Knowledge is the Beginning of Action, and Action is the Completion of Knowledge: Meng Liansheng's Research and Practice in Resource Construction and Information Retrieval (Postprint)

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Abstract

[Purpose/Significance] To systematically review Mr. Meng Liansheng's research achievements in resource construction and literature information retrieval, revisit his practical experiences in this field, and demonstrate the dedication and exploratory spirit of the older generation of library and information science scholars. [Method/Process] Employing the literature survey method combined with personal interviews to analyze Mr. Meng's research achievements and working manuscripts, summarizing from two aspects: resource construction and information retrieval. [Results/Conclusion] Mr. Meng's research draws on the strengths of diverse sources, encompassing not only abundant theoretical research achievements but also substantial practical experience in database construction at the Chinese Academy of Sciences and NSTL, thereby realizing the integration of theory and practice. He explored the characteristics and methods of information retrieval and digital resources serving users, enriching the theoretical research and practical system of resource construction and information retrieval.

Full Text

Preamble

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Knowledge Is the Beginning of Action, and Action Is the Completion of Knowledge—Meng Liansheng's Research and Practice in Resource Construction and Information Retrieval

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Abstract:
[Purpose/Significance] This paper reviews Mr. Meng Liansheng's research achievements in resource construction and literature information retrieval, recounts his practical experience in this field, and demonstrates the striving and pioneering spirit of the older generation of library and information science scholars. [Method/Process] Through literature research combined with interviews, this study analyzes Mr. Meng's research results and working manuscripts, summarizing his contributions from two aspects: resource construction and information retrieval. [Result/Conclusion] Mr. Meng's research draws widely from various sources, yielding not only abundant theoretical research outcomes but also rich practical experience in database construction at the Chinese Academy of Sciences and NSTL, thereby achieving the integration of theory and practice. He has explored the characteristics and methods of information retrieval and digital resource services for users, enriching the theoretical research and practical system of resource construction and information retrieval.

Keywords: Meng Liansheng; library and information science; resource construction; literature retrieval
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In the pre-digital era, Indian librarian S.R. Ranganathan pointed out that "the library is a growing organism." Indeed, as an institution, a library is a growing organism—a collection of three growing organic components: collections, readers, and librarians. Moreover, library collections exist for use, and every book should have its reader. In the digital age, library resource systems have become more abundant, with resource types increasing substantially. Digital and non-digital resources complement each other to meet users' diverse information needs. To fulfill the sacred responsibility of libraries as cultural and knowledge institutions in inheriting human civilization and to provide better services to users, the key lies in doing well in resource construction and retrieval discovery work. On the one hand, the resource system must be built more comprehensively; on the other hand, the information retrieval capabilities supporting resource discovery and utilization must be more precise and efficient. To this end, Mr. Meng Liansheng (hereinafter referred to as "Mr. Meng") has always regarded resource construction and information retrieval as a core issue in his years of theoretical research and practical work in library and information science, forming a series of research achievements and construction outcomes.

2. Theoretical Exploration of Resource Construction and Information Retrieval

2.1 Emphasis on Theoretical Exploration and Career Planning

China began exploring literature database construction technology in the late 1970s. After the birth of Chinese character encoding in the late 1980s solved the problem of computer processing of Chinese characters, Chinese literature databases began to enter the historical stage. After about ten years of development, China's literature database construction achieved tremendous success, showing vigorous growth. In his 1999 article "A Brief Review of Chinese Literature Database Construction in the 1990s," Mr. Meng wrote: "Enterprise management has invigorated database construction, commercial operation has gradually formed a database market, abstract literature databases have become increasingly mature, CD-ROM database products have become rich and colorful, networked online retrieval systems have developed rapidly, full-text literature databases have emerged as a new force, and scientific evaluation literature databases have developed distinctive features." This provided a high-level summary of the development status of the field from a macro perspective. In the early days of China's major full-text databases, Mr. Meng and his students conducted comparative research on the retrieval functions and effectiveness of three major Chinese full-text journal databases on the Internet, publishing the article "A Comparative Study of Three Chinese Full-Text Journal Databases on the Internet" (2002). Through actual retrieval experiments, they objectively analyzed the advantages and shortcomings of each database and discussed the importance of proper product positioning for database products.

In China's literature database research and construction, both the Documentation and Information Center of the Chinese Academy of Sciences and the National Science and Technology Library (NSTL) have been major participants, playing pioneering and leading roles in many aspects. Mr. Meng was not only an important participant in this development process, promoting the development of many innovative projects, but also attached great importance to writing articles reflecting the progress of important events. He independently or collaboratively published numerous articles, including "Document Database Construction in China in the 1990s—A Review" (2000), "On the Digital Construction of Literature Information Resources" (2001), "An Overview of NSTL Literature Information Processing in the Past 10 Years" (2010), "Building an International Science Citation Database to Expand NSTL Service Connotation" (2010), "Functional Framework Design of NSTL Joint Data Processing System" (2011), and "Research on the Construction of Numerical Databases—Taking the Construction of Numerical Databases in the Metallurgical Industry as an Example" (2016). These writings reflect, to a certain extent, the historical process of literature database construction at the Documentation and Information Center of the Chinese Academy of Sciences, NSTL, and even the entire Chinese library and information community, providing first-hand materials for future generations to understand and study the entrepreneurial stage of China's litera-

ture information digitalization and the birth and development of major scientific literature database products.

Mr. Meng also paid close attention to international developments in literature resources and database construction, introducing major foreign technical methods and management measures in this field. He published several articles, including "The History of Online Development" (1987), "CD-ROM Information Products for Libraries" (1991), "Preserving History for the Future—An Introduction to Australia's Web Archive PANDORA" (2006), and "India's Open Access Activities and Their Implications" (2006). During the 1990s, Mr. Meng participated in the formulation of the "Ninth Five-Year" and "Tenth Five-Year" development plans for the Documentation and Information Center of the Chinese Academy of Sciences. In 2000, while working at the Office of the Publishing, Library and Information Committee of the Chinese Academy of Sciences, he participated in drafting the "Knowledge Innovation Construction Plan for the Documentation and Information System of the Chinese Academy of Sciences" and the "Construction Plan for the Digital Library of the Chinese Academy of Sciences." In 2001, he participated in the formulation and early implementation preparation of the "National Science Digital Library" construction plan of the Chinese Academy of Sciences. In 2000, Mr. Meng began part-time work at NSTL, where he participated in drafting the "Fifteenth Five-Year Development Plan" for NSTL. From 2001 to 2002, as the project leader, he organized and completed the research project "Research on Digital Library Construction and Development Models." In 2004, he participated in drafting the "Development Plan for the Construction of Scientific and Technical Literature Information Resources and Service Platform" for the Ministry of Science and Technology, as well as the "Eleventh Five-Year Development Plan for the National Science and Technology Library" and the "Medium and Long-Term Development Plan for the National Science and Technology Library." In 2009, entrusted by the Ministry of Science and Technology, he participated in organizing and writing the "Research Report on the Twelfth Five-Year Development Plan for National Scientific and Technical Literature Services." He also participated in the research and report drafting for the NSTL project "Positioning and Role of the National Scientific and Technical Literature Strategic Guarantee System" and contributed to the formulation of the "Twelfth Five-Year Development Plan for the National Science and Technology Library." In all these important documents, resource construction and the development of literature information retrieval systems were placed in very important positions, emphasizing their significance for information service work and playing a macro-guiding role for career development. Since October 2005, Mr. Meng has served as a member of the "Resource Construction and Sharing Professional Committee" of the China Society of Library Science.

2.2 Compiling Books and Textbooks to Promote Knowledge Dissemination

To better promote the development of scientific and technical literature information retrieval in China, Mr. Meng chaired or participated in the compilation of various literature information retrieval tools, in both traditional paper and modern digital formats. While actively promoting the construction of various types of literature databases, he also attached great importance to the promotion and application of literature retrieval methods and tools. He accumulated rich experience in the field of scientific and technical information retrieval and chaired or participated in the compilation of multiple teaching books on scientific and technical literature information retrieval and discipline information resource guides, available in both print and CD-ROM versions, forming a systematic body of knowledge that thoroughly introduces the basics of scientific literature resource searching, retrieval strategies, and retrieval tools and major information resources for different disciplines and resource types.

In his early years, Mr. Meng participated in the compilation of the teaching material "Literature and Information Retrieval" (1990) for library and information work at the Chinese Academy of Sciences and edited the reference book "Compilation of Major Domestic and Foreign Scientific and Technical Retrieval Publications and Databases" (1991). He also produced the CD-ROM "Information Tracing—A Practical Guide to Domestic and Foreign Scientific and Technical Literature and Online Scientific and Technical Information Retrieval" (2000). Later, he edited the graduate textbook "Tracing Scientific and Technical Literature Information—A Tutorial on Scientific and Technical Literature Information Retrieval and a Practical Guide to Discipline Resources" (2006). In this textbook, Mr. Meng organized the content into two parts. The first part mainly elaborates on basic concepts of information and information retrieval, types and characteristics of information resources, information retrieval methods and strategies, approaches and methods of information acquisition, and famous information service platforms at home and abroad. The second part takes discipline classification as the main line, focusing on introducing the relevant retrieval tools and major information resources available in each discipline area at that time, while also listing the methods and approaches to access these resources. From the perspectives of writing style, content structure, and compilation style, this book features novel content, abundant materials, reasonable arrangement, and convenient use, reflecting the most comprehensive resource types and service models in the field of literature information retrieval and information services at that time. It provided users with a comprehensive and specific guide to understanding the development level of domestic and foreign information resources and information services and to querying and obtaining relevant literature information. As a designated textbook for the University of Chinese Academy of Sciences, this book played an important role in teaching scientific and technical literature information retrieval at the university.

In the field of information retrieval, Mr. Meng not only actively wrote relevant

articles and edited textbooks but also undertook teaching tasks for many years. He long offered courses such as "Scientific and Technical Intelligence Retrieval" for master's students at the Graduate School of the Chinese Academy of Sciences, with annual enrollment reaching over 200 students. He frequently lectured at various types of professional training courses or user training workshops on information retrieval knowledge, imparting knowledge and skills of scientific and technical literature retrieval and introducing various retrieval tools or resource service platforms. His practical teaching techniques, which integrated information retrieval into specific scientific research task scenarios, specific research query topics, and specific literature databases, were unanimously appreciated and widely welcomed by students.

3. Advancing the Development of China's Literature Databases

3.1 Construction of Chinese Academy of Sciences Literature Databases

For users to efficiently utilize various literature information resources provided by libraries, the prerequisite is to have retrieval tools or systems that are convenient for users. The Chinese Academy of Sciences has attached great importance to literature database construction, launching and building multiple disciplinary literature databases successively since the 1980s. By the end of 1992, there were 68 databases under construction with more than 1,000 records each, already taking initial shape. However, due to the lack of unified management and planning, database construction suffered from a series of problems, including decentralized data processing, small construction scale, low processing efficiency, non-standard data formats, lack of clear development goals, and poor service effectiveness. The management system and model for database construction at the Chinese Academy of Sciences urgently needed reform. To solve these problems, the Chinese Academy of Sciences established the Literature Database Expert Committee in 1993, and Mr. Meng was appointed as the director of the expert committee office. Under the leadership of the Academy's Publishing, Library and Information Committee and the Expert Committee, the office was fully responsible for the organization and management of literature database construction at the Chinese Academy of Sciences. Mr. Meng participated in proposing many practical reform plans, organized the formulation of multiple management measures and data processing standards such as the "Management Measures for Scientific Literature Databases of the Chinese Academy of Sciences," adjusted the allocation method of database construction funds, and vigorously promoted reforms in database construction management. After several years of unremitting efforts, the Chinese Academy of Sciences organized and created the "Chinese Science Literature Database" based on multiple disciplinary databases.

Mr. Meng published articles including "Development Goals and Tasks of the

'Ninth Five-Year' Literature Database Construction of the Chinese Academy of Sciences" (1995), "Chinese Academy of Sciences Literature Database Construction for the 21st Century" (1996), and "Developing Information Resources to Better Serve Scientific Research and Teaching—A Brief Description of the Chinese Academy of Sciences Literature Database CD-ROM" (1998). He also collaborated with colleagues on articles such as "Review and Prospects of Recent Chinese Academy of Sciences Literature Database Work" (1994), "Brief Introduction to the Construction of Chinese Academy of Sciences Secondary Literature Databases" (1994), and "Current Status and Development Strategy of Chinese Academy of Sciences Scientific Literature Database Construction" (1994), which reviewed and looked forward to the construction and development of Chinese Academy of Sciences literature databases. These articles proposed that Chinese Academy of Sciences literature databases should achieve integrated construction and build an authoritative Chinese science literature database in the field of natural sciences as soon as possible. They argued that Chinese Academy of Sciences literature database construction should continuously innovate in management mechanisms, system functions, and technical methods, strengthen the digital construction of literature resources, and provide good data support for literature retrieval, information consultation, and other literature and information services.

3.2 Construction of Chinese Science Citation Database and Bibliometric Analysis

In the 1980s, when SCI (Science Citation Index) was making remarkable achievements abroad, domestic bibliometrics faced problems of lack of originality and disconnect between theory and application. Mr. Meng believed that the most important reason was the lack of a domestic citation database to utilize. Mr. Meng was the earliest scholar in China to conduct experiments on constructing a Chinese scientific citation database and to carry out comprehensive Chinese scientific citation analysis. He selected "Chinese Scientific Citation Analysis" as the research topic for his master's thesis, attempting to build a Chinese scientific citation database and exploring the basic methods and processes of citation database construction. Through his own efforts, Mr. Meng manually indexed the citations of "7,658 academic papers published in 554 issues in 1980," experimentally constructing a retrieval tool with tens of thousands of citation records, which laid a solid foundation for subsequent citation analysis. More importantly, through these attempts at citation indexing, Mr. Meng fully realized the value of fast, reliable, and convenient information retrieval for citation analysis work. In 1983, he published the paper "Chinese Scientific Citation Analysis," proposing the compilation of the "Chinese Science Citation Index" (CSCI), which won the National Library Science Excellent Paper Award.

The completion of Mr. Meng's master's thesis had a significant impact in the academic community, promoting to some extent the development of citation database construction and bibliometric research and application in China.

The leadership of the Documentation and Information Center of the Chinese Academy of Sciences, with great foresight, realized that this was a very promising undertaking and organized relevant personnel from various departments, including Mr. Meng, to write reports applying for National Natural Science Foundation projects. In 1989, the Documentation and Information Center of the Chinese Academy of Sciences obtained funding support from the National Natural Science Foundation and the Chinese Academy of Sciences, established a project team, and under Mr. Meng's leadership, created the Chinese Science Citation Database (CSCD) after several years of effort. In 1995, the print version of the "Chinese Science Citation Index" was successfully developed, and in 1996, the CD-ROM version of the "Chinese Science Citation Database" was officially released, later providing online retrieval services nationwide and becoming an important member of China's family of influential literature database products. This project won the second prize of the Chinese Academy of Sciences Science and Technology Progress Award. Behind these achievements lies Mr. Meng's wisdom and dedication. To promote the application of the citation database, Mr. Meng published articles including "The Establishment of the Chinese Science Citation Database and Its Application Prospects" (1995), "The Compilation Structure and Utilization Methods of the Chinese Science Citation Index" (1996), "The Chinese Science Citation Database and Its Products" (1996), and "Current Status and Development of Chinese Science Citation Database Construction" (1997), which played an active role in expanding the database's influence in the academic community.

In the field of bibliometric research and application, Mr. Meng also published papers such as "On the Nature and Function of Citation Indexing Methods" (1996) and "Creating a New Situation for Bibliometric Research and Application in China" (1997). He collaborated with colleagues on articles including "Distribution of China's Core Scientific Literature and Its Citation Analysis" (1990), "A Novel and Unique Literature Retrieval and Scientific Measurement Tool—Chinese Science Citation Index" (1995), and "A Scientometric Analysis of Academicians of the Chinese Academy of Sciences" (1998). With students, he co-authored papers such as "Progress in Bibliometric Research in Mainland China and Its Citation Analysis" (1996), "Core Literature, Core Authors, and Core Journals in Chinese Bibliometrics" (1998), "On the Differences Between Patent Citation Behavior and Journal Paper Citation Behavior in Revealing Knowledge Associations" (2010), and "On Problems in Patent Citation-Based Science-Technology Linkage Detection Methods" (2010). These works promoted the popularization and application of citation statistical analysis methods for scientific and technical literature in China and even the development of bibliometrics in China.

3.3 NSTL Literature Database Construction

The National Science and Technology Library (NSTL) is a web-based scientific and technical literature information service institution jointly established by

the Ministry of Science and Technology, the Ministry of Finance, the Chinese Academy of Sciences, and other departments, with the approval of the State Council leaders on June 12, 2000. With the mission of building a national scientific and technical literature resource strategic guarantee service system in the digital age, NSTL collects, preserves, and develops scientific and technical literature resources in various fields of science, engineering, agriculture, and medicine according to the mechanism of "unified procurement, standardized processing, joint online access, and resource sharing," providing literature information services and guarantees for the national scientific and technological community. Since 2000, Mr. Meng has worked part-time at NSTL, later serving as the director of the Database Construction Department, responsible for scientific literature database construction and participating in the organization and coordination of the center's network service system construction and the formulation and management of multiple center projects and programs.

During his tenure at NSTL, Mr. Meng promoted the establishment and development of the data processing system, participated in organizing the construction of NSTL's network service system and various other service systems, and contributed to the improvement of NSTL's resource construction and service functions. To deepen NSTL's information service connotation, Mr. Meng organized the planning, design, and development of NSTL's "Open Access Journal Integrated Retrieval System." He also participated in organizing the planning, demonstration, design, and construction of the International Science Citation Database (DISC), which officially launched online services on December 6, 2007, expanding NSTL's service connotation and receiving welcome from users. Mr. Meng also dedicated himself to promoting NSTL's resources and services, writing articles introducing NSTL's resource and service types, retrieval functions, and full-text service methods. He believed that in resource construction, attention should be paid not only to current services but also to long-term preservation of resources. In the process of digitizing literature information resources, it is necessary to further improve digital technology levels and pay attention to the digital conversion of special collection literature resources. Mr. Meng also published articles such as "Ten Questions About Free Scientific and Technical Literature Retrieval and Online Full-Text Delivery Services of the NSTL Network Service System" (2001), providing help and guidance for users nationwide to utilize NSTL's various resources and services.

Resource construction provides the basic guarantee for library and information institutions to carry out literature information services, while providing fast and convenient discovery and utilization mechanisms for various information resources that have been built and put into use—namely, efficient information retrieval capabilities—is the fundamental means to make users aware of and recognize the value of library and information resources. However, information retrieval alone is not enough; it is also necessary to further explore more three-dimensional library and information institution service systems. To this end, Mr. Meng further expanded his research vision to the improvement of library and information service capabilities.

With the continuous deepening of networked information services, users' demand for obtaining help in a timely manner during the process of utilizing library services has become increasingly strong. Library reference consultation services face the transformation from traditional desk services to digital reference consultation services that adapt to changes in users' information utilization behavior. In view of the fact that domestic digital reference consultation started relatively late and there is a large gap compared with developed countries in terms of service content, methods, efficiency, and effectiveness, NSTL decided to develop a real-time reference consultation system to improve networked information service levels. In 2004, Mr. Meng organized the research on the feasibility of NSTL's real-time reference consultation service system, and on this basis, organized the development of real-time reference consultation system software, trained a team of consultation experts, and launched NSTL's real-time reference consultation service system on September 28, 2004, expanding NSTL's information service scope and receiving positive user feedback. During the same period, Mr. Meng organized the publication of multiple special-topic articles on "digital reference consultation services" in the journal *Library and Information Service*, systematically introducing the theories, practices, and service models of digital reference consultation at home and abroad, providing references for the development of digital reference consultation work in relevant domestic institutions. He also proposed strengthening the construction of reference consultation standards and norms, promoting cooperation among domestic libraries and among domestic and foreign service institutions, and developing comprehensive joint digital reference consultation services.

Network information annotation is an information behavior through which people express opinions on the Internet, which can facilitate other users in finding and utilizing the same resources. With the increasing number of public annotation behaviors, research on the revelation capabilities and application methods of annotation content has attracted academic attention. In 2008, Mr. Meng organized a special series of papers on "Research on Network Annotation Behavior and Its Impact" [9], conducting in-depth discussions on annotation and its evolution, the value of user annotation in network environments, network annotation methods, and the operation of folksonomy networks. This enhanced people's understanding of annotation phenomena, annotation behaviors, and annotation resource utilization, and played a positive role in improving the value and efficiency of annotations in resource finding, discovery, utilization, and sharing. With the arrival of the 5G era and the increasing popularity of library mobile services, Mr. Meng collaborated with colleagues to publish the article "Investigation and Analysis of Scientific Researchers' Information Seeking and Utilization Behavior in the Digital Environment—A Case Study of the Chinese Academy of Sciences" [10], which investigated and analyzed the information seeking and utilization behavior of Chinese Academy of Sciences researchers in the new environment, proposed the construction of one-stop discovery systems and the provision of integrated "single sign-on" services by libraries, and suggested that libraries should accelerate the transformation to smart services.

For decades, Mr. Meng has not only tirelessly explored theoretical research but also paid great attention to using theoretical research results to guide each construction and service practice activity he undertook. The rigorous academic style and unremitting pioneering spirit demonstrated by the older generation of library and information professionals in Mr. Meng's career are worthy of learning and reference for younger generations and should be carried forward in our daily work. As the proverb says, "An old steed in the stable still aspires to travel a thousand miles; a hero in his late years still harbors lofty ambitions." After retirement, Mr. Meng's steps on the exploration path of library and information theory, such as resource construction and information retrieval, have not stopped. He continues to pay close attention to the development of the library and information cause, actively participates in various academic activities, guides younger scholars in academic research, participates in the selection of network information resources, and frequently participates in academic paper reviews and knowledge service website evaluations. Stemming from his deep love for the cause, he has always been practicing the original aspiration and mission of a library and information professional with his own actions, steadfastly holding onto the conviction that "the older one gets, the more vigorous one becomes, and one would never change one's lofty aspirations even in old age; the more impoverished and harder-pressed one is, the more resilient one becomes, and one would never abandon one's noble aspirations."

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Guo Dehua: Paper framework revision and proofreading;
Li Xiaojuan: Guidance on paper revision ideas and direction.

Action Is the Beginning of Knowledge, and Knowledge Is the Completion of Action—Meng Liansheng's Professional Practice and Academic Research on Resource Construction and Information Retrieval

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Keywords: Meng Liansheng; library and information science; resource construction; literature retrieval

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