Citizen Science Services in American Academic Libraries: Practices and Implications (Postprint)

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Abstract

[Objective/Significance] This study reviews and summarizes the current state of citizen science services in university libraries in the United States, aiming to provide reference for developing citizen science services in Chinese university libraries.

[Method/Process] Nine U.S. university libraries that have implemented citizen science services were selected as research subjects. The analysis and summary focused on the establishment of "Citizen Science" sections on library websites, recommendations for citizen science projects and resources, and the organization of citizen science practice activities. Based on these findings, recommendations were proposed for Chinese university libraries.

[Results/Conclusion] Chinese university libraries should strengthen citizen science education to encourage active participation from librarians and the public; establish well-functioning "Citizen Science" sections on their websites; organize diverse citizen science activities; leverage makerspaces to advance citizen science services; create dedicated citizen science service positions; and utilize library associations and consortia to encourage and guide the development of citizen science services.

Full Text

Preamble

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Practice and Enlightenment of Citizen Science Services in American Academic Libraries

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Abstract

[**Purpose/Significance**] This paper summarizes the current state of citizen science services in American academic libraries to provide reference for developing such services in Chinese academic libraries. [**Method/Process**] Nine American university libraries that have implemented citizen science services were selected as research subjects. The analysis and summary cover the establishment of "citizen science" sections on library websites, citizen science project recommendations, resource recommendations, and the organization of citizen science practice activities. Based on these findings, recommendations are proposed for Chinese academic libraries. [**Result/Conclusion**] The paper suggests that Chinese academic libraries should strengthen citizen science education to guide librarians and the public to actively participate in citizen science practice; establish fully functional "citizen science" sections on library websites; carry out diverse citizen science activities; utilize makerspaces to promote citizen science service development; create dedicated citizen science service positions; and leverage the power of library associations and consortia to encourage and guide academic libraries in developing citizen science services.

1. Introduction

The continuous development of information science and technology, particularly in data informatics, graphical user interfaces, and GIS-based mobile Web applications, has facilitated the emergence of a new scientific paradigm—citizen science [**?**]. Also known as community science, crowd science, or public participation in scientific research [**?**], citizen science involves the public participating in scientific research through distributed collaboration via the Internet. In this research model, the public contributes to scientific creation by observing or recording natural phenomena, labeling or analyzing project data, and providing computational resources, playing an important role in analyzing and monitoring phenology, landscape ecology, macro-ecology, invasive species, populations, and diseases [**?**]. Consequently, many countries have explored citizen science initiatives. The U.S. government has established an official citizen science website (www.citizenscience.gov) that provides project directories, toolkits, and portal websites to promote the development of citizen science and research crowdsourcing in America [**?**]. European countries have also elevated citizen science to an important level, not only establishing the European Citizen Science Association but also supporting public participation in research through legal frameworks and green papers, such as the EU's Seventh Framework Programme [**?**] and the European Green Paper on Citizen Science [**?**].

In China, citizen science has gradually attracted attention. Since 2004, the Chinese Academy of Sciences has held an annual "Public Science Day" event every May, which has been successfully held for 14 sessions. In April 2013, scientists including Chen Bin from the Institute of Botany, Chinese Academy of Sciences, established the China Citizen Science Project Platform [**?**], which mainly involves citizen science activities such as bird and plant observation.

This platform has not only promoted environmental protection in China but also advanced citizen science education, exerting certain influence [**?**]. China's library and information science community has also recognized the role of citizen science in promoting a new library ecology and begun active exploration. In December 2016, the 13th Advanced Digital Library Seminar (ADLS) themed its conference "Digital Scholarship and Citizen Science: A New Ecology for Digital Libraries" [**?**]. The National Science Library and the National Library of China have actively participated in organizing Chinese Academy of Sciences Public Science Day events. For example, in May 2017, the National Science Library organized a series of activities with the theme "Dialogue with Science, Enlightenment through Reading," including science lectures, science culture reading salons, and exhibitions of wall decorations on "Important Technological Inventions and Creations in Ancient China" [**?**]. In May 2018, it held more than 10 science lectures, popular science book exhibitions, technology exhibitions, and interactive experiences under the theme "Spring of Science," which not only popularized scientific knowledge but also inspired the public's scientific spirit [**?**]. In May 2018, the Institute for the History of Natural Sciences of the Chinese Academy of Sciences and the National Library of China collaborated to hold a series of events at the National Library's Wenhui Hall, including the "Science and Technology History Masters Forum" and exhibitions on important scientific and technological inventions in ancient China [**?**].

In this new wave of public participation in scientific research, Chinese academic libraries, as important research support institutions, should fully utilize their advantages in rich information resources, user training experience, scientific data management expertise, and large user bases to actively provide services such as citizen science project recommendations, resource recommendations, data management, Internet access, and technical training. This would transform academic libraries into ideal citizen science support institutions, thereby realizing their social service value and enhancing their social influence.

2. Research Status and Methodology

2.1 Research Status

Using Google Scholar, Springer, CNKI, and Baidu Scholar, the authors conducted a comprehensive survey of research on citizen science services in libraries both domestically and internationally. The findings indicate that research in this area is still in its preliminary stages, though international research output exceeds domestic production. International research focuses primarily on two aspects: library support for citizen science and the impact of library citizen science activities on students. For example, C. M. Cohen et al. examined how academic libraries can participate in citizen science through two case studies, noting that libraries can provide data management, activity spaces, and related technologies and resources [**?**]. J. E. Bader pointed out that libraries can promote student participation in citizen science activities by recommending diverse citizen science projects, teaching information literacy skills, and providing re-

source support, thereby facilitating student learning and application of science and laying a foundation for future scientific research [?]. Domestic research themes mainly include the role of libraries in citizen science and library support services. For instance, Huang Mincong analyzed the opportunities and challenges for libraries in citizen science development based on an analysis of its current state and construction model characteristics [?]. Zeng Jing surveyed the status of citizen science in American universities and K-12 schools, analyzing the roles and services of libraries, as well as the resulting paradigm shifts and challenges [?]. Overall, current domestic research on citizen science remains relatively weak, with limited output and insufficiently comprehensive analysis of foreign library citizen science service practices. Therefore, this study examines American academic libraries, which are at the forefront of citizen science services, to analyze their current practices in detail and extract valuable lessons for Chinese academic libraries.

2.2 Methodology

This study selected 59 American university libraries from the QS World University Rankings 2018 [?] as initial survey subjects. Using Google, the search terms "citizen science" + "library" were used to identify the top 20 American university libraries in the search results. After removing duplicates, 62 university libraries were selected as preliminary survey subjects.

The study primarily employed website investigation methods, visiting each of the 62 library websites to verify whether they had established a "citizen science" section. The investigation found that only nine university libraries had established such sections: University of California, Los Angeles Library [?]; University of Wisconsin-Madison Library [?]; University of Illinois at Urbana-Champaign Library [?]; University of Southern California Library [?]; Arizona State University Library [?]; North Carolina State University Library [?]; St. Mary's University Louis J. Blume Library [?]; Duquesne University Gumberg Library [?]; and Iowa State University Library [?]. These nine libraries were selected as the final survey sample. Detailed information about citizen science services was then obtained through these library websites, including the main content of the "citizen science" sections and the types and content of service items. The survey was conducted from January 3 to March 1, 2018, with supplementary data collection from April 15 to 20, 2018.

3. Current Status of Citizen Science Services in American Academic Libraries

The investigation revealed a common characteristic: all libraries use their official websites as the primary platform for citizen science services, establishing dedicated "citizen science" sections to guide service delivery. Simultaneously, each library provides distinctive and diverse citizen science services. To clearly present the current status, this analysis focuses on two aspects: the establish-

ment of "citizen science" sections and the citizen science service projects and content.

3.1 Establishment of Library Website "Citizen Science" Sections

3.1.1 Section Names and Locations The "citizen science" section is established on library websites to aggregate relevant resources and provide opportunities and information for those wishing to participate in citizen science. It serves as an essential tool for teaching and research. All nine libraries named their sections "citizen science," indicating high recognition and acceptance of citizen science services in American libraries.

Regarding section placement, several libraries positioned the "citizen science" section within "Research Guides" or "Library Guides," parallel to subject-specific guides such as "Medicine," "Biology," "Economics," and "History." This demonstrates that citizen science is treated as an emerging discipline or subject area in American libraries. As shown in , the specific locations vary: UCLA, Wisconsin-Madison, USC, and Duquesne Gumberg libraries placed it under "Research Guides"; Illinois at Urbana-Champaign, Arizona State, and Iowa State libraries placed it under "Library Guides"; and St. Mary's Blume Library placed it under "Open Access."

3.1.2 Main Content of "Citizen Science" Sections The content of "citizen science" sections varies among libraries while maintaining distinctive features, as shown in . The University of Illinois at Urbana-Champaign Library emphasizes research and evaluation guidance for citizen science services. Arizona State University Library aims to establish itself as a community citizen science knowledge hub, featuring a dedicated sub-section titled "Libraries as Community Hubs for Citizen Science." The University of Wisconsin-Madison Library focuses on engaging community residents in university scientific activities, including sub-sections such as "STEM Education," "Broader Impacts," and "Library User Resources" to guide community participation.

In addition to these main sub-sections, some libraries include "Citizen Science News" and "Contact a Librarian" sub-sections. The news sub-section publishes relevant updates from both on-campus and external sources. The "Contact a Librarian" sub-section provides contact information, expertise areas, and departmental affiliations of subject specialists, enabling convenient consultation. Overall, these sub-sections complement each other to form comprehensive, user-friendly, and well-developed citizen science service guides.

3.2 Citizen Science Service Projects and Content

As shown in , the citizen science services provided by these nine American academic libraries cover multiple stages of the entire project lifecycle, including research question selection, team formation, volunteer recruitment, results dissemination, and impact assessment.

3.2.1 Project Recommendations The "Project Recommendations" section serves as the most direct, convenient, and important window for the public to learn about and participate in citizen science activities. A well-organized, diverse, and engaging project window not only provides multiple options for participants but also stimulates interest among potential participants. Therefore, project recommendation is a fundamental service offered by most libraries. These libraries emphasize both diversity and rationality in their recommendations—providing multiple project options while ensuring logical categorization for clarity. For example, the University of Illinois at Urbana-Champaign Library categorizes projects into Illinois-related and national projects, while the University of Wisconsin-Madison Library organizes projects into categories such as climate, plants, invasive species, water quality, and animals under the "Opportunities, People, and Projects" section [**?**].

For comparative purposes, recommended projects were classified into in-state and out-of-state projects. Most libraries emphasize in-state projects because they address actual local problems and needs (such as ecological pollution) while incorporating state characteristics and culture. This approach allows participants to contribute to their state while experiencing its cultural identity. Out-of-state recommendations are also comprehensive. For instance, Arizona State University Library's out-of-state projects include federal agency projects, projects from other citizen science portals, and virtual projects. UCLA's external projects include global projects and SciStarter projects. Thus, libraries demonstrate both commonalities in diversity and rationality while incorporating local characteristics.

3.2.2 Resource Recommendations Resource recommendations include citizen science books and journals, multidisciplinary databases, project support toolkits, organizations, and expert blogs. These resources are essential channels for understanding project information and obtaining support tools. Frequently recommended resources include purchased books, journals, and multidisciplinary databases, as well as relevant organizations and institutions. This approach improves resource utilization while leveraging external resources to compensate for local gaps, providing participants with rich and comprehensive resource access.

As shown in , all libraries except North Carolina State University Library provide two or more types of resource recommendations. The University of Illinois at Urbana-Champaign Library and the University of Wisconsin-Madison Library offer the most comprehensive resource recommendation services with the greatest variety. Libraries have developed three distinct resource recommendation models: (1) establishing a dedicated section for various resources (used by Arizona State, Wisconsin-Madison, and UCLA libraries); (2) combining resource recommendations with project evaluation (used by St. Mary's Blume Library); and (3) dispersing resource recommendations across various sub-sections (used by Illinois at Urbana-Champaign, USC, and Duquesne Gumberg libraries).

3.2.3 Research Guidance Research guidance primarily comprises two components: First, it provides reference concepts and terminology to help researchers locate articles and books on citizen science. For instance, the University of Illinois at Urbana-Champaign Library's "Citizen Science in Research" section advises users to search for articles using citizen science data with keywords such as "citizen science," "participatory science," and "crowdsourcing," adjusting them according to the relevant discipline [**?**]. Second, it offers open-access search engines and databases—including Google Scholar, Web of Science, Nature, and Galaxy Zoo publications—to help the public access additional relevant resources. Among the libraries surveyed, only the University of Illinois at Urbana-Champaign Library and Duquesne University Gumberg Library currently provide research guidance services; the others have not yet implemented such offerings.

3.2.4 Evaluation Guidance Citizen science project evaluation typically occurs in the later stages of the project lifecycle. After results dissemination and patent applications, project teams assess data collection quality, project value, and social impact to determine whether scientific and educational objectives were met, facilitating future utilization or identifying areas for improvement [**?**, **?**]. Some libraries provide guidance or demonstrations on evaluation methods. For example, the University of Illinois at Urbana-Champaign Library's "Evaluating Citizen Science" section provides articles such as "Evaluating the Contribution of Citizen Scientists to Butterfly Monitoring in Two Large Cities" and "Assessing Volunteer Performance in Mapping Invasive Plants in Public Conservation Areas." These articles demonstrate data accuracy and reliability through qualitative or quantitative methods, providing reference cases for evaluation [**?**]. St. Mary's Blume Library links to a user guide for evaluating citizen science outcomes in its "Evaluation and Resources" section, which includes practical overviews of evaluation techniques, tips and best practices, glossaries, and numerous templates and worksheets to aid evaluation planning and implementation [**?**].

3.2.5 Citizen Science Practice Activities In addition to establishing website sections, some libraries actively organize citizen science practice activities as initiators and planners, including forming project teams, establishing community citizen science centers, selecting citizen science stars, and conducting series of activities. Arizona State University Library and North Carolina State University Library have developed particularly distinctive practices.

Arizona State University Library's citizen science practices include three aspects: (1) collaborating with the College of Public Service and Community Solutions to form an interdisciplinary team of faculty and librarians to develop field-tested, replicable citizen science resource toolkits for public libraries, create resources to train and support librarians and citizen scientists, and develop plans with stakeholders to expand this service model statewide and nationally [**?**]; (2) organizing a series of "Citizen Science Star" interviews, such as project

team member R. Tanner interviewing SciStarter founder D. Cavalier about the importance of citizen science, and D. Stanton interviewing Dr. P. Christensen about his passion for science and citizen science projects [?]; and (3) establishing itself as a community citizen science hub by organizing "Citizen Science Day" events to promote university citizen science activities to community residents and encourage their participation. For example, on April 4, 2018, the library held a webinar titled "Citizen Science in Libraries: Fostering Community Connections on Citizen Science Day and Beyond," inviting experts to introduce the library website's citizen science section and highlight special activities supporting the library's role as a community hub [?, ?].

North Carolina State University Library has held three citizen science challenges: Fall 2016, Fall 2017, and Spring 2018. These challenges select campus or nearby areas as activity venues, focusing on local flora and fauna to attract student and community participation. Each challenge features a different theme with related activities and extensive promotion. The Fall 2016 challenge required students, faculty, and staff to use professional-grade trail cameras provided by the library to track wildlife on campus, with winners receiving carefully designed prizes [?]. To promote the challenge, the library created two new webpages: one detailing the "Wolfpack Citizen Science Challenge" ("Wolfpack" is NCSU's nickname, not a specific animal type), and another highlighting all campus citizen science projects. Additionally, on August 20, library staff promoted the challenge at NCSU's fifth annual Packapalooza street festival, and on August 30, R. Kays from NCSU used data from the eMammal citizen science project to explain coyote migration patterns while presenting recent research findings [?]. Extensive promotion and reasonable incentive structures attracted enthusiastic participation from students and community members, achieving excellent results.

4. Implications for Chinese Academic Libraries

Citizen science services in American academic libraries are flourishing, with increasing numbers of participating libraries and continuously expanding service content. These services not only popularize scientific knowledge and enhance public understanding of and interest in science but also engage the public in scientific research, contributing to scientific advancement. Citizen science services are becoming a new growth point for academic library services.

To understand the current development of citizen science services in Chinese academic libraries, the authors conducted a comprehensive survey of 42 first-class university libraries in China [?]. Searches using the libraries' names plus "citizen science" or "citizen research" on Baidu, Bing, and Google yielded no relevant information. Additionally, searches on the libraries' official websites using their internal search functions produced no results regarding citizen science services. This indicates that Chinese academic libraries have low awareness and participation in citizen science services, leaving considerable room for development. Drawing on advanced American experiences and considering the

current state of Chinese academic library development, this paper proposes several recommendations to promote citizen science services in Chinese academic libraries.

4.1 Strengthen Citizen Science Education to Guide Librarians and Public Participation

Successfully promoting citizen science services in libraries requires librarian support and public participation. Therefore, education and training are needed to help librarians and the public understand and embrace citizen science services. For example, Arizona State University Library formed a citizen science project team responsible for educating and training librarians and citizen scientists, as well as developing citizen science plans, which proved effective [**?**]. Chinese academic libraries can adopt this approach by organizing citizen science training workshops or seminars, inviting experts to introduce international citizen science development and library practices, and helping librarians and the public become familiar with these services. After training, materials such as videos, PowerPoint presentations, and records should be compiled into a dedicated citizen science learning resource repository. For librarians as the main service providers, field study visits to well-developed foreign libraries represent an effective self-education method. When possible, Chinese academic libraries should provide opportunities for promising librarians to visit foreign libraries to comprehensively understand and learn from advanced practices, cultivating them as future leaders in citizen science services.

4.2 Establish Fully Functional "Citizen Science" Sections on Library Websites

Successful citizen science projects require a network platform or community that can gather large numbers of users, organizing professional scientists, citizen scientists, and partners [**?**]. Since academic library websites host large numbers of students, faculty, and community members, they can serve as ideal platforms. Libraries should establish "citizen science" sections parallel to traditional subject guides, offering resource recommendations, project recommendations, evaluation guidance, and research guidance.

Section Content Should Balance Comprehensiveness and Rationality: Comprehensiveness requires diverse functions, including resource recommendations, project recommendations, research guidance, evaluation guidance, and online consultation. Rationality requires logical page layout, grouping similar content to avoid confusion and enhance user experience.

Establish Thematic Citizen Science Resource Repositories: Drawing on American practices, libraries should integrate e-books, journal articles, audiovisual materials, and other 馆藏 resources related to citizen science, supplemented by online information resources collected or developed through the Internet, to create distinctive thematic repositories providing one-stop, convenient resource

access.

Recommend Meaningful Projects in the "Project Recommendations" Section: Many Chinese environmental protection associations have launched citizen science activities, such as the "Bring Leopards Home" initiative by the China Felid Conservation Alliance and the winter survey of Chinese mergansers organized by the Zhuque Society [**?**]. These meaningful projects suffer from insufficient promotion and low participation. By introducing these projects to campuses, academic libraries can attract numerous science enthusiasts, expand project influence, and provide more research opportunities for interested students and community members. Libraries should collaborate with associations and research institutions to promote these projects through their "project recommendations" sections, serving as a bridge for participation.

Promote the "Citizen Science" Section Through Social Media: After establishing the section, libraries should leverage influential social media platforms such as WeChat, Weibo, and blogs to publicize the section, helping the public understand what citizen science is and the functions of the library's citizen science section, gradually guiding public usage.

4.3 Conduct Diverse Citizen Science Activities

Citizen science services require both website sections and diverse activities as supplements. North Carolina State University Library has successfully organized three citizen science challenges and various series of activities, creating a distinctive brand that has gained widespread recognition and significantly advanced its citizen science services [**?**]. Chinese academic libraries should similarly use the library as a platform and students and community members as primary participants to organize diverse activities, considering two key points:

First, libraries should design activity projects based on their institutional strengths. Each university has key disciplines and specialties. Libraries should prioritize citizen science activities that reflect their institutional advantages to attract more student participation. For example, universities strong in astronomy could introduce projects like Galaxy Zoo [**?**], while those strong in biology could introduce projects like Evolution MegaLab [**?**].

Second, libraries should employ reasonable incentive mechanisms to encourage participation. The fundamental purpose of diverse activities is to attract participants and promote public engagement in scientific research. Libraries can establish reward systems or create sections such as "Citizen Scientist Profiles," "Citizen Science Events," and "Citizen Science News" to publicize upcoming activities and attract participants.

4.4 Utilize Makerspaces to Promote Citizen Science Development

Driven by the global maker movement, Chinese academic libraries have been actively constructing makerspaces. Both the maker movement ("everyone is

a maker") and citizen science ("public participation in scientific research") advocate public engagement in innovation and creation, making them mutually reinforcing. Therefore, academic libraries can combine citizen science services with the maker movement, leveraging existing makerspace resources and popularity to advance citizen science services while using citizen science's creativity and scientific rigor to inspire more ideas and promote conceptual collisions.

Arizona State University Library pioneered this integration by hosting a Citizen Science Maker Summit in October 2016 to explore the convergence of citizen science and the maker movement. The event included keynote speeches, informal discussions, and skill-building workshops, attracting many citizen scientists and makers [**?**].

Chinese academic libraries can adopt the following measures: (1) Dedicate makerspace areas to introduce citizen science through exhibitions, videos, and case presentations to attract potential participants; (2) Encourage makers to design activity toolkits for citizen science projects, leveraging makerspace equipment such as 3D printers, modeling software, and measurement instruments; (3) Establish a "Citizen Science" communication group bringing together participants and makers to exchange ideas and stimulate innovation.

4.5 Establish Dedicated Citizen Science Service Positions

Citizen science project implementation involves multiple stages requiring expert coordination [**?**]. Some institutions have begun hiring citizen science specialists, such as Bosque School in New Mexico, which recruited citizen science staff to develop plans for students and create field education programs [**?**]. Chinese academic libraries should establish dedicated citizen science service positions, hiring qualified professionals familiar with citizen science and trained in library and information science. Although the surveyed libraries have not yet created such positions, they have embedded "Ask a Librarian" links in their citizen science sections, providing contact information for subject specialists (often with interdisciplinary backgrounds) to answer questions. For example, Duquesne Gumberg Library's citizen science consultation is handled by R. Miller, the subject librarian for biology and chemistry, with email and phone contact information provided [**?**]. Chinese libraries can initially train existing subject librarians with interdisciplinary backgrounds to serve as citizen science librarians.

4.6 Leverage Library Associations and Consortia to Encourage and Guide Citizen Science Services

Internationally, library consortia and associations actively promote citizen science. In 2013-2014, the University of California and the Association of College and Research Libraries (ACRL) Science and Technology Section collaborated with the Los Angeles County Museum of Natural History on citizen science initiatives, surveying existing practices and future directions [**?**, **?**]. China's library associations and consortia, with members across all types of libraries

nationwide, possess significant influence and represent important social forces advancing the library profession. They should play a leading role by organizing training, lectures, conferences, and 征文 activities to create a top-down atmosphere for developing citizen science services. Additionally, they should issue guiding documents such as "Guidelines for Library Citizen Science Services" to clarify service content, methods, target audiences, and funding sources, providing authoritative guidance for practice. In April 2016, IFLA released its "IFLA Strategic Plan 2016-2021," proposing to develop strategies and action plans to guide libraries in supporting regional, user-participatory public research activities [**?**].

5. Conclusion

For Chinese academic libraries, citizen science services represent a new, promising, and worthwhile service area. This study surveyed American academic libraries at the forefront of citizen science services, finding that they typically use official websites as platforms, establishing dedicated "citizen science" sections to provide services including project recommendations, resource recommendations, research guidance, evaluation guidance, and activity organization—covering multiple stages of the citizen science project lifecycle. Notably, during the four-month investigation period, citizen science services in American academic libraries developed rapidly, with increasing numbers of participating libraries and continuously improving service content, indicating growing attention that foreshadows citizen science becoming an important library service. Therefore, Chinese academic libraries should seize this opportunity, learn from American experiences, and vigorously develop citizen science services suited to China's national conditions to promote the rapid development of citizen science in China.

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Author Contributions

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The Practice and Enlightenment of Citizen Science Service in American Academic Libraries

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Abstract: [Purpose/Significance] This paper summarizes the current state of citizen science services in American academic libraries to provide reference for developing such services in Chinese academic libraries. [Method/Process] Nine American university libraries that have implemented citizen science services were selected as research subjects. The analysis and summary cover the establishment of "citizen science" sections on library websites, citizen science project recommendations, resource recommendations, and the organization of citizen science practice activities. Based on these findings, recommendations are proposed for Chinese academic libraries. [Result/Conclusion] The paper suggests that Chinese academic libraries should strengthen citizen science education to guide librarians and the public to actively participate in citizen science practice; establish fully functional "citizen science" sections on library websites; carry out diverse citizen science activities; utilize makerspaces to promote citizen science service development; create dedicated citizen science service positions; and leverage the power of library associations and consortia to encourage and guide academic libraries in developing citizen science services.

Keywords: American academic library; citizen science service; enlightenment

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