Development Trends of Academic Libraries in the Context of Transformation and Change: An Interpretive Analysis of the 2012-2018 ACRL Top Trends in Academic Libraries Reports (Postprint)

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Abstract

[Purpose/Significance] This study compares and analyzes four ACRL "Top Trends in Academic Libraries" reports published between 2012 and 2018, aiming to provide references for promoting the transformational development of academic libraries in China.

[Methodology/Process] The study provides an in-depth interpretation of seven major development trends highlighted in the "Top Trends in Academic Libraries: 2018 Edition," including emerging trends in publisher and database vendor development, fake news and information literacy, library project management methodologies, textbook affordability and open educational resources, learning analytics and data collection and ethical issues, research data collection and text mining and data science, and collection management.

[Results/Conclusion] Recommendations are proposed, including drawing on advanced international experiences, developing a Chinese version of library trends reports, strengthening digital literacy education, paying attention to information ethics issues, and exploring evidence-based acquisition models.

Full Text

Research on Development Trends of Academic Libraries in the Context of Transformation and Reform: Interpretation and Analysis Based on the 2012–2018 Versions of the ACRL *Top Trends in Academic Libraries* Report

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Abstract: *[Purpose/Significance]* This article compares and analyzes four versions of the ACRL *Top Trends in Academic Libraries* reports from 2012 to 2018, aiming to provide references for promoting the transformation and development of domestic academic libraries. *[Method/Process]* The study focuses on interpreting seven major trends in the 2018 report: developments among publishers and database vendors, fake news and information literacy, library project management methods, textbook affordability and open educational resources, learning analytics and data collection and ethical issues, research data collection and text mining and data science, and collection management. *[Result/Conclusion]* The paper proposes recommendations including drawing on advanced foreign experiences, developing a Chinese version of library trend reports, strengthening digital literacy education, paying attention to information ethics issues, and exploring evidence-based acquisition models.

Keywords: ACRL; trend report; fake news; project management method; open educational resources; learning analytics; digital literacy; information ethics
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2 Comparative Analysis of Annual Reports

As shown in the comparison table of report contents (see Table 1), the trends covered in all four reports can be categorized into three dimensions: environment, resources, and services. First, from the environmental dimension, all reports emphasize creating better conditions for the educational development of universities and students. Whether discussing changes in the publisher and vendor environment or shifts in academic publishing payment models, the ultimate goal is to promote student success—a mission inextricably linked to libraries, which fully demonstrates the unique value and important social function of academic libraries. Second, from the resource dimension, academic libraries have increasingly focused on digital scholarship research and development in recent years, strengthening diversified resource construction and evaluation models.

They have discovered, developed, and utilized more open educational resources (OER) and e-books to support textbook payment programs, advancing resource procurement models to reduce student financial pressure and provide more free educational resources. Third, from the service dimension, all four ACRL reports explicitly state that libraries need to provide data services. From digital curation services in 2014 to research data services in 2016, and then to the 2018 report's emphasis on data collection and organization, knowledge mining, and data science, the depth and breadth of data services have continuously expanded. Additionally, the ACRL reports have addressed emerging trends such as altmetrics, digital scholarship, and ethical issues. Throughout the four reports, academic libraries have consistently prioritized student development as their starting point, striving to explore their potential knowledge connotations and service values, enhancing their core competitiveness, and seeking new business growth points and development space to meet users' diversified, personalized, and deep-level knowledge service needs.

3 Core Content Analysis

3.1 New Development Trends Among Publishers and Database Vendors

With the rapid development of emerging information technologies such as mobile internet, cloud computing, big data, and artificial intelligence, the traditional publishing industry has been transforming and upgrading to cope with drastic changes in technological market competition and user consumption habits. Abroad, publishers and database vendors no longer limit their business to traditional publishing and distribution but have begun expanding into knowledge discovery, analysis, production, and research, striving to become full-process providers of academic publishing from R&D to distribution. In August 2017, the academic publisher Elsevier, after acquiring the social science research network SSRN and the second-hand e-commerce platform Plum, further acquired the institutional repository and publishing platform Bepress, while Clarivate Analytics acquired Pubons (a peer review platform) and Kopernio (a plugin providing "one-click access" to academic papers for the academic community) [8]. Through such acquisitions, these two companies effectively connect various elements of academic research, enabling a single provider to complete the entire academic research and publishing process including funding provision, data collection and analysis, cross-institutional and cross-national cooperation, writing, publishing, and publication promotion.

In Europe (particularly Germany and the Netherlands), data vendors actively negotiate with major publishers to promote open access, becoming key drivers of sustainable development in the academic information ecosystem. To optimize access to licensed content, publishers, libraries, and other stakeholders are jointly committed to the "Resource Access for the 21st Century" (RA21) embedded collaborative initiative [9]. Meanwhile, HighWire Press (a publishing house established by Stanford University Library dedicated to academic

literature publishing) has collaborated with Google Scholar to develop the Campus Activated Subscriber Access (CASA) platform [10]. These tools propose a standardized federated online identity authentication system, allowing users to access all participating platforms with a single login without IP authentication or proxy servers. However, this system still faces many issues: (1) privacy concerns arising from online identity authentication and associated information aggregation; (2) potential challenges for small publishers to deeply participate in the collaboration process; and (3) increased access barriers for campus users.

3.2 Fake News and Information Literacy

The U.S. library community defines fake news as content that "relies on attracting attention or provocative material for widespread dissemination and impact on others." The IFLA statement on fake news during the 2018 World Library and Information Congress reaffirmed libraries' important role in providing technical means and methods to detect, identify, and combat false information. Librarians' professional expertise makes libraries irreplaceable in helping citizens critically evaluate information obtained online.

In China, information literacy education has become an important component of library orientation programs for new students. Online courses such as Pan Yantao's *Information Literacy General Tutorial: A Required Course for Digital Survival* and Huang Ruhua's *Information Retrieval* have become national-level excellent courses, receiving positive social feedback. Additionally, technical measures can be taken to address the challenges posed by fake news. For example, a *Washington Post* report on August 22, 2018, noted that Facebook had developed an AI-based reputation assessment system to evaluate and score user credibility to help distinguish true news from false [11]. However, it is worth noting that user reputation assessment also involves the collection of private data, and how to balance privacy respect with fake news prevention requires multi-party negotiation [11].

3.3 Library Project Management Methods

In the library field, project management focuses on adopting progressive, team-based approaches to solve large-scale digital projects, enabling libraries to effectively and efficiently optimize staffing models, collections, and budgets. As demand for knowledge and skills related to project management principles increases, many professionals traditionally trained in library and information science find themselves needing project management expertise and certification. For example, J. H. Walther incorporated project management into customized graduate courses and recommended wider use of this teaching method in library and information science education [12]. B. D. Currier, R. Mirza, and J. Downing argue that project management planning skills have always existed among libraries and librarians, but the increase in digital humanities projects requires librarians to adopt more systematic thinking and position themselves as collaborative partners rather than just service providers [13].

Abroad, project management has been widely applied in library automation systems and digital library construction processes. Although relevant research in China's library community started relatively late, practical cases have emerged, such as the "Project-Based Library" initiative at Foshan Library and the "Function-Project" composite management model concept at Shunde Polytechnic Library. As a public service organization influenced by emerging technologies and advanced concepts, libraries also need to introduce this strategic, systematic, and integrated advanced management concept to improve service efficiency, train staff, and promote efficient team management [14].

3.4 Textbook Affordability and Open Educational Resources

On August 16, 2018, the *2018 New Media Horizon Report (Higher Education Edition)* was officially released, identifying "the proliferation of open educational resources" as an important trend driving technology application in higher education over the next three to five years—a topic also mentioned continuously in both the 2016 and 2018 reports. Currently, challenges in OER application include difficulty finding relevant resources, scarcity of resources in certain disciplines, quality needing improvement, and slow content updates [15]. However, these obstacles can be resolved through collaboration between librarians and faculty. As an important component of open data resources, OER requires libraries to adopt new forms and measures to promote data literacy education as OER increases. For example, by integrating OER into curriculum systems, librarians can collaborate with faculty, subject librarians, and academic technology experts to identify available OER, evaluate OER quality, assist in developing OER resources, and attempt to integrate OER into course management systems (CMS), thereby promoting OER application through multiple measures.

Furthermore, to help students control educational costs and encourage faculty to select affordable courses, some institutions mark courses with "low-cost" and "zero-cost" textbooks in their course registration systems. Many libraries are also using e-books to support textbook affordability programs. These programs provide electronic access to textbooks and offer faculty catalogs of e-books that can be used in courses. However, market constraints such as digital rights management (DRM) restrictions, lack of login methods, and uninstalled software hinder e-collection support for textbook affordability programs. Some publishers and CMS platform products have proposed solutions to these issues. For example, EBSCO's Curriculum Builder integrates with Blackboard's content management system, enabling faculty to search EBSCO and quickly create links to content from CMS [16]. This method helps people realize that libraries are supporting faculty curriculum development in new ways through licensed content and demonstrates library value. In recent years, as China's "13th Five-Year" education informatization construction work has steadily progressed, domestic OER has shown a trend of diversified development, with increasingly rich digital resources and gradually promoted online learning spaces. Libraries can continue to collaborate with relevant institutions in promoting online teaching

platform construction and teaching model innovation, contributing to building a lifelong education system and promoting balanced educational development and learning method transformation.

3.5 Learning Analytics, Data Collection, and Ethical Issues

In the *2018 New Media Horizon Report (Higher Education Edition)*, "analytical technology" was included as an important technology likely to be adopted in the next 1-2 years, while "learning analytics," related to it, was also mentioned continuously in both the 2016 and 2018 reports. The term "learning analytics" originates from data mining of consumer activities in the commercial sector to grasp consumption trends. Learning analytics technology can link library materials and services with student performance indicators such as Grade Point Average (GPA) and retention rates. ACRL advocates in its *Academic Library Impact Report* that stakeholders should collaborate to achieve "statistical analysis and prediction of student learning conditions and achievements based on shared analytics." For example, the Bill & Melinda Gates Foundation has invested heavily in digital learning solutions, using the power of analytics technology to create personalized and adaptive learning experiences for students. However, learning analytics may violate ALA's Code of Ethics and conflict significantly with "the professional commitment to promoting intellectual freedom, protecting patron privacy and confidentiality, and balancing intellectual property interests among library users, their institutions, content creators, and vendors" [17].

In higher education, there is growing concern about quantifying student learning and experiences into measurable variables and using data to identify "at-risk" students. As university and research libraries become more involved in analytics program processes, ethical intervention in this field will become increasingly important. Librarians and other information experts are focusing on "how library discovery tools capture user data, share data, and share objects," and seeking to provide more precise and efficient services (such as marketing, discovery interfaces, and collection usage). However, these advancements may be achieved through user analysis, creating a contradiction between user services and user privacy. For example, proxy servers may involve collecting user IDs (and related demographic information) and associating them with that user's resource usage. Privacy, data aggregation, and data preservation issues must be considered and balanced with enhanced library services, ensuring continuous communication between campus IT departments and libraries [18].

3.6 Research Data Collection, Text Mining, and Data Science

With the development of E-science, research models are also quietly changing, moving toward data-intensive science, especially with increased demand for data science and quantitative research. Data sources have expanded from text and numerical data to multimedia data, social media data, hypertext, and hypermedia data. Related mining technologies and methods include various approaches from information extraction, information retrieval, natural language processing,

classification and clustering to text summarization [19]. Meanwhile, datasets face acquisition and management challenges, including licensing restrictions, access and ownership, support, maintenance, discovery, and costs. On March 17, 2018, the State Council promulgated the *Administrative Measures for Scientific Data*, China's first national-level data management regulation, which provides detailed provisions on data management, data sharing and utilization, and data security issues.

Currently, many libraries are researching and developing optimal solutions for managing, funding, and developing these dataset collections. Because data sources are typically heterogeneous and use different standards, data integration and interoperability are difficult. When processing datasets containing sensitive information (such as social media data, corporate data, and health data), privacy protection technologies must be carefully applied throughout the entire data integration, sharing, and processing stages [20]. Regarding copyright protection, since many datasets are protected by copyright, fair use rights may be limited by licenses. Librarians can assist researchers by clarifying relevant legal issues and negotiating licenses with publishers. In terms of technology application, librarians can provide support in resource digitization, data extraction, data preparation, and even data analysis model design. For example, at the end of text and data mining projects, libraries can help preserve datasets for reuse, assist researchers in contributing to open-access datasets, and discover record metadata. The application of these emerging technologies places high demands on librarians' professional competencies, requiring them to continuously strengthen their learning and improve their data science capabilities to adapt to the requirements of the big data era.

3.7 Collection Management

3.7.1 Development of Acquisition Models In recent years, Demand-Driven Acquisition (DDA) models have continuously developed. Many libraries have established cooperation with vendors to develop new DDA programs, eliminating the practice of short-term book loans (especially for key titles) to libraries and providing non-DRM (digital rights management) access models to university press resources. Although key resource databases have relatively scarce content, collaborators are working to provide more DRM-free resources and promote book procurement from wholesalers. Evidence-Based Acquisition (EBA) model represents a new development in procurement models. Under this model, libraries provide publishers with a catalog of titles in advance and then select an agreed-upon number of books for permanent ownership. While this model is attractive to both libraries and publishers, the EBA model has the following main concerns: (1) the need for long-term subscription commitments due to potential changes in e-book usage across disciplines, and (2) the need for sufficient statistical data for decision-making. Additionally, many domestic university libraries have also begun to adopt PDA models. For example, Jiangsu University Library, in collaboration with Xinhua Bookstore, launched

a "You Choose Books, We Pay" program to meet the personalized reading needs of teachers and students. The library's original collection structure and book purchasing model are also continuously adjusting to cope with changes in various library procurement models.

3.7.2 Open Access Collection Development Policy and Funding The open access trend was listed in the 2014 report and mentioned again in the 2018 report. Compared with four years ago, domestic research on open access policies, models, and platform construction has made new progress. Currently, open access program funding faces dual challenges from collection budgets and policies. D. W. Lewis [22] proposes that libraries could consider allocating 2.5% of their budgets to support open access infrastructure construction. According to open access investment regulations and each library's budget, 2.5% would have a substantial impact on collection budgets. Accumulated over time, if libraries invest 2.5% of their budgets in open access, this would significantly impact open access initiatives. Therefore, collection managers have the responsibility to establish clear policies with detailed indicators for supporting and investing in specific open access programs and projects. Open access may have profound impacts on library management models, information resource construction scope, information organization, and information service methods.

3.7.3 Traditional Print Collections Some new large-scale print retention programs are at different development stages. For example, the HathiTrust Copy Retention Program has cumulatively preserved over 4.8 million print volumes from member institutions. As libraries digitize their collections and purchase more electronic resources, the library community has discussed print collection management and promoting print collection usage. For instance, the A. W. Mellon Foundation funded a report from Arizona State University on openstack collections, which attempted to achieve personalization and diversification of the library's collection resources and help library development through marketing strategies [23]. In recent years, one of the frequently discussed library development trends in the international library community has been to "emphasize print resource construction and highlight characteristic collections." Cheng Huanwen, Director of Sun Yat-sen University Library, believes that "library resource construction should maintain parallel development of digital and print resources" and has put this concept into practice. In the past three years (2015-2017), Sun Yat-sen University Library's annual acquisition volume exceeded 100,000 titles, and by December 2017, the total collection had expanded from 3 million volumes in 1992 to 6.85 million volumes [24].

4 Recommendations

4.1 Learn from Foreign Advanced Experience and Develop Chinese Versions of Library Trend Reports

In recent years, foreign library trend reports have emerged continuously. For example, IFLA's *IFLA Trend Report* has released 2013, 2016, and 2017 versions; the New Media Consortium (NMC) released three *NMC Horizon Report (Library Edition)* versions in 2014, 2015, and 2017; ACRL has continuously released four *Environmental Scan* reports and five *Top Trends in Academic Libraries* reports; and the American Library Association (ALA) has released the *State of America's Libraries Report* for 13 consecutive years, attracting widespread attention in the international library community. Additionally, OCLC's *The Realities of Research Data Management* report and the Pew Research Center's *Libraries at the Crossroads* and other related thematic series reports are also released periodically. These international organizations' predictions and analyses of various new concepts, technologies, and problems encountered in library development enable us to better face various opportunities, risks, and challenges in future library development.

In China, apart from the *China Library Yearbook* regularly published by National Library of China Publishing House annually, there are relatively few national-level predictive or in-depth analysis reports on library career development. Given this situation, while strengthening learning from and drawing on important foreign LIS reports, we should also take initiative to attempt to develop Chinese versions of library trend reports. In March 2018, the Smart Learning Institute (SLI) of Beijing Normal University cooperated with the New Media Consortium (NMC) to publish the *2018 China Vocational Education Technology Outlook: Horizon Project Report* (data collection for this report was jointly completed by NMC and SLI, and report writing was completed by SLI) [25]. Using this as a model, could the Chinese library community, led by national library professional organizations such as the Library Society of China, cooperate with international organizations like IFLA, OCLC, and the Pew Research Center to organize domestic and foreign industry experts to develop regional LIS reports with Chinese characteristics, such as *China Library Career Development Report*, *China Academic Library Development Trend Report*, or *2018 China Library Development Outlook: Horizon Project Report*? This would not only provide decision-making support for the transformation and upgrading of domestic library careers but also promote Chinese wisdom academic achievements to the world and expand international influence.

4.2 Strengthen Digital Literacy Education

As a research field of key international concern in recent years, digital literacy saw several important reports or standards issued in 2017 alone, including *Digital Literacy in Higher Education II: New Media Consortium Horizon Project Strategic Brief*, *IFLA Digital Literacy Declaration*, and *EU Digital Competence*

Framework DigComp 2.1. As digital literacy becomes increasingly important in higher education, many highly educated people also recognize the need to improve digital literacy. For example, according to the *UK 2017 Student Digital Experience Tracking Report* based on a survey of 22,000 students, over 80% of university students believe digital skills are very important in their careers [26].

Currently, China has not yet issued laws or guiding documents related to digital literacy, and the organization of digital literacy education courses is relatively loose. To better improve user digital literacy, on the one hand, it is recommended that government agencies or library professional organizations could refer to international practices and experiences, draw on the research and revision processes of foreign digital literacy frameworks and standards, and establish and improve digital literacy education models suitable for China. On the other hand, as the frontline of digital literacy cultivation, academic libraries should actively participate in teaching related courses. For example, the University of Edinburgh in Scotland offers a self-study course—"23 Things for Digital Knowledge"—that helps students develop digital and online skills through experiments and applications. Domestic universities such as Sun Yat-sen University and Wuhan University have also offered general education courses related to digital literacy, achieving good results [27].

4.3 Pay Attention to Information Ethics Issues

Information ethics emerges alongside information progress and, in turn, influences the development of information technology. As long as information technology continues to advance, new fields will continuously emerge, generating problems that cannot be solved within existing ethical frameworks and constantly triggering information ethics issues. Therefore, information ethics is a never-outdated research topic. Ethics issues were first addressed in the 2018 report and were repeatedly mentioned in three trends—"New Development Trends Among Publishers and Database Vendors," "Fake News and Information Literacy," and "Learning Analytics, Data Collection, and Ethical Issues"—highlighting the importance and sensitivity of the issue. Taking "learning analytics" technology as an example, this technology can track students' learning resources and learning behavior records in the form of big data collection, enabling teachers to comprehensively and instantly grasp individual effects and group processes [28]. This is beneficial for identifying lagging student groups and providing early diagnosis of learning behaviors, but it inevitably requires collecting some learners' private information. How to ensure that private information is not leaked, how to protect users' privacy rights, and how to use user data reasonably and effectively (involving the ownership of information property rights) are not only technical issues but also involve ethical and legal issues. On the one hand, we must improve the regulatory mechanism for information ethics in data utilization, such as accelerating the formulation of information ethics-related laws and regulations at the national level. On the other hand, while strengthening user information ethics education, we should

enhance research and development of data science-related technologies to prevent and resist information ethics issues in data utilization from the technical level.

4.4 Explore Evidence-Based Acquisition Models

Evidence-Based Acquisition (EBA) model, based on "acquisition of best evidence," organically combines librarians' acquisition experience and professional knowledge with user information needs and expectations and best practice research evidence. It is considered a relatively new resource procurement model that academic libraries can "afford" and has been promoted in foreign libraries such as the University of Denver Library and the University of Colorado Library with good results. While affirming that EBA has many advantages, we should also view it dialectically, starting from the actual needs of national and library conditions to avoid blindly following trends. For example, the "You Borrow Books, We Pay" activities currently carried out in many domestic libraries (generally referencing PDA) face issues such as unreasonable collection structure, declining collection quality, and activity budget overruns while better satisfying readers' autonomous selection rights. In the face of emerging procurement models such as bulk transactions, PDA, DDA, and OA, it is recommended that domestic libraries first conduct small-scale pilots for EBA application and introduce platform tools for evidence-based procurement such as GOBI (developed by EBSCO) and CollectionHQ (developed by Baker & Taylor) at the appropriate time. They should actively explore procurement methods and tools suitable for domestic libraries and gradually promote them after gaining certain practical experience [29].

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