper demonstration and arrangement, it is difficult to proceed. Fourth, scarce human resources delay space reconstruction. Reconstructed space models are challenging work for most librarians. Most libraries are constrained by their own capabilities, lacking excellent personnel to support the realization and sustainable development of new space functions. Thus, scarce human resources have become another important factor delaying space reconstruction. Fifth, lack of policy support affects space reconstruction. China's Public Library Law and Regulations for Ordinary University Libraries have no explicit provisions on space reconstruction. The concept of "rethinking library space" has begun only under foreign influence, transformation development impetus, and librarians' professional awareness. Although the concept of space reconstruction is generally accepted by university libraries, policy support is still lacking.

3. Thoughts on Future Development of University Library Space Reconstruction

The survey analysis shows that the status of university library space reconstruction in China is uneven and varied, which is natural for the times. Space reconstruction has become an inevitable choice in the development process of university libraries. To promote extensive and in-depth expansion of space reconstruction, sound enhancement and optimized operation of space services, this paper proposes five thoughts on future library space reconstruction.

3.1 Reader-Centered Approach in Space Reconstruction

Currently, some libraries still maintain a library-centered approach, 固守 simple borrowing and returning services passively. This situation urgently needs to be broken to establish reader-centered interactive collaborative learning spaces. Space reconstruction is a complex project. Heidi Card believes that libraries are not only places to search for and find information but also places to share information, emphasizing that libraries should transform their management and service concepts [7]. University library space reconstruction should be goal-oriented to meet learners' needs, with the starting point of maximizing satisfaction of reader demands. Space services should be committed to learner communication, interaction, and collaboration, without deviating from the reader-centered theme and foundation. Before space reconstruction, libraries should conduct investigations to fully understand reader needs, combine them with the university's educational characteristics, and accurately grasp and formulate the services and functions provided by the space. For example, the Qian Xuesen Library at Xi'an Jiaotong University has formed diversified spaces through reconstruction, prioritizing the transformation of spaces with good views, lighting, and ventilation into social and cultural display spaces for reader learning, communication, and discussion, achieving the transformation from book-centered spaces to people-centered spaces [11].

3.2 Deep Service Enhancement as the Purpose of Space Reconstruction

Space reconstruction is not just the process of changing large reading rooms into small reading rooms or learning rooms but more importantly endowing new spaces with diversified functions. It should be formed by spatial environment, advanced equipment, quality resources, and high-quality librarians to provide quality deep services, enabling reconstructed spaces to fully play new service roles. The survey shows that most reconstructed spaces integrate learning support connotations, providing deep services around spatial resources and technical elements, which are welcomed and highly evaluated by readers. First, learning support services. New spaces have multiple functions, maintaining regular reading promotion activities while developing services supporting learning such as information resource navigation, thesis writing guidance, research topic services, study information push, and project tracking analysis, developing and guiding readers' initiative, innovation, and exploratory learning methods and spirits. Second, personalized customization services. Relying on reconstructed spaces to establish personalized recommendation system frameworks, tracking readers' learning behavior trajectories and literature search information, applying big data methods to determine readers' learning habits and needs, and then carrying out personalized recommendations and targeted customized services based on dynamic accurate profiling, such as information promotion services, intelligent guidance services, and subject services. Third, innovative experience services. The survey shows that nearly 30 university libraries have built

maker spaces, enabling learning experiences of new technologies, equipment, and environments through spaces, and providing innovative experience service platforms around knowledge discussion, exchange and sharing, creative support, achievement display, and social contact, enhancing readers' practical abilities and knowledge innovation.

3.3 Promoting Active Learning as the Goal of Space Reconstruction

Regardless of form, layout, function, and service, university library space reconstruction should focus on cultivating readers' active comprehensive literacy as its main purpose. Active learning has been used in curricula by most European science universities, with Delft University of Technology being a typical case of using active learning methodology to promote innovation [13]. More than half of Japanese universities have established active learning spaces and included active learning in teaching outlines to cultivate college students' active learning literacy and research abilities. Active learning space does not refer to a specific space name but means that all reconstructed spaces have the function of cultivating readers' initiative, featuring diversity, openness, accessibility, and innovation. Space services emphasize promoting active learning, collaborative learning, interactive learning, and problem-based learning (PBL) [7]. Active learning space activities can cultivate independent learning, support individual exploration, cultivate cognitive styles, inspire research and creation, and develop leadership abilities, leading and stimulating the coordination, initiative, independence, and innovation of learning. Services can adopt customized, community-based, intelligent, and cross-disciplinary approaches focusing on learning and research, enhancing the effectiveness of space services and cultivating innovative talents. Active learning space should become the guiding ideology for space reconstruction and is currently the latest and most effective service model.

3.4 Integration of Physical and Virtual Spaces in Reconstruction

Physical space reconstruction in libraries should form a systematic layout structure. In design and planning, factors such as reader types, learning modes and needs, and behavioral patterns should be fully considered to construct comfortable spaces with accurate functional positioning, scientific and rational layout, and complete resource services, helping to enhance readers' learning abilities and innovative consciousness. Virtual space is the network environment where readers conduct independent learning, exchange and sharing, and knowledge sharing. Starting from reader needs, massive network information resources should be organized and made orderly to increase attention. New media technologies such as WeChat and QQ should be used to construct virtual space services, establishing virtual learning communities and virtual subject exchange platforms such as blogs and wikis to provide timely targeted guidance and help for readers. Readers with common goals but different professional backgrounds should be gathered on one platform to achieve online exchange and learning among readers and between readers and librarians. For example, Shanghai Jiao

Tong University Library's IC innovation service model takes "subject service" as the main line, introducing a new "innovation community" service concept on the basis of emphasizing learning-supporting "information commons." Space reconstruction should deeply integrate physical space, virtual space, and cultural activities, ensuring both physical and virtual capabilities, combining online and offline services, expanding service channels, providing precise services, and improving service effectiveness. For readers, they can fully enjoy the library's new services, enhancing their stickiness to learning spaces and promoting conscious learning, independent thinking, exchange and collaboration, and cultivating innovative thinking [12].

3.5 Leading Campus Culture Enhancement Through Space Reconstruction

University libraries are important carriers of campus culture construction and main venues for improving students' cultural literacy. In space reconstruction, attention should be paid to cultural environment construction and atmosphere creation. Space planning and design should be guided by the guiding ideology of campus culture construction, integrating the soul of campus culture and reflecting campus cultural elements. On the one hand, library space is a campus cultural space that should reflect the school's characteristic cultural resources, such as integrating the university's educational philosophy, motto, emblem, and anthem into library space design, endowing space areas with profound cultural connotations, highlighting the educational concept of environmental education, making library space services become cultural activities for cultivating students' quality and platforms for college students to improve their cultural literacy and communication abilities. On the other hand, the concept of space reconstruction should aim at people's all-round development, creating a positive, harmonious, and free cultural atmosphere, focusing on cultivating college students' correct values, moral awareness, and team spirit [14]. For example, Chongqing University Library has transformed its space into diversified spaces with a Republic of China style, excavating school history and culture, establishing the Chongqing University Library Collection, and creating a classical humanities and art-themed reading room—Boya Academy, recommending classic books and guiding reading, making the soft environment of spaces full of humanistic atmosphere become a driver for leading campus culture enhancement [15].

Space reconstruction is the best way to promote the transformation and innovation of university library services. Many university libraries are continuously practicing and exploring the development and innovation of space service connotations. With changes in the external situation, the expansion of library functions and enrichment of functions require libraries to provide open, flexible, comfortable, and diverse experience spaces to meet readers' learning, discussion, sharing, and innovation needs in different contexts. Libraries are growing organisms that must keep pace with the times. Librarians should overcome fear of difficulties, conservative traditions, and the fluke mind of standing still. Space

reconstruction transformation is imperative—those with conditions should reconstruct, and those without conditions should create conditions to reconstruct. Reconstruction brings vitality, and excellent space environments can better play the role of libraries as the second classroom.

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Author Contributions

Wang Yu: Conceived research ideas and outline; wrote and revised the paper.
Che Baojing: Wrote and revised the paper.
Liu Sisi: Collected and organized materials; proofread the draft.

Note: Figure translations are in progress. See original paper for figures.