

Current Status and Development Path of Science Popularization Education in Libraries: A Post-print Based on a Survey of 88 Science Popularization Education Bases Across 25 Provinces and Cities

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Abstract

[Purpose/Significance] Libraries shoulder the statutory responsibility of implementing science popularization education. With diverse and abundant science popularization literature and information resources, libraries possess unique advantages in conducting such education. Library science popularization education began relatively early; in 2005, the China Society of Library Science established the Science Popularization and Reading Guidance Committee. However, within the library profession, science popularization education remains merely sporadic and decorative service innovation explorations, rather than a normalized service item. In the new era of law-based library governance and innovative development, seeking development paths for library science popularization education holds significant theoretical and practical importance.

[Method/Process] Through Internet, WeChat, and other social network platforms, this study investigates the construction status of library science popularization education bases, conducting in-depth analysis regarding base levels, types, quantities, regional distribution, validity periods, and accreditation criteria, and proposes alternative development paths for libraries to implement science popularization education.

[Results/Conclusion] Library science popularization education should adopt strategies that combine base construction with science popularization services, integrate reading promotion with nationwide science popularization, and develop science popularization alongside study tours, pursuing a path of sustained, steady, and coordinated development featuring the “trinity” of facilities, resources, and services.

Full Text

Preamble

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Research on the Current Situation and Development Path of Popular Science Education in Libraries: A Survey of 88 Popular Science Education Bases in 25 Provinces and Municipalities

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Abstract: [Purpose/Significance] Libraries shoulder the legal responsibility of implementing popular science education. With their diverse collections and rich information resources in popular science literature, libraries possess unique advantages for conducting such education. While library-based popular science education began relatively early—the Chinese Library Society established the Steering Committee for Popular Science and Reading Guidance in 2005—it remains merely a sporadic, exploratory service innovation within the library profession and has not yet become a normalized service item. In the new era of law-based library management and innovative development, seeking development paths for library popular science education holds significant theoretical and practical importance. [Method/Process] This study investigates the status of popular science education base construction in libraries through internet and social media platforms such as WeChat, analyzing base levels, types, quantities, regional distribution, validity periods, and identification criteria. It also proposes development paths for implementing popular science education in libraries. [Result/Conclusion] Library popular science education should adopt strategies that combine base construction with popular science services, integrate reading promotion with nationwide science popularization, and develop popular science and tourism simultaneously, pursuing a path of sustained, stable, and coordinated development that unifies facilities, resources, and services.

Keywords: popular science education; development path; library

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Science and technology popularization (hereinafter referred to as “popular science”) can enhance public scientific literacy and promote technological innovation. Like the two wings of a bird or the two wheels of a cart, science popularization and technological innovation complement each other. President Xi Jinping has stated: “Scientific and technological innovation and science popularization are the two wings of innovative development, and science popularization should be placed on an equal footing with technological innovation.” This profoundly illustrates the dialectical relationship of mutual reinforcement between the two.

Popular science education refers to educational activities for science and technology popularization, targeting the general public with the aim of improving scientific literacy. This paper specifically refers to popular science education bases for natural science and technology, excluding social science popularization bases recognized by philosophy and social science federations at various levels.

Library popular science education bases are libraries recognized and awarded plaques by associations for science and technology at various levels. Currently, libraries tend to emphasize the dissemination of humanities knowledge while inadequately promoting natural science knowledge.

1. Theoretical Foundation

1.1 Primary Responsibility for Popular Science Popular science is a common task for the whole society. According to China's Law on Science and Technology Popularization, science and technology museums (stations), libraries, museums, cultural centers, and other cultural institutions should play their role in popular science education. As legally designated entities for popular science work, libraries have the duty to conduct nationwide science popularization activities and implement popular science education.

1.2 Library Mission Libraries serve the social functions of preserving cultural heritage, transmitting literature and information, developing intellectual resources, and conducting social education. The attributes of popular science education align essentially with library functions. Contemporary public libraries' primary missions include educational missions, reading habit cultivation, information assurance, cultural transmission, basic cultural and information literacy development, and social harmony. Compared to school libraries, public libraries serve more diverse user groups, making popular science education a particularly important mission. As information and knowledge centers with rich literature resources, libraries possess unique advantages for conducting popular science education.

1.3 Legal Requirements for Popular Science Education China's Law on Science and Technology Popularization requires libraries to play their role in popular science education. The Public Cultural Service Guarantee Law, implemented on March 1, 2017, mandates that governments at all levels should make full use of public cultural facilities to promote the provision and dissemination of excellent public cultural products and support nationwide activities in reading, law popularization, fitness, science popularization, art popularization, and excellent traditional culture inheritance. These laws establish clear requirements for libraries to conduct popular science education.

2. Research Status

In 1999, Fei Liqun and colleagues discussed libraries' three major functions—ideological education, popular science education, and leisure education—and proposed measures such as improving collection quality and expanding popular science book acquisitions to optimize collection structures and enhance popular science education functions. In 2001, Zhuang Xiaohong and others explored the necessity, urgency, and feasibility of libraries conducting popular science education and proposed implementation methods. Subsequent research has addressed libraries' responsibilities, missions, and roles in popular science education, such as “The Responsibility and Mission of Public Libraries in Modern Popular Science” and “Popular Science Education as an Important Mission of Libraries.”

In recent years, with the deepening of theory and practice in library reading promotion, popular science reading promotion has emerged as a new content of reading promotion services. Case studies have proliferated, including “Practice and Exploration of Popular Science Reading Promotion for Children in Public Libraries—A Case Study of Guangzhou Children's Library” and “Innovative Practice of Artificial Intelligence Popular Science Education Activities in Libraries—A Case Study of Fujian Provincial Library.” The Reading Promotion Committee of the Chinese Library Society organized “Popular Science Reading Promotion Case Collection Activities” in 2012 and 2016, evaluated and awarded outstanding cases, and published the *Collection of Excellent Cases in Popular Science Reading Promotion*.

Previous research has primarily relied on industry intuition to study the rationality of libraries conducting popular science education or focused on case studies of popular science reading promotion. No systematic investigation of the current state of library popular science education has been conducted. This paper surveys library popular science education bases to analyze the current situation at a higher level and provide development paths for libraries serving nationwide science popularization.

3. Research Design

3.1 Data Sources This study investigates library popular science education bases. Sample selection criteria and sources include: (1) The survey covers base levels, provinces/municipalities, base names, base types, validity periods, recognizing organizations, naming institutions, and identification criteria; (2) Given that data on library popular science education base construction before 2010 is difficult to collect, the sample range covers provincial-level and above library popular science education bases recognized and named between 2010 and May 2019; (3) Since no previous systematic survey of domestic library popular science education exists, this study first uses web search engines for preliminary information discovery, then conducts site searches on provincial/municipal science association and science bureau websites, using these as primary data sources.

3.2 Data Collection and Processing Using web investigation and literature research methods, the author first searched the official websites of 32 provincial science associations or science departments, finding that 25 provinces/municipalities had publicly released data on popular science education bases. Through this search, 52 pieces of information on popular science education bases were identified. Second, through manual verification of web pages and further investigation to obtain detailed data, the author screened and eliminated duplicates, ultimately identifying 88 library popular science education bases as research samples. The collected data were analyzed and processed using tables covering: (1) base level; (2) base name; (3) base type; (4) recognition year; (5) validity period; (6) recognizing and organizing units; (7) naming institution; and (8) identification criteria, as shown in Table 1 .

4. Current State of Library Popular Science Education

4.1 Analysis of Library Popular Science Education Bases

4.1.1 Scarcity of Recognized Provincial-Level and Above Bases According to statistics, by 2017 China had 3,166 public libraries, and by 2018 there were 2,663 regular institutions of higher education. Assuming “one library per university,” there are 2,663 university libraries. Based on the 88 provincial-level and above library popular science education bases identified in this survey, the number of libraries with such base designation is clearly insufficient. This is largely related to the voluntary application principle for base recognition and libraries’ traditional focus on reading promotion, particularly emphasizing humanities and social science knowledge dissemination over natural science popularization.

4.1.2 Unreasonable Structure and Uneven Regional Distribution An analysis of the data in Table 1 by base type and region reveals deeper insights into the quantity and structure of library popular science education bases, as shown in Table 2 . Among the 88 bases, 76 are public libraries, indicating a relatively singular type structure. While public libraries have advantages in user resources and location for conducting social popular science education, the type structure remains unreasonable. The number of bases in eastern, central, and western regions shows little disparity, with the east having a slight advantage. However, eastern and central regions have more diverse library types. For instance, the east includes three specialized libraries: the National Science Library of the Chinese Academy of Sciences, Guangdong Science and Technology Library, and Shanghai Science and Technology Library, while the west only has public libraries.

4.1.3 Weak Connection Between Base Creation and Library Services

Popular science education base recognition follows a cyclical pattern (see Figure 1 [Figure 1: see original paper]), with peaks in 2012, 2015, and 2018, though

the upward trend is not pronounced. The validity period for base recognition is generally 3-5 years, resulting in cyclical patterns in library popular science education bases.

Recognition standards categorize bases according to applicants' facilities and business characteristics. According to the *National Popular Science Education Base Recognition and Management Trial Measures* and most provincial regulations, popular science education bases include five categories: science and technology venues (science, culture, and education venues), public places, education and research institutions, production facilities, and information media. Among the surveyed libraries, 32 have clearly identified types: 24 are venue-type and 3 are public place-type. Classification varies by region. For example, Tianjin divides popular science bases into science venues, science theme parks, youth science activity stations, and specialized bases, with Tianjin libraries belonging to the youth science activity station category. Shanghai categorizes bases into comprehensive science venues, specialized science venues, and basic-level science education bases. Except for the Qian Xuesen Library as a specialized science venue, Shanghai's other three libraries are basic-level bases.

From the perspective of popular science education roles, libraries can be classified as venue-type or public place-type. Libraries with digital popular science literature columns or website platforms can also be categorized as information media-type. The *National Popular Science Education Base Recognition and Management Trial Measures* classifies libraries as science venue-type, while provincial regulations in Heilongjiang and Henan categorize them as public place-type. The *National Popular Science Education Base Recognition Standards* serve as guidelines for recognition and for provincial governments to formulate their own standards, covering five aspects: facilities, open access, funding, personnel, and activities. In terms of facilities, open access, and funding, libraries' current services are generally consistent with these standards, though funding and facility development should be oriented toward popular science education. However, popular science activity planning and implementation, as well as team building, are weaknesses for library popular science education bases, requiring guidance and support from science associations as the main force in popular science, and more importantly, effective integration with library services.

4.2 Analysis of Library Popular Science Education Services To further explore the content and implementation methods of library popular science education, this study uses the *Collection of Excellent Cases in Popular Science Reading Promotion* (hereinafter referred to as the *Case Collection*) to investigate popular science content and implementation methods. The book includes 43 excellent cases selected primarily from the first and second popular science reading promotion case collection activities. Comparing these with Table 1 reveals that most cases come from provincial-level and above science association systems, demonstrating typicality and exemplarity.

4.2.1 Popular Science Content China is a country with unbalanced and insufficient economic and social development, and public scientific literacy exhibits urban-rural gaps, regional differences, and occupational disparities. China's popular science is a multi-level, three-dimensional project, richer in content than Western public understanding of science, encompassing knowledge dissemination, scientific method advocacy, scientific thought transmission, and scientific spirit promotion. Popular science education primarily focuses on disseminating scientific knowledge, with scientific methods, thoughts, and spirits reflected through knowledge and methods. The *Case Collection* shows that service targets are mainly minors, with some attention to elderly people and migrant workers. These target groups influence library popular science content, which currently focuses on scientific knowledge such as low-carbon green living, safety education, and new technologies like aerospace, with limited advocacy of scientific methods.

4.2.2 Implementation Methods Popular science forms include science propaganda, training, poverty alleviation, services, demonstrations, competitions, projects, and consulting. Unlike science and technology museums, libraries conduct popular science education by leveraging their own characteristics, primarily through literature recommendation, exhibitions, lectures, popular science picture book reading, scientist story sessions, knowledge competitions, essay contests, digital reading, hands-on activities like animal and plant breeding, science theater, experiments, games, and summer camps. Library popular science reading promotion activities mainly focus on collection recommendation and lectures, with booklist selection being somewhat arbitrary and connections between different methods on the same theme lacking smooth integration.

4.2.3 Integration of Popular Science Education and Reading Promotion Currently, library popular science education is primarily implemented through reading promotion. Deep integration between popular science education and reading promotion facilitates positive interaction between popular science resources and reading, promoting the dissemination of popular science literature while improving public reading literacy. Comparing the 88 library popular science education bases with award-winning cases from the second popular science reading promotion case collection (see Table 3) reveals that most libraries are not popular science education bases, reflecting insufficient integration between reading promotion and popular science education.

Jinling Library's cross-boundary cooperation with the Nanjing Association for Science and Technology effectively integrates high-quality resources from both sides. Its "I · Jinling" digital reading case won first prize in the first China Library Society Reading Promotion Committee's popular science promotion case collection. Zhangjiagang Library's case "Building a Platform for Science and Technology Workers, Vigorously Promoting Popular Science Reading" won third prize in the first excellent case collection. Both libraries are popular science education bases and successful examples of cross-boundary cooperation between

libraries and science associations.

4.3 Constraints on Library Popular Science Education Many factors constrain library popular science education development. The current base recognition and management system is not conducive to base creation, affecting access to professional guidance and resource sharing from science association systems. Libraries themselves lack sufficient understanding, practice, and research on popular science education, and nationwide science popularization has not yet been fully recognized and accepted by the library profession compared to nationwide reading promotion. Socially, public perception of libraries remains primarily focused on reading.

Libraries' disadvantages in base recognition affect professional guidance and resource sharing from science associations. Cross-boundary cooperation with science associations can facilitate resource sharing and professional exchange. Constraints in the social environment require libraries to strengthen publicity and promotion, improve popular science education services, and enhance public awareness and acceptance. Therefore, this paper focuses on libraries themselves to explore development paths for popular science education.

5. Development Paths for Library Popular Science Education

Based on library realities and leveraging theoretical and practical achievements in popular science, this paper explores development paths: constructing a three-dimensional framework integrating facilities, resources, and services; strengthening cooperation with science associations to develop recognition standards suitable for libraries (such as Shanghai's basic-level base recognition standards); fully utilizing libraries' reading promotion advantages to accelerate integration with nationwide science popularization and explore new models; and responding to the cultural-tourism integration trend to develop coordinated popular science education and tourism activities.

5.1 Constructing a “Trinity” Framework of Facilities, Resources, and Services Library popular science education should activate existing resources such as popular science books, periodicals, audio-visual materials, and films, while building a coordinated three-dimensional framework of facilities, resources, and services. Facilities are the foundation for conducting popular science education. Based on smart digital experience spaces, libraries should renovate spaces to facilitate popular science activities. Resources are the source of popular science education. Libraries should integrate and reorganize traditional resources while introducing popular science literature, drama, games, and multimedia resources to diversify resource formats. Services are the fundamental goal. Diverse and rich popular science activities require careful planning and effective implementation, as well as team building. Developing a team of librarians who understand popular science, can plan activities, and implement them effectively is crucial for improving service levels.

5.1.1 Utilizing New Technologies to Support Facility Development

Modern facilities and equipment are essential tools for popular science education. Without modern equipment, the utility of libraries' multimedia information resources would be significantly weakened. Computer, network, and information technologies have played important roles in library development. Emerging technologies like cloud computing, big data, and artificial intelligence are changing how people live and work. Libraries also need new technology support and should collaborate with technology providers to develop popular science education products suitable for library characteristics, such as integrating wearable and immersive smart devices with multimedia popular science digital resources.

5.1.2 Expanding Resources to Strengthen Resource Construction

Popular science digital resources are the knowledge base for library popular science education. Libraries need both historical collection resources and stable digital information sources. Through inter-library cooperation, libraries can achieve resource co-construction and sharing. Cross-boundary cooperation with science associations, science and technology museums, and other cultural venues can absorb their resources and even form regional popular science education alliances to achieve complementary advantages and promote effective utilization.

5.2 Combining Base Creation with Popular Science Services for Coordinated Development

Analysis of recognition standards reveals that base evaluation emphasizes facilities, funding, and human resources, while assessment of popular science services is relatively simple, considering only the number of activities held. This fails to fully leverage libraries' space and collection advantages. Recognition standards more suitable for libraries should be developed to achieve coordinated and sustainable development of base construction and services. Base construction is the foundation for popular science services, while services are the ultimate purpose. Libraries must combine base construction with popular science services for seamless integration and coordinated development.

5.3 Integrating Reading Promotion with Nationwide Science Popularization

Reading promotion is libraries' primary service, and nationwide reading is a crucial task for public libraries. Deep integration between reading promotion and nationwide science popularization is essential. Libraries should build new models based on their own characteristics and local conditions. University libraries can explore models based on their institutional specialties and campus culture. Public libraries can develop distinctive popular science reading promotion brand activities based on local cultural characteristics, especially intangible cultural heritage. This integration will achieve mutual benefits for reading and popular science education.

5.4 Developing Popular Science Education and Tourism Simultaneously

Unlike mainstream popular science bases such as science and technology museums, libraries lack physical objects and direct experiential resources. Study tourism (or educational tourism) combines visits, tours, and learning. On April 23, 2011, the National Library organized a reading tour activity called “Reading Journey—Beijing Central Axis,” where author Zhu Zuxi led 30 readers along Beijing’s central axis from Yongding Gate to the Drum Tower, explaining traditional culture and helping participants experience Beijing’s cultural heritage. For public libraries, the integration of culture and tourism provides a policy environment advantage for developing popular science study tours. Libraries should leverage their strengths, seize new opportunities in the cultural-tourism integration era, overcome limitations in physical collections, and actively explore innovative development paths that integrate popular science education with study tourism.

Library popular science education started early but has developed slowly. As library services deepen, popular science education must also advance. Libraries need to strengthen base creation, combine base construction with services, integrate reading promotion with nationwide science popularization, and explore new models. They should also respond to cultural-tourism integration by developing popular science education alongside study tourism, making popular science education an important library service.

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Research on the Current Situation and Development Path of Popular Science Education in Libraries: A Survey of 88 Popular Science Education Bases in 25 Provinces and Municipalities in China

Abstract: [Purpose/Significance] Libraries shoulder the legal responsibility of implementing popular science education. With their diverse collections and rich information resources in popular science literature, libraries possess unique advantages for conducting such education. While library-based popular science education began relatively early—the Chinese Library Society established the Steering Committee for Popular Science and Reading Guidance in 2005—it remains merely a sporadic, exploratory service innovation within the library profession and has not yet become a normalized service item. In the new era of law-based library management and innovative development, seeking development paths for library popular science education holds significant theoretical and practical importance. [Method/Process] This study investigates the status of popular science education base construction in libraries through internet and social media platforms such as WeChat, analyzing base levels, types, quantities, regional distribution, validity periods, and identification criteria. It also proposes development paths for implementing popular science education in libraries. [Result/Conclusion] Library popular science education should adopt strategies that combine base construction with popular science services, integrate reading promotion with nationwide science popularization, and develop popular science and tourism simultaneously, pursuing a path of sustained, stable, and coordinated development that unifies facilities, resources, and services.

Keywords: popular science education; development path; library

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

Source: ChinaXiv — Machine translation. Verify with original.