Survey and Analysis of Science Popularization Reading Promotion Practices in Chinese Libraries: A Case Study of Award-Winning Libraries in the Second Science Popularization Reading Promotion Case Collection Activity (Postprint)

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Abstract

[Purpose/Significance] This study investigates the practical cases and service characteristics of popular science reading promotion activities currently conducted by libraries in China, with the aim of providing references for the library profession to develop higher-quality and more diverse popular science reading promotion activities. [Method/Process] Taking 20 award-winning libraries from the second Popular Science Reading Promotion Case Collection Campaign as research subjects, information regarding popular science reading promotion activities was obtained by investigating each library's official website, WeChat official account, and related websites. Selected libraries were subjected to field visits and interviews to thoroughly explore all popular science reading promotion practices implemented by these libraries, with a focused analysis of three characteristic cases. [Results/Conclusion] The following reflections and recommendations are proposed for the further development of popular science reading promotion activities in Chinese libraries: ground activities in reader needs and connect them to real-life contexts; enrich activity programs and innovate thematic content; attend to disadvantaged groups and benefit all citizens; seek multi-party cooperation to improve activity quality; strengthen the use of new media and advance digital development, etc.

Full Text

Investigation and Analysis of Science Popularization Reading Promotion Practices in Chinese Libraries: A Case Study of Award-Winning Libraries from the Second Science Popularization Reading Promotion Case Collection Campaign

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Abstract: [Purpose/Significance] This paper explores the practical cases and service characteristics of science popularization reading promotion activities currently conducted by Chinese libraries, aiming to provide references for the industry to develop higher-quality and more diverse science popularization reading promotion activities. [Method/Process] Taking the 20 award-winning libraries from the Second Science Popularization Reading Promotion Case Collection Campaign as research subjects, this study collected information about science popularization reading promotion activities by investigating each library's official website, WeChat public accounts, and related websites. Selected libraries were visited and interviewed to deeply explore their science popularization reading promotion practices, with particular focus on analyzing three distinctive cases. [Result/Conclusion] The paper proposes the following considerations and recommendations for future development of science popularization reading promotion activities in Chinese libraries: basing activities on reader needs and staying close to real life; enriching activity programs and innovating thematic content; paying attention to vulnerable groups and benefiting all citizens; seeking multi-party cooperation to improve activity quality; strengthening new media utilization and promoting digital construction.

Keywords: library; science popularization; science popularization reading promotion; reading promotion

1 Introduction

1.1 Research Background

Science popularization refers to activities that use various media to introduce scientific and technological knowledge to the general public in accessible ways, advocate scientific methods, disseminate scientific thinking, and promote scientific spirit. In September 2015, Liu Yunshan, then member of the Standing Committee of the Political Bureau and Secretary of the Secretariat of the CPC Central Committee, emphasized during the National Science Popularization Day activities that science popularization work should be carried out consistently to continuously improve the scientific and cultural literacy of all citizens. Article 1 of the *National Reading Promotion Regulations* also points out that the primary

distinction of science popularization reading promotion lies in its emphasis on "science." Therefore, the goal of science popularization reading promotion is not only to make non-readers fall in love with reading, to teach non-proficient readers how to read, and to help those with reading difficulties overcome barriers, but more importantly, to closely integrate rich scientific and cultural knowledge with lively and diverse promotion methods based on actual conditions and various reader needs, thereby comprehensively improving science popularization effectiveness and achieving the purpose of disseminating scientific knowledge, advocating scientific methods, spreading scientific thinking, and promoting scientific spirit.

Given the gradual increase in attention Chinese libraries are paying to science popularization reading promotion activities and the growing number of related cases, especially successful examples from award-winning units in the Second Science Popularization Reading Promotion Case Collection Campaign that demonstrate unique characteristics, this study investigates these practical cases to summarize their service features and shortcomings. The aim is to enrich current domestic theoretical research on library science popularization reading promotion and provide references for practice.

1.2 Research Status

1.2.1 Domestic Research Status Currently, reading promotion practices in China have become increasingly colorful, and theoretical research has gradually developed its own characteristics. However, theoretical research on library science popularization reading promotion services or activities remains scarce, still at the stage of concept definition and case summarization, with no in-depth theoretical studies yet seen and limited relevant achievements. Most research explores science popularization reading promotion practices from the perspective of public libraries, with teenagers as the primary target audience. For example, Yang Yanchang reflected on and discussed several aspects of science popularization reading promotion for children at Guangzhou Children's Library; Jinling Library's model for digital science popularization reading promotion is worth learning from; Wu Cuihong discussed the advantages and shortcomings of public libraries conducting science popularization work based on the actual situation of Guangzhou Library and proposed work strategies; Zhou Ting explored approaches for university libraries to conduct science popularization classic reading promotion using cases from Nanjing University, Nanjing Tech University, and Southwest Jiaotong University. Lang Jiebin et al. discussed the necessity of conducting science popularization work in universities, its relationship with talent cultivation, and main practice forms, but did not directly address university science popularization reading promotion. In theoretical research, Zhu Lei et al. summarized the characteristics of science popularization reading promotion and conducted detailed analysis on the selection of science popularization reading materials, activity methods, and cultivation of science popularization reading promoters. Most other related studies approach from the perspective

of science popularization education, exploring the necessity and practical exploration of science popularization education work in universities or libraries.

1.2.2 International Research Status International reading promotion activities started earlier and are more mature, with particular emphasis on students' scientific information literacy. Since the 1970s and 1980s, European countries such as Sweden and Belgium have listed science popularization as universities' third mission beyond teaching and research, and Austria has emphasized through the slogan "Universities, Far from Ivory Towers" that science popularization is an important university task. Jeff Sherrill, the 2013 U.S. National Teacher of the Year, believed that "science education is crucial for all students; the skills acquired in science, technology, engineering, and mathematics classes can help students improve creativity, problem-solving ability, and communication skills." Some scholars have investigated and analyzed science popularization reading promotion cases, such as Y. R. Youn et al., who surveyed and analyzed the "Ulsan Students' Reading Day" science popularization reading promotion project, concluding that such projects require professional personnel for management, should improve the reading promotion environment, and encourage students to voluntarily participate. Additionally, some scholars have studied related policies and promotion measures.

Overall, current domestic and international theoretical and practical research on library science popularization reading promotion remains limited, with library science popularization reading promotion theory lagging far behind practice, few core journal publications, research depth needing improvement, and case studies focusing on individual activities or projects rather than comprehensive and holistic analysis.

1.3 Data Sources

The Second Science Popularization Reading Promotion Case Collection Campaign, hosted by the Reading Promotion Committee of the Chinese Library Association, saw active participation from 80 libraries across more than ten provinces and cities nationwide, with 20 libraries winning awards. These cases cover almost all current activity forms, service populations, and content of domestic science popularization reading promotion, featuring broad participation, high quality, strong comprehensiveness, and responsiveness to era development, making them highly significant for analyzing Chinese science popularization reading promotion activities. Therefore, this study takes these 20 award-winning libraries as research subjects, collecting information about their science popularization reading promotion activities through official websites, WeChat public accounts, and related websites, and conducting on-site investigations and interviews with selected libraries to deeply explore their science popularization reading promotion practices (rather than only investigating their individual award-winning cases). Based on the characteristics demonstrated by these cases, the study proposes reflections and recommendations to provide

references for future Chinese library science popularization reading promotion practice. The basic information of the 20 surveyed libraries is shown in .

As shown in , among the 20 award-winning libraries, there are 17 public libraries (85%), and one each of university library, research system library, and comprehensive library. This reflects that public libraries attach great importance to science popularization reading promotion activities, have achieved certain results in practice, and have gradually become the main force in science popularization activities, conducting a large number of science popularization activities for different groups. Additionally, most libraries have obtained the titles of "Science Popularization Education Base" or "National Reading Demonstration Base." Some libraries are both science popularization education bases and national reading demonstration bases, such as Jinling Library and Zhangjiagang City Library, indicating that these libraries are at the forefront of science popularization education and reading promotion in the library field and possess certain reference value for the industry.

2 Overall Situation of Science Popularization Reading Promotion Practices in Chinese Libraries

2.1 Activity Programs Conducted by Each Library

Through investigation and statistics of science popularization reading promotion activity information from the 20 surveyed libraries, all current science popularization reading promotion activity programs were identified (see). The surveyed libraries have conducted rich science popularization reading promotion programs (127 activity programs in total), with diverse activity forms that are distinctive, flexible, interesting, and highly creative.

Currently, there is no clear classification system for science popularization reading promotion activity types in China. Therefore, based on and according to activity content, form, and characteristics, this study summarizes the types of science popularization reading promotion activity programs and statistics the number of libraries conducting each type of activity among the 20 surveyed libraries, as shown in [Figure 1: see original paper]. Meanwhile, each library has conducted relatively rich types of science popularization reading promotion activities, and under each category, various activities have been carried out. For example, Beijing Tongzhou District Library's 宣讲培训类 (lecture and training category) includes activities such as Hour of Code training, Feixiang Alliance Aviation Classroom, and interesting science popularization knowledge lectures. Therefore, [Figure 1: see original paper] also shows the number of activities conducted for each project type in library science popularization reading promotion.

As shown in [Figure 1: see original paper], the science popularization reading promotion project types of the 20 surveyed libraries can be classified into seven categories: book recommendation, lecture and training, interactive communi-

cation, exhibition and visit, creative experience, performance and competition, and digital media. Among them, creative experience is the most numerous activity type, with 35 such activities conducted; followed by lecture and training, with 33 activities. Meanwhile, the number of libraries conducting lecture and training activities is the highest, with 19 libraries; followed by creative experience activities, with 12 libraries conducting such activities. This shows that creative experience and lecture and training are currently the main activity methods for library science popularization reading promotion. Book recommendation and digital media are the least numerous types, with only nine activities each, while digital media not only has the fewest projects but also the fewest libraries conducting such activities (only six), indicating that few libraries have yet realized the need to conduct activities that align with information technology and digital media development.

2.2 Types of Science Popularization Reading Promotion Activities

2.2.1 Book Recommendation Activities The essence of science popularization reading promotion is to facilitate people's reading of science popularization materials, making book recommendation the most direct method. Book recommendation activities include classic book recommendations, new resource recommendations, book guides, and book giveaways. Currently, there is still much debate in academic and practical circles about the conceptual definition of science popularization reading materials. Through analysis of recommended books in book recommendation activities of surveyed libraries, this study argues that science popularization reading materials refer to popular science books on natural sciences, life knowledge, and skills, excluding social science books such as philosophy, political science, sociology, and history. For example, Beijing Tongzhou District Library's science popularization book recommendation activities recommend plant-related and future mystery science books; Zhangjiagang City Library's "Science Popularization into Communities" book 下乡 (rural outreach) program selects science popularization reading materials including children's science popularization, medical health, dietary hygiene, and environmental protection related to daily community life.

2.2.2 Lecture and Training Activities Lecture and training activities refer to group activities where librarians or invited experts and scholars conduct online and offline knowledge lectures and training courses, explaining scientific and technological knowledge in simple terms to disseminate scientific knowledge and methods to readers or audiences. Such activities mainly follow lecture, teaching, and training models, with the broadest audience reach. The activity process includes not only instructors' explanations but also interactive exchanges, allowing participants to learn while doing for more systematic and in-depth understanding of relevant knowledge. Currently, lecture and training activities are the most common form of science popularization reading promotion for general audiences in Chinese libraries, with 19 surveyed libraries (95%) conducting such activities. For example, Shanghai Pudong Library has held youth science popularization

classrooms while providing training courses such as maker classrooms and VR natural classrooms for all citizens.

2.2.3 Interactive Communication Activities Interactive communication activities include games, interviews, parent-child experiences, science experiments, academic salons, human libraries, and reading sharing sessions. Eight surveyed libraries have conducted interactive communication activities, such as Taicang Library's "Wow! Science Laboratory" activity, which targets youth aged 8-14, popularizes scientific knowledge through experiments, guides teenagers in hands-on practice, and improves their scientific literacy, creativity, and practical skills. Jinling Library's "Workshop Science Show" mainly features interesting stage science shows such as smoke tornadoes, tea color changes, and dry ice wonderlands, using science experiments as carriers to help children learn through scientific inquiry, answer questions and share exchanges through practical games, and cultivate thinking, observation, creativity, and communication skills while playing. There are also science micro-classrooms targeting children aged 3-8 and their parents, mainly guiding readers to learn hands-on making through science experiments. Such activities not only allow children to experience the fun of experimenting like scientists and master basic scientific knowledge but also promote communication and emotional bonding between children and parents.

2.2.4 Exhibition and Visit Activities Exhibition and visit activities convey text, images, and other information visually and intuitively to readers, mainly including photography exhibitions, painting exhibitions, achievement exhibitions, picture exhibitions, model exhibitions, and specimen exhibitions, or organizing field visits in collaboration with nature reserves, museums, and other units. Currently, 10 surveyed libraries have conducted such activities. For example, Qingzhou Library's "World Science Popularization Day" exhibition displayed dozens of science popularization boards on improving scientific literacy, low-carbon living, and opposing cults in the lobby, providing convenience for the public to learn science. Xinjiang Agricultural University Library not only established a specialized animal and plant specimen museum for long-term specimen exhibitions but also invited primary school students from rural areas in southern Xinjiang to visit the animal and plant specimen museum as part of its poverty alleviation project, with ethnic minority teachers providing serious explanations and answering questions.

2.2.5 Creative Experience Activities Creative experience activities are currently the most numerous type of library science popularization reading promotion and the most interesting to teenagers. These activities focus on cultivating innovative thinking, emphasize improving practical abilities through hands-on production, and aim to help users learn science and use tools, equipment, and technology for design, collaboration, and invention. Activity forms include electronic building block assembly, 3D printing experience activities, creative

handcrafting, and STEAM course training. Activities are equipped with various handcrafting materials, industry-standard technology, and advanced equipment, providing services such as laser cutting, 3D printing, game development, video production, and creative programming course guidance. For teenagers, such activities can stimulate their technological awareness, cultivate innovation and divergent thinking from an early age, and improve their scientific literacy. For example, Guangzhou Library's "Little Maker" and "Youth Art Workshop" sub-projects; Shanghai Pudong Library's maker classrooms and STEM science laboratories; and Changsha Library's "Creative Battle" Star City Maker Competition and New Triangle Maker Space·Makers Workshop. These activities are closely integrated with reading promotion, stimulating readers' reading interest and technological awareness during the creation and experience process, broadening readers' reading horizons, and improving their artistic creation abilities and scientific literacy.

2.2.6 Performance and Competition Activities Performance and competition activities provide participants with platforms for learning, understanding, and practicing knowledge through artistic performances, competitions, or contests, disseminating scientific knowledge and promoting scientific spirit to users. Science popularization performances mainly include science popularization stage plays such as dramas and musicals, which integrate scientific, ideological, and artistic elements. Through this 演绎 (performative) approach, performers can more deeply understand the scientific themes and content they express, while audiences can gain more intuitive understanding of science popularization themes while watching interesting performances. Competition activities mainly include essay contests, reading contests, speech contests, knowledge competitions, and creation contests. Currently, seven surveyed libraries have conducted such activities. For example, Beijing Tongzhou District Library, in cooperation with schools, implemented science popularization drama competitions for teenagers around themes such as ecological civilization, scientific knowledge, and nature exploration, allowing students to write, direct, and perform science popularization stage plays. The activities are lively and interesting, stimulate participants' imagination, enhance scientific awareness, and promote their profound mastery of science popularization knowledge. Other examples include Zhangjiagang Suzhou Industrial Park Library's Gao Shiqi Science Popularization Creative Works Competition and Taicang Library's Science Popularization Knowledge Fun Quiz, whose competitive formats greatly attract broad reader participation.

2.2.7 Digital Media Activities Digital media activities refer to activities that use digital text, graphics, images, sound, video, and animation to disseminate scientific knowledge and promote science popularization reading. This is a reading promotion activity based on digital and information technology, with carriers including both internet media and other digital media forms not based on internet platforms, such as mobile TV, touch media, online resource

platforms, and outdoor LED displays. For example, Qingzhou Library set up a "Science Popularization China" video broadcast window on the startup interface of 130 computers in the electronic reading room (playing videos such as the origin of oxygen, China's Tiangong-2, and the secret of fresh air) and continuously played "Science Popularization China" V-video science popularization videos on the LED screen in the library lobby, providing great convenience for citizens to learn scientific knowledge. Additionally, five libraries have established science popularization digital resource platforms, such as Zhangjiagang City Library's "Mathematics Science Popularization Reading Window" digital resource broadcast platform and Jinling Library's Weizhitang digital resource platform, fully demonstrating that libraries are keeping pace with digital era development, conducting science popularization reading promotion activities through online-offline integration, and promoting the development of library reading promotion.

Overall, among these seven science popularization reading promotion activity types, lecture and training activities are the most common form, with the most libraries conducting them; creative experience activities are the most numerous type, integrating science, art, reading, creativity, and handcrafting, providing great convenience for readers to learn about science, technology, engineering, art, mathematics, and related knowledge. Digital media activities, being an emerging type with information technology development, require good mastery of digital media technology, and the creation and operation of digital resource platforms require more human and material resources and higher quality and technical requirements for relevant management personnel, resulting in the fewest libraries conducting such activities. Additionally, different target audiences lead to different activity type selections; performance and competition, creative experience, and interactive communication activity types are more suitable for minors and can also involve parents to increase parent-child communication and sharing.

2.3 Target Audiences of Science Popularization Reading Promotion Activities

The original intention of science popularization reading promotion activities is to disseminate scientific and cultural knowledge to readers, with activities revolving around readers. All work during activity implementation is related to readers. Overall, the target audience of science popularization reading promotion activities is the general readership, but some activities target specific groups. Therefore, analyzing the target audiences of science popularization reading promotion activities is essential. This study conducted demographic statistical analysis on the audiences of 127 activities from the 20 surveyed libraries, summarized patterns, and categorized activity audiences by age and special characteristics.

2.3.1 Age Perspective The target audience range of library science popularization reading promotion activities is broad, which can be divided into adults and minors from an age perspective. Through statistical analysis, it was found that except for the Chinese Academy of Sciences Documentation and Information Center, whose main service targets are adults, other libraries have conducted various science popularization activities for different groups. As shown in [Figure 2: see original paper], 63 science popularization reading promotion activities (50%) target all age groups; activities specifically for minors total 56, accounting for 44%. For example, among the seven science popularization reading promotion activities conducted by Beijing Tongzhou District Library, four are specifically for minors. However, only seven activities target adults exclusively, accounting for just 6%. This indicates that minors are currently the main target audience for library science popularization reading promotion activities. Minors are the future of the nation and the hope of the ethnicity. To improve the scientific literacy of all citizens, we must start with minors. Therefore, libraries regard minors as the primary service targets for science popularization reading promotion activities, making them the main body of science popularization activities, cultivating their scientific awareness from an early age, disseminating scientific knowledge to them through diverse science popularization reading promotion activities, stimulating their interest in science and technology, and gradually enabling them to master scientific knowledge and enhance their abilities in communication, cooperation, and comprehensive problem-solving.

2.3.2 Special Characteristics Perspective From the perspective of special characteristics, target audiences can be divided into general populations and vulnerable groups. Vulnerable groups here include visually impaired persons, elderly people, disabled persons, left-behind children, migrant workers and their children, residents in remote areas, and military personnel under special restrictions. After in-depth analysis of the science popularization activity programs conducted by the 20 surveyed libraries, it was found that library science popularization reading promotion for vulnerable groups has improved to varying degrees in both coverage and depth.

(1) In terms of population coverage, activities are targeting an increasingly broad range of vulnerable groups. In addition to science popularization reading promotion activities for elderly people and rural residents, there are also science popularization activities for left-behind children and migrant workers' children. For example, Cangzhou Library's "Universal e-Era" activity is a smartphone usage training class specifically for elderly people, combining explanation with practical operation to popularize internet, WeChat, and smartphone usage for elderly people, enabling them to master basic smartphone applications faster and better. Hengyang Zhuhui District Library has specially conducted science popularization reading promotion activities for rural left-behind children, with rich activity forms such as science popularization painting exhibitions, book floating activities, science popularization book donation activities, literature

knowledge quizzes, and reading contests, thereby attracting more children and teenagers to participate.

(2) In terms of geographical coverage, science popularization reading promotion services are gradually extending to more remote villages or other areas. For example, Zhangjiagang City Library specifically conducted "Science Popularization into Communities" book 下乡 (rural outreach) activities for residents in remote villages and communities: using bookmobiles to penetrate remote communities and villages, delivering science popularization books and scientific information resources to the grassroots level, and providing science popularization cultural services for grassroots masses. Qingzhou Library, through its Qing Songshu Science Popularization Academy activities, established dozens of rural science popularization reading rooms in over a dozen villages, with each reading room providing about 1,000 agriculture-related science popularization books. In 2018, Qingzhou Library also selected over 20,000 books to deliver to various townships, carrying out "Serving the People in Rural Areas" activities, bringing science popularization knowledge to farmers' hands.

The above analysis shows that the service population range of Chinese library science popularization reading promotion activities is increasingly broad, with minors as the key service targets, and attention and emphasis on vulnerable groups gradually increasing. However, only a minority of libraries conduct science popularization reading promotion activities for vulnerable groups—only six of the 20 surveyed libraries (30%).

3 Featured Case Analysis of Chinese Library Science Popularization Reading Promotion

Among the 20 surveyed public libraries, this study selected three unique cases. These libraries have conducted diverse science popularization reading promotion activity programs with broad service populations, paying attention to minors' science popularization education while also emphasizing science popularization for vulnerable groups such as left-behind children, migrant workers, and their children, providing good demonstration effects for the industry.

3.1 Beijing Tongzhou District Library—"Tech Sundays"

In recent years, Beijing Tongzhou District Library has continuously increased and improved the intensity and quality of science popularization reading promotion work, united social forces, held a series of rich and diverse science popularization reading activities, created the "Tech Sundays" activity brand, and extended it into social life practice in various fields, fully leveraging the social effects of science popularization reading. The following sections mainly introduce several distinctive activities, as shown in .

** Distinctive Programs of Tongzhou District Library's Tech Sundays**

Program Name	Content and Format
"Science Popularization E-Know"	Format of "Explanation + Experience + Guided Operation": Introducers explain issues related to nutrition and health, daily necessities utilization, and life tips, revealing essences and principles, and guide users in conducting operational experiments. The main recommended books are practical life books that can solve practical problems and trigger thinking at different levels, guiding people to apply scientific principles to improve life quality and achieve the goal of "scientific living."
"Cross-Time" Science Popularization Column	Content includes the latest scientific and technological inventions and cutting-edge scientific research achievements. Format: Demonstration + Explanation + Operation. The column uses videos, images, and text to comprehensively display the connection between science and technology and real life, invites audiences to experience new technologies, breaks the time and space dimensions of science popularization reading promotion, and makes science popularization reading more coherent, interesting, and natural.
Tesla Laboratory (Classic Science Volume)	Content mainly includes classic physics experiments in mechanics, optics, electromagnetism, and fluid mechanics. Format: Explanation + Observation + Operation.
ISEE! Technology Salon (Modern Science Volume)	Content mainly includes 20th-century scientific exploration processes and major discoveries. Format: Guidance + Explanation + Display + Experience.
Blue Vision (Future Science Volume)	Content mainly includes biographies of scientific figures and the history of scientific thought. Format: Display + Discussion + Production.

Program Name	Content and Format
"Green Home"	Format of "Display + Discussion + Production": Video displays activity themes such as recycling principles of various waste items, new energy development, emerging biotechnology, and life science technology; then organizes audience discussions and learning to make practical green environmental protection items.

The "Cross-Time" science popularization column is a carefully planned "trinity" "cross-time" science popularization theme activity by the library service team. The three programs of "Tesla Laboratory," "ISEE! Technology Salon," and "Blue Vision" coordinate coherently, using three themes of "classic science," "modern science," and "future science" to comprehensively display the development process of science, making science popularization reading more hierarchical and richer. During activities, video resources are appropriately introduced, which to some extent enhances the attractiveness, appeal, and influence of science popularization reading. The "Green Home" activity mainly popularizes knowledge about natural environmental protection and sustainable development, discussing how science and technology can make the ecological environment more harmonious and human life better. Through this activity, the general public deeply feels the importance and relevance of scientific knowledge and ecological environment, learning to use scientific knowledge to protect their living homeland in daily life. Notably, these three distinctive programs run through the entire science popularization reading promotion activity, last for relatively long periods, and possess certain continuity. Moreover, during each activity, organizers recommend relevant science popularization books to readers, truly achieving promotion of science popularization reading through activities with significant effects.

3.2 Jinling Library—Science Popularization Alliance

Jinling Library has always attached great importance to science popularization work and established the Science Popularization Alliance on January 28, 2018. Initiated by Jinling Library and the School of Information Engineering of Nanjing Xiaozhuang University, alliance members include primary and secondary schools, science and technology popularization, science education, and social culture institutions, as well as well-known local self-media in Nanjing, with 14 first-batch alliance member units. The Jinling Library Science Popularization Alliance fully utilizes the resource advantages of the library and each member unit, consistently conducts rich science popularization reading promotion activities in various forms such as science popularization salons, exhibitions, experiments, lectures, and maker classrooms, and has formed four distinctive

sectors targeting minors: artificial intelligence robot series, STEM education series, Creative Classroom, and Science Show. Simultaneously, it actively promotes science popularization reading materials and vigorously advances readers' scientific quality construction with remarkable results. The following sections focus on introducing the four distinctive sectors of Jinling Library's science popularization reading promotion activities, as shown in .

** Four Distinctive Sectors of Jinling Library's Science Popularization Reading Promotion Activities**

Sector	Description
1. Artificial Intelligence Robot Series	Includes artificial intelligence robot exhibitions, film appreciation, and handicraft salons. Aims to popularize scientific knowledge among youth and cultivate interest in high technology such as artificial intelligence. Activities include Little Maker VR glasses, artificial intelligence handicraft experience activities, science popularization exhibitions, film appreciation, and VR experience.
2. STEM Education Series	Science Popularization Alliance collaborates with Creative Space to conduct lively and educational STEM science experiments, STEM game experience courses, smart classrooms, and handicraft production practices, integrating scientific knowledge into animations, driving practice with scientific thinking, and allowing minors to experience the fun of science in carefully prepared animations, optimizing thinking through games.
3. Creative Classroom	Programming course training activities introduced through library-school cooperation with Nanjing Xiaozhuang University, mainly targeting minors (parents can also participate). This activity not only improves minors' programming abilities but also helps broaden the width and breadth of their thinking, making thinking more agile.

Sector	Description
4. Science Show	Uses science experiments as carriers, allowing children to learn through scientific inquiry, answer questions through practical games, and cultivate thinking, observation, creativity, and communication abilities. Includes: Stage Science Show: such as smoke tornado, air cannon, tea color change, dry ice wonderland; Science Micro-classroom: DIY production such as starry sky cups and airplane models. Target audience: children aged 3-8 and their parents.

In addition to the four distinctive sectors introduced above, Jinling Library Science Popularization Alliance has also conducted multiple featured activities such as V-Bo Lecture Hall (wonderful lectures on nature's mysteries for citizens), Weizhitang·"Enjoy Watching" (online science popularization short video broadcasts covering society, life, technology, culture, and other categories), and "Colorful Winter, Wisdom Gathering at Jinling" Winter Camp (covering five days and ten sessions with diverse themes including fun science, mathematics programming, classic Chinese studies, and English picture books). Jinling Library emphasizes building distinctive brands and constructing supporting technology platforms, stresses diversified social cooperation, conducts rich and diverse science popularization reading promotion activities for all citizens, and has received widespread praise from users, providing valuable references for the industry.

3.3 Zhangjiagang City Library—"Wonderful Library" Science Popularization Station

In recent years, Zhangjiagang City Library has vigorously promoted science popularization innovation, emphasized science popularization brand building and resource integration, built the "Wonderful Library" Science Popularization Station, provided targeted science popularization services around reader needs, and held a series of science popularization reading promotion activities using resource and position advantages. It is one of the libraries with the most science popularization activity programs among surveyed libraries. This study summarizes and analyzes from two perspectives: regular science popularization theme activities and innovative science popularization services.

Zhangjiagang City Library's regular science popularization theme activities are rich in form, close to citizens' needs, and achieve good results. The library has created the "Cangjiang Citizens' Lecture Hall" brand activity, with themes mainly focusing on "healthy living," "green environmental protection," and "food safety," popularizing scientific knowledge for citizens in accessible and

easy-to-understand ways. Science popularization exhibitions are also colorful, including patriotism exhibitions, technology exhibitions, specimen exhibitions, and coin exhibitions, vividly displaying the colorful scientific world to citizens through images or physical objects. Additionally, the annual Science Popularization Publicity Week uses various forms such as science popularization lectures, book recommendations, book delivery to rural areas, knowledge competitions, reading assistance for elderly people, creative handcrafting for teenagers, and caring for migrant workers, allowing the masses to experience the unique charm of scientific knowledge.

Zhangjiagang City Library's innovative science popularization services include bookmobile rural outreach, establishing a "Home for Scientific and Technological Workers," establishing a book circulation center, and conducting "Sunshine Station" blind reading actions (see). Among them, the bookmobile rural outreach has become a convenient "mobile library" for villagers; the "Sunshine Station" blind reading action for visually impaired persons and the establishment of Zhangjiagang City Book Circulation Center fully demonstrate the library's attention and emphasis on vulnerable groups, reflecting the equality, fairness, and universality of science popularization. The "Zhangjiagang City Home for Scientific and Technological Workers," jointly established by the Municipal Science and Technology Bureau, Municipal Science Association, and the library, provides scientific and technological workers with professional services such as sci-tech novelty search and document delivery, as well as irregular expert lectures and report meetings, enabling them to access science and technology, market, and policy information more quickly. This service is a unique feature of Zhangjiagang City Library, relying not only on the library's information resources and professional information service talents but also emphasizing multi-party cooperation, expanding library services, helping improve science popularization activity quality, and enriching science popularization reading promotion activity services.

** Science Popularization Service Activities of Zhangjiagang City Library**

Activity Type	Description
Regular Activities	Mainly include science popularization book recommendations, knowledge quizzes, science experiments, science popularization lectures, and exhibitions.
Innovative Services	Bookmobile Rural Outreach: Entering villages and communities to provide on-site book borrowing, science popularization film screenings, and other services for villagers.

Activity Type	Description
	Establishment of "Zhangjiagang City Home for Scientific and Technological Workers": Provides multi-functional comprehensive information services for scientific and technological personnel including sci-tech novelty search, literature search, information training, and document delivery. "Sunshine Station" Blind Reading Action: Establishes reading rooms for visually impaired readers, configures equipment for blind people, conducts computer training, reading clubs, and "watching" movies for blind people. Establishment of Zhangjiagang City Book Circulation Center: Book delivery to rural reading rooms, establishment of 24-hour self-service book stations throughout urban and rural areas, renovation of community activity stations, and establishment of digital resource platforms.

4 Reflections on Science Popularization Reading Promotion Activities in Chinese Libraries

4.1 Based on Reader Needs, Close to Real Life

The smooth implementation of science popularization reading promotion activities cannot be separated from readers' active participation. To achieve higher activity evaluations and more effective implementation, it is necessary to carefully analyze and meet the differentiated needs of different readers and provide more comprehensive services. Currently, the target audiences of science popularization reading promotion activities are increasingly broad, with different groups having different characteristics and reading needs. Before conducting activities, libraries can distribute questionnaires or conduct interviews to deeply understand readers' needs for science popularization reading promotion services.

Minors are curious about everything, prefer interesting and challenging activities, and are particularly interested in technology practice, creative experience,

and performance and competition activities. They hope to learn scientific knowledge while experiencing infinite fun in library science popularization activities. Jinling Library Science Popularization Alliance has conducted four distinctive brand activities for minors. The industry can learn from this model to conduct more activities they enjoy, such as handcrafting, game programming, science performances, science popularization competitions, STEAM course learning, digital media training, and scientific invention creation, guiding minors to learn scientific knowledge through "play" and exert their creativity to make technological inventions.

For adults, science lies in application, and science popularization itself should be rooted in life. Therefore, they pay more attention to science popularization knowledge and hot issues in real life. In this regard, when conducting science popularization activities for the general public, libraries should try to stay close to mass needs and real life. For example, in science popularization lectures, topics should preferably focus on life knowledge, daily necessities utilization, nutrition and health, green environmental protection, and food safety issues. Explaining the principles behind these phenomena can not only generate strong and widespread resonance but also enable audiences to apply them in life to solve practical problems. Additionally, for vulnerable groups, more attention should be paid to their special needs, and suitable science popularization activities should be flexibly conducted according to library conditions to meet their needs as much as possible.

4.2 Enrich Activity Programs, Innovate Thematic Content

To ensure the long-term smooth implementation of science popularization reading promotion activities, it is necessary to constantly pay attention to the novelty and richness of thematic content, allowing readers to feel the innovation of activities. Currently, the 20 surveyed libraries have conducted multiple activity programs for different groups, but relatively novel digital media activities are still relatively few. From the current situation, new media and digital activities are still emerging activity types with characteristics of convenience, easy acceptance, and wide coverage, but they also have disadvantages of fragmentation, superficiality, and randomness. Therefore, to meet readers' needs, libraries should continuously strive to transform service models and use traditional resource advantages to compensate for the disadvantages of new activities. For example, traditional book recommendation activities can be combined with science experiments, 3D printing, AR, and VR science popularization experiences, using actual experience and operation to arouse readers' reading interest and using book guidance to stimulate readers' deep reading. In terms of activity theme selection, the scope can be expanded to include multiple series of activity themes such as current technology affairs, health and environmental protection, art and culture, astronomy and geography, life knowledge, STEAM education, and artificial intelligence. Moreover, for scientific activities such as science experiments, robot programming, and STEAM education, while enrich-

ing activity content, attention should also be paid to the classroom-like format and systematic content—that is, conducted activities should have continuity like classrooms, making readers' participation process more like "learning" than "simple experience," allowing readers who continuously participate to feel the coherence of learning to master scientific knowledge more profoundly. This "curriculum-based, systematic" approach further guides the development of subsequent science popularization activities, opening new ideas for enriching activity programs.

Additionally, libraries should gradually expand service reach and innovate service content, adopting different promotion methods for readers of different ages and acceptance levels rather than conducting blanket promotion. For example, for young readers aged 3-5, science popularization picture book explanations and animation exhibitions can be conducted to cultivate interest; for readers aged 10-18, science popularization competitions, maker activities, and STEAM education series activities can be conducted. Libraries can also learn from Zhangjiagang City Library's innovative science popularization services by implementing bookmobile rural outreach and establishing book circulation centers, compiling science popularization special issues for citizens, actively conducting scientific and technological information services, and building reader exchange platforms. In short, activity themes and forms should not be limited to the aforementioned seven types but can extend library services based on library conditions and conduct richer and newer science popularization activities.

4.3 Focus on Vulnerable Groups, Benefit All Citizens

In recent years, Chinese libraries have gradually improved science popularization reading promotion for vulnerable groups in both coverage and depth. For example, Hubei Provincial Library has specially established a Migrant Workers' Children Love Classroom, regularly teaching scientific knowledge and science popularization life knowledge to migrant workers' children aged 7-18 in the science popularization classroom, enabling them to cultivate scientific awareness and interests from an early age, improve scientific literacy, and feel special warmth and care. Zhangjiagang City Library's "Sunshine Station" blind reading action, bookmobile rural outreach, and rural reading room book circulation activities all reflect attention to vulnerable groups and efforts to extend library services to all citizens, providing strong examples worth referencing. However, overall, only a minority of libraries currently conduct science popularization reading promotion activities for vulnerable groups. Libraries undertake social education functions and have the obligation to conduct science popularization reading promotion activities for all citizens, especially vulnerable groups who should receive more attention. Therefore, Chinese libraries should conduct more science popularization activities for vulnerable groups such as blind people, elderly people, left-behind children, and migrant workers and their children, such as providing special science popularization services for disabled persons, opening science popularization summer camps for left-behind children or migrant

workers' children, establishing science popularization activity centers for elderly people, providing door-to-door services for blind people, and leading minors on field visits into nature. Libraries should cultivate minors' scientific innovation awareness and interest, commit to popularizing scientific knowledge and spreading scientific thinking for the general public, and strive to extend services to broader areas such as remote streets, towns, villages, or other regions to improve science popularization activity coverage.

4.4 Seek Multi-Party Cooperation, Improve Activity Quality

The smooth implementation and quality improvement of library science popularization reading promotion activities cannot rely solely on the library's own strength, especially for series activities such as maker space activities, science performances, and artificial intelligence, which require introducing appropriate resources, advanced technology equipment, professional service projects, and high-tech talents. This requires collaboration and mutual assistance from other professional institutions. For example, the successful implementation of Shanghai Pudong Library's "Digital Carnival" activity benefited from extensive social cooperation, jointly organized with Pudong New Area Science Association and nearly ten technology service and education industry units such as Shangye Technology and Chaoxing. Zhangjiagang City Library's "Zhangjiagang City Home for Scientific and Technological Workers" was also jointly established with the Municipal Science and Technology Bureau, Municipal Science Association, and other units. Therefore, libraries should actively seek cooperation with municipal science associations, science and technology museums, youth activity centers, technology service institutions, and other information service institutions, maintain good communication with them, achieve information exchange and resource sharing, and form a working pattern of joint efforts with division of labor and cooperation. For example, for professional programming course training, libraries can invite professionals from programming institutions or technology service institutions to conduct programming course training and technical guidance for readers; for equipment, they can adopt "borrowing" and "renting" methods, first introducing equipment for experience, then signing subsequent procurement agreements based on usage and budget, which can not only provide readers with richer and more advanced equipment but also effectively control project costs. At the same time, libraries should strengthen their talent team building, improve the overall quality and professional capabilities of their work teams, thereby ensuring rich, complete, and high-quality activity content.

4.5 Strengthen New Media Utilization, Promote Digital Construction

In the digital era, how to perfectly integrate scientific knowledge with new media and digital technology to achieve maximum promotion effects, Shanghai Pudong Library provides a good reference for the industry. The library built a "Digital Experience Center" in 2016, created the "Digital Experience Carnival" science popularization practice project, and formed a model combining "listen-

ing + watching + reading + activity experience," attracting numerous participants with significant effects. Other Chinese libraries should also keep pace with the times, strive to integrate science popularization reading services, science and technology experience, and learning development, introduce, display, and promote new reading technologies, equipment, resources, and methods that meet era development, and build frontier positions for science popularization reading promotion and experience spaces for modern technology applications in the cultural field. Meanwhile, in science popularization reading promotion and publicity, new media utilization should be strengthened to attract broad public participation, such as using modern communication methods like QQ, WeChat, and Weibo for science popularization activity information publicity and registration; cooperating with micro-media of other cultural units or institutions (such as local education institutions and school cinemas) to conduct joint publicity through resource sharing; setting up science popularization columns or science popularization book reading on WeChat public accounts where readers can participate in online activities through daily check-ins, thereby further expanding the influence and dissemination power of library science popularization work.

Additionally, libraries should increase investment and strive to promote digital construction. In addition to adding mobile TV, touch media, outdoor LED displays for science popularization knowledge promotion, they should also introduce professional technical talents, establish online resource platforms for effective operation and management, such as building broader-coverage science popularization digital resource broadcast platforms, digital reading platforms, and online learning platforms, enabling the general public to access and learn rich science popularization resources anytime and anywhere without leaving home.

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