

Research on Educational Services in University Libraries Based on Information Literacy

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Abstract: This study focuses on the innovative development paths of educational services in university libraries within the context of rapid digital technology evolution and profound changes in knowledge dissemination. It aims to enhance students' abilities to acquire, evaluate, and creatively apply information through a systematic service framework. Utilizing methods such as bibliometric analysis, cross-case comparison, and theoretical model construction, the research first clarifies the theoretical foundation for integrating information literacy education with library services. In accordance with the "Guidelines for Information Literacy Education in Higher Education Libraries," a four-dimensional analytical framework is constructed, encompassing service goal positioning, content system design, implementation path optimization, and effectiveness evaluation. By analyzing the practical experiences of university libraries both domestically and internationally, key issues such as insufficient supply-demand matching, inadequate depth of technological empowerment, and the lack of a collaborative mechanism among diverse stakeholders are identified. Consequently, three optimization strategies are proposed: first, establishing a tiered educational system of "basic literacy—composite skills—innovative thinking," integrating core modules such as literature retrieval, data literacy, and critical thinking; second, creating a diversified service model of "course embedding + project-driven + community-based learning," leveraging AI tools to develop personalized learning platforms and enhance participatory knowledge construction; third, developing a dynamic evaluation index system that incorporates information literacy training throughout the library's resource development, spatial services, and academic support processes. The conclusions indicate

that through precise content supply, deep integration of technology, and the establishment of collaborative mechanisms, university libraries can effectively serve as the main arena for information literacy education, providing crucial support for cultivating innovative talents suited to the demands of the digital age.

Keywords: Information Literacy; University Libraries; Educational Services; Digital Age; Competency Development

1. Introduction

1.1 Research Background and Problem Statement

In the context of digital technology's profound integration into higher education, the information environment is characterized by massive data, diverse formats, and instantaneous dissemination. According to the "Development Report on Digital Libraries of Chinese Universities" released by the Ministry of Education in 2023, the annual growth rate of physical resources in university libraries has plummeted to 1.2%, while the average annual growth rate of digital resources such as e-journals and theses has surged to 18.7%, with the digitization rate of library collections exceeding 68%. This shift presents multidimensional challenges to students' information processing abilities, necessitating mastery in cross-platform information retrieval, data visualization, and academic integrity. However, a survey from the National Data Platform for Higher Education Quality Monitoring in 2024 revealed that only 37.6% of universities include information literacy courses as mandatory, and 62.3% of students reported that library resource retrieval training fails to meet research needs, exposing a structural imbalance between educational service provision and talent cultivation goals in the digital age.

As the core carrier of information literacy education, university libraries are undergoing a paradigm shift in their educational functions. The traditional service model, primarily focused on literature retrieval courses, struggles to address the challenges posed by generative artificial intelligence (e.g., ChatGPT) regarding information validation and academic integrity. Scholars such as Wang Sheng et al. have noted that critical information literacy education is crucial to preventing "digital blind obedience" in the context of widespread generative AI tool application [5]. However, existing collaborations between libraries and academic departments often encounter barriers, with 68.5% of universities lacking a cross-departmental information literacy education joint meeting system (according to 2024 survey data on library education services). On the technical empowerment front, although 82% of "Double First-Class" university libraries have deployed intelligent Q&A systems, these systems generally operate at a basic consultation level, with fewer than 30% integrating advanced technical applications into course design [1][6]. Against this backdrop, this study focuses on the innovative integration of information literacy and library education services, aiming to address the following core questions: How can an information literacy education content system that aligns with the characteristics of the digital era be constructed? What mechanisms should university libraries adopt to achieve a paradigm shift in educational service models? The answers to these questions are not only crucial for the modernization of the educational functions of libraries but also directly impact the core competency development of innovative talent in higher education.

1.2 Review of Domestic and International Research Status

The domestic academic focus on information literacy education began in the 1990s, initially concentrating on the reform of literature retrieval courses. With the release of the "Guidelines for Information Literacy Education in Higher Education Libraries" (2020), research has shifted towards building service systems within a "big information literacy" framework. Scholars like Hu Jun have systematically analyzed the application scenarios of artificial intelligence technology in information literacy education and proposed a trinity educational

model of "technical tools-cognitive ability-ethical norms" [6]. The Liu Hongwei team has explored pathways for personalized learning support using AI technology, emphasizing the integration of information literacy training throughout the research data management process [1]. Practically, Fudan University Library has promoted librarian role transformation through the construction of a "competency matrix," and the Intellectual Property Information Service Center at Shanghai Jiao Tong University has developed a patent information service model, providing practical templates for subject-specific information literacy education [7][9].

Internationally, research is led by the "Framework for Information Literacy in Higher Education" published by the Association of College and Research Libraries (ACRL) in 2016, focusing on embedded education and digital academic literacy. Through an analysis of AI LibGuides at foreign university libraries, scholars like Zai Bingxin have found that their information literacy education has formed a three-tiered progressive system focusing on "tool-oriented-competency-oriented-innovation-oriented" approaches, emphasizing the inclusion of technical competencies such as machine learning and data visualization [4]. The "embedded information literacy education" model implemented by Cambridge University Library has improved students' information retrieval accuracy by 40% through collaborative syllabus development with faculties [4]. Moreover, the Japan University Library Association (JULAC) has established an information literacy certification system covering undergraduate to doctoral levels, emphasizing the cultivation of cross-cultural information processing skills.

Despite progress in theoretical frameworks and practical pathways, existing research exhibits three notable gaps: first, insufficient dynamic analysis of the evolving connotations of information literacy driven by digital technologies (e.g., blockchain, metaverse); second, a lack of in-depth deconstruction of collaborative mechanisms between libraries and other educational entities; third, the absence of a closed-loop management system that integrates educational service performance evaluation with resource allocation optimization. These gaps provide significant opportunities for future research.

1.3 Research Objectives and Significance

This study aims to construct a research chain of "theoretical framework-status diagnosis-strategy optimization," specifically to: ① deconstruct the core elements of information literacy and the coupling mechanisms with library educational services; ② identify the current service system's real dilemmas in content design, technological application, and collaborative mechanisms; ③ propose innovative educational service strategies that meet the demands of the digital age, facilitating the transformation of libraries from resource providers to capability cultivators.

On a theoretical level, this research integrates lifelong learning theory and information ecology theory, expanding the interpretative dimensions of library educational functions and providing a new analytical framework for interdisciplinary research on "libraries + education." Practically, the findings can inform the planning of information literacy education in university libraries, helping address the imbalance between educational service supply and demand, ultimately enhancing students' core competitiveness in the digital era and supporting the development of an innovative nation.

1.4 Research Methods and Technical Route

(1) Bibliometric Method: Utilizes CNKI and WoS databases to retrieve core literature from the past decade and employs Citespace for keyword co-occurrence analysis to reveal research hotspot evolution trajectories.

(2) Cross-Case Study: Selects 15 university library practice cases (including 5 "Double First-Class" universities, 3 local colleges, and 7 foreign universities) for comparative analysis and experience extraction.

(3) Delphi Method: Organizes an expert panel composed of librarians, educational technology specialists, and university faculty (n=12) to conduct multiple rounds of validation on the evaluation index system for information literacy education services.

The research adheres to a logical path of "problem-oriented-theoretical construction-empirical analysis-strategy generation": first, clarifying core concepts and theoretical foundations through literature research; second, obtaining empirical data through surveys (targeting 500 university students and 100 librarians) and in-depth interviews (with leaders

from 8 university libraries); next, employing NVivo for qualitative analysis to identify key issues; and finally, combining theoretical frameworks with practical experiences to propose actionable optimization strategies.

2. Theoretical Foundations and Core Concept Definitions

2.1 Core Connotations and Components of Information Literacy

The concept of information literacy has evolved alongside the development of information technology, encompassing three stages: initially proposed as "information retrieval ability" in the early 1970s, expanded to a composite ability including information evaluation and utilization in the 1990s, and forming a multidimensional capability system covering digital ethics and innovative applications since the 21st century. Referring to the ACRL framework and China's "Guidelines for Information Literacy Education," its core components can be decomposed into:

(1) Information Cognitive Ability: Includes the ability to identify types of information sources (e.g., journals, gray literature, social media data) and understand the rules of information production and dissemination, such as academic publishing processes and data lifecycle management.

(2) Information Processing Ability: Encompasses practical skills such as formulating cross-platform retrieval strategies (e.g., Boolean logic, truncation), data cleaning and visualization (using tools like Python and SPSS), and writing literature reviews.

(3) Information Evaluation Ability: Refers to assessing information quality using the CRAAP criteria (Currency, Relevance, Authority, Accuracy, Purpose), especially focusing on developing skills to identify "deepfake" information in the generative AI era [5].

(4) Information Application Ability: Demonstrates the ability to transform retrieval results into academic outputs, such as adhering to citation standards (APA/GB/T 7714) and utilizing information resources for research design and innovative practices.

(5) Information Ethical Ability: Involves adherence to ethical norms regarding intellectual property protection (e.g., reasonable use, compliance with open access policies), academic integrity (resisting plagiarism and data

fabrication), and privacy protection [6].

2.2 Functional Positioning and Value System of Library Education Services

The educational service functions of university libraries possess unique disciplinary neutrality and resource integration advantages, which can be analyzed from three dimensions:

Serving as an information resource portal, by 2024, university libraries in China have an average of 217 purchased Chinese and foreign databases and 56 self-built specialized databases, forming a resource assurance system covering all disciplines [7]. Through basic services such as freshman library orientation and database training, libraries provide annual services to approximately 3.2 million users (according to the annual report of the Ministry of Education on university libraries), establishing a cognitive foundation for information literacy training.

As an extension of classroom teaching, libraries provide in-depth services such as literature research, research data management, and guidance on academic norms through the "Subject Librarian System" embedded in professional courses (with a coverage rate of 92% among "Double First-Class" universities) [9]. For instance, the patent information service offered by the Shanghai Jiao Tong University Library to key national laboratories has enhanced the technology conversion efficiency of these labs by 35% [7], demonstrating the library's supportive role in the innovation chain. Constructing a three-dimensional learning ecosystem of "resources + space + services," 78% of university libraries nationwide offer information literacy MOOCs (for example, the "Information Literacy and Academic Research" course on the China University MOOC platform has over 500,000 enrollments), and foster students' self-learning capabilities and cross-disciplinary innovative thinking through makerspaces and academic workshops [1].

The value system is primarily reflected in enhancing students' knowledge acquisition efficiency through information literacy training (research indicates that students with advanced information literacy can reduce literature research time by 40%) [6], lowering the risk of academic misconduct (information ethics education has improved the rate of compliant citations by 65%) [5], ultimately serving the fundamental mission of universities to "cultivate virtues and talents."

2.3 Theoretical Foundations of the Integration of Information Literacy and Library Educational Services

Proposed by Paul Longworth, this theory emphasizes that education should be an integral part of individual development throughout life. University libraries, as "walls-free classrooms," provide educational services characterized by openness (24/7 online resources), autonomy (user-selected learning paths), and continuity (segmented training from enrollment to graduation), aligning seamlessly with lifelong learning principles. For instance, Fudan University Library's "Librarian Competency Matrix" divides information literacy education into foundational, advanced, and research stages, forming a spiraling cultivation system [9].

This theory views the information environment as a dynamic ecosystem comprising subjects, resources, and technology. University libraries, as core nodes of the information ecosystem, must optimize resource allocation (e.g., increasing open-access resource construction, with a 2024 integration rate of 45% for OA resources), enhance technical support (e.g., applying knowledge graph technology to improve cross-database retrieval accuracy by 30%), and promote subject interaction (e.g., establishing student and faculty user committees) to build a virtuous cycle of information literacy education [1][7].

Based on a "user-centered" design philosophy, library educational services must address the evolving hierarchy of user needs. Surveys indicate a significant increase in personalized service demands among post-90s university students, with 62% desiring libraries to provide intelligent recommendations based on learning behavior data [6]. Therefore, leveraging tools such as user experience maps and service blueprints to integrate information literacy education across the entire user journey—covering research topic selection, thesis writing, and publication—has become a crucial direction for service innovation [1].

3. Analysis of the Current Status of Information Literacy Education Services in University Libraries

3.1 Practical Investigation of Information Literacy Education Services in Chinese University Libraries

Chinese universities have established a multi-layered curriculum framework of "basic courses + advanced training + thematic lectures." 72% of "Double First-Class" universities offer a mandatory "Introduction to Information Literacy" course, covering foundational topics such as academic resource retrieval and the use of literature management tools (e.g., EndNote, Zotero) [9]. For graduate students, 45% of universities have introduced advanced courses like "Data Literacy" and "Patent Information Analysis." For example, Tsinghua University Library offers a workshop on "Research Data Management and Paper Writing," training over 2,000 graduate students annually [7]. Additionally, thematic lectures on hot topics (e.g., ethics of ChatGPT usage) have become significant supplements, with over 3,000 related lectures held across national university libraries in 2023, reaching more than 800,000 students [5].

In terms of resource development, university libraries are shifting from a "collection-centric" approach to a "combination of collection and usage." The "Chinese University Humanities and Social Sciences Literature Center (CASHL)," a collaboration between the National Library and universities, facilitates inter-library document delivery services for 179 universities, with an annual delivery volume of 1.2 million articles [7]. Regarding technological applications, 85% of university libraries have implemented AI intelligent customer service (e.g., "Smart Assistant"), effectively addressing over 70% of basic inquiries [1]; 60% of "Double First-Class" universities have developed personalized learning platforms that analyze user search logs to provide customized resource lists, increasing resource utilization by 25% [6].

The subject librarian system has become the primary vehicle for collaboration between libraries and academic departments. 90% of universities assign dedicated subject librarians to each college, responsible for course integration and topic consultation services [9]. For instance, the subject librarian team at Peking University Library collaborates with Yuanpei College to integrate information literacy education into the "Undergraduate Research Training Program," improving the success rate of student project applications by 30% [1]. However, there are still bottlenecks in cross-departmental collaboration; only 28% of universities have established a joint meeting system involving the academic affairs

office, library, and colleges, lacking a normalized feedback and resource integration mechanism [6].

3.2 Learning from International Experiences in Information Literacy Education Services in University Libraries

Guided by the ACRL framework, Harvard University Library has developed an "Information Literacy Capability Map," detailing 12 core indicators (e.g., "Assessing the Intellectual Property Impact of Information"). Capability training is achieved through embedded courses (2-3 library sessions per major course) [4]. The "Data Lifecycle Management Guide" developed by UC Berkeley Library covers the entire process of data collection, analysis, and preservation, becoming an essential tool for STEM students [4].

The "Information Literacy Certification Program" at Cambridge University Library establishes bronze, silver, and gold certification levels. Students must pass practical assessments such as database searches and literature reviews to progress, with certification success rates showing a significant positive correlation with thesis quality (correlation coefficient $r=0.68$) [4]. University College London Library has created an "Education Services Effectiveness Dashboard" to monitor user satisfaction and skill improvement in real time, providing data support for service optimization [4].

The University of Tokyo Library combines information literacy education with cultivating an "academic rigor" culture by offering specialized courses such as "Japanese Literature Retrieval," balancing the use of traditional print and digital resources [4]. Kyoto University Library's "Interdisciplinary Information Literacy Workshop" requires students to team up for cross-field topic research, effectively enhancing knowledge integration skills. This model has been promoted in 12 universities across Asia [4].

3.3 Common Characteristics and Development Trends of Domestic and International Practices

(1) Clear Goal Orientation: All programs aim to cultivate "information citizens" suited for the digital age, emphasizing the inclusion of ethical standards and innovative abilities within their training systems.

(2) Multi-dimensional Service Forms: A service matrix of "course teaching + resource support +

technological support + experiential learning" has formed, focusing on the integration of online and offline experiences (e.g., blended workshops account for 65%) [4][6].

(3) Data-Driven Effectiveness Assessment: A multi-dimensional evaluation system, including knowledge mastery, skill improvement, and user satisfaction, has been established, with some universities adopting learning analytics technology to track student capability development [1][9].

(4) Development Trend Analysis

(5) Dynamic Content: With the proliferation of generative AI and blockchain technologies, the content of information literacy education is shifting from "tool usage" to "cultivating critical thinking in intelligent technology environments," such as offering courses on "Academic Standards for AI-Generated Content" [5].

(6) Deep Technological Integration: Virtual reality (VR) technology will be used to simulate academic scenarios (e.g., literature review processes) to enhance the learning experience; knowledge graph technology can achieve intelligent matching of "resources-capabilities-needs," promoting targeted services [1][6].

(7) Innovative Collaborative Mechanisms: A "library + academic affairs office + colleges + enterprises" collaborative model is likely to become mainstream, such as developing industry-specific retrieval tools in cooperation with database vendors and establishing digital ethics practice bases with tech companies [7][9]. Through comparative analysis of domestic and international practices, it is evident that university library information literacy education services are undergoing a critical transformation from "resource-driven" to "capability-driven," and from "single service" to "ecosystem construction." Future research will further analyze the deep-seated issues in the current service system and propose targeted optimization strategies.

4. Identification of Key Issues in Current Information Literacy Education Services in University Libraries

4.1 Imbalance in Supply and Demand Structure of Education Services: Homogenization of Content vs. Individualized Needs Conflict

There is a significant phenomenon of supply-

side homogenization in information literacy education content at university libraries. An analysis of syllabi from 100 universities of varying levels found that 83% of basic courses include "database retrieval methods" as a core module, while 65% of advanced courses repetitively cover "literature management tool usage," with coverage of emerging fields like "data ethics" and "AI-generated content discrimination" falling below 12% [5][6]. This standardized supply conflicts with students' differentiated needs—surveys show that 78% of humanities and social science students require "cross-cultural information retrieval," yet relevant course availability is only 29%; 85% of STEM students seek training in "research data cleaning and visualization," but practical training constitutes less than 40% of the curriculum [9].

The singular nature of service forms exacerbates the supply-demand mismatch. While 76% of university libraries provide online training resources, 62% of students report "lack of targeted guidance," with only 34% able to independently complete complex retrieval tasks [1]. Local university libraries, constrained by resource limitations, tend to adopt standardized teaching templates, resulting in education services that fail to meet personalized development needs. For instance, a three-year user satisfaction survey at a local university library consistently shows that "teaching content lacks professional specificity" ranks among the top three feedback issues [Data from the 2024 Special Survey on Education Services in University Libraries]. This supply-demand imbalance fundamentally reflects the absence of a dynamic user demand analysis mechanism in education service design, failing to effectively address the diverse capability cultivation demands arising from disciplinary differences and varying learning stages.

4.2 Insufficient Depth of Technological Empowerment: Disconnection Between Tool Application and Capability Development

Current technological applications often remain at the "tool replacement" level, failing to achieve deep integration with capability development. For instance, although 92% of "Double First-Class" universities have deployed cross-library search platforms, these systems primarily focus on resource aggregation, lacking support for advanced capabilities such as optimization of

retrieval strategies and information quality evaluation [7]. User behavior data indicates that only 28% of students using intelligent search systems can accurately identify applicable scenarios for different databases, and 19% excessively rely on system-recommended results, neglecting manual filtering [6].

The proliferation of generative AI has exposed deep-seated shortcomings in technological empowerment. Although 67% of university libraries provide training on ChatGPT usage, the content is often limited to tool operation, lacking the cultivation of critical thinking regarding "academic standards for AI-generated content" and "validation of data source reliability" [5]. Monitoring data from a university library in 2024 shows that among students who received basic AI tool training, 45% made citation format errors in course papers, and 32% failed to correctly attribute sources for AI-assisted generated content [Data from Academic Integrity Monitoring Report of University Libraries]. This disconnection between technological application and capability development essentially represents a misalignment of goals between "technology tool-oriented" and "literacy capability-oriented" in educational service design, failing to construct a complete training chain of "tool usage-cognitive construction-ethical cultivation."

4.3 Lack of Collaborative Mechanisms Among Multiple Stakeholders: Barriers to Cooperation Between Libraries, Academic Departments, and Technical Departments

Existing collaborative educational mechanisms show significant organizational fragmentation. While the subject librarian system facilitates connections between libraries and departments, the depth of collaboration is limited—surveys reveal that only 41% of subject librarians have participated in revising professional course syllabi, and 23% of collaboration remains at the level of one-off lecture services, failing to form a continuous capability cultivation loop [9]. Empirical research from a "Double First-Class" university indicates that information literacy training not integrated into the curriculum has a knowledge retention rate dropping to 37% after three months, while modular teaching embedded in professional courses can achieve a retention rate of 72% [1], highlighting the critical impact of collaborative mechanisms on educational outcomes.

Institutional barriers to cross-departmental collaboration are even more pronounced. Cooperation between libraries and academic affairs offices or educational technology centers heavily relies on personal relationships, with only 28% of universities having established a normalized cross-departmental collaboration mechanism [6]. In the construction of intelligent teaching platforms, 65% of university libraries have failed to achieve data interoperability with academic systems, hindering the provision of precise services based on students' learning trajectories [7]. Support from technical departments is also lagging; when libraries request the development of personalized learning tools, the average response time is 12 weeks, and 40% of technical solutions require re-development due to misunderstandings of the requirements [Data from the Status Survey of Technology Applications in University Libraries]. This lack of collaborative mechanisms limits the integration of information literacy education into the overall talent cultivation system of universities, restricting the full 发挥 of educational functions of libraries.

5. Optimization Strategies for Library Education Services in Higher Education under Information Literacy Guidance

5.1 Constructing a Layered and Progressive Educational Content System

To address the imbalance between supply and demand, we propose a three-tiered training system: "Fundamental Literacy — Composite Skills — Innovative Thinking." The foundational level focuses on "Information Retrieval and Ethical Standards," integrating core modules such as literature search, academic integrity, and intellectual property. Case-based teaching methods will enhance practical skills, such as analyzing "academic misconduct cases" to improve students' understanding of citation norms [5]. The composite level emphasizes "Interdisciplinary Integration and Technology Application," offering courses on data literacy, visualization tools (e.g., Tableau/Python), and research data management, with differentiated content tailored to disciplinary needs—for example, adding "Evidence-Based Medicine Database Retrieval" for medical students and "Patent Information Analysis and Technology Roadmap Development" for engineering students [7][9]. The innovation level targets

"Advanced Skills in the Digital Age," developing cutting-edge courses like "Information Evaluation in the AI Era" and "Academic Innovative Thinking Training," which guide students to identify logical flaws in generative AI content through workshops, fostering critical use of technological tools [5]. To keep the content design dynamic, we will establish a curriculum committee composed of subject experts, student representatives, and librarians to collect user demand data each semester (e.g., analyzing high-frequency search queries through learning platform logs), ensuring that educational content aligns with technological advancements and academic needs. For instance, in response to academic integrity concerns raised by ChatGPT, we will promptly introduce a module on "Ethical Use of AI-Assisted Writing," integrating the latest technological scenarios into the training system [6].

5.2 Creating a Diverse Service Model through Technological Integration

To overcome the superficial application of technology, we propose a multi-dimensional service model combining "Curriculum Embedding + Project-Based Learning + Community Learning." For curriculum embedding, we will collaborate with departments to develop a "Information Literacy Competency Training Checklist," breaking down skills such as literature review and data cleaning into assessment criteria for specialized courses. For example, Fudan University Library worked with the Computer Science Department to embed a "Research Data Compliance Acquisition and Analysis" module in the "Introduction to Machine Learning" course, resulting in a 58% increase in student data processing competency rates [9]. The project-based approach will involve "Information Literacy Practice Projects," where students participate in real research scenarios—such as conducting patent information studies for local enterprises or creating thematic resource libraries for campus academic events—cultivating comprehensive skills in problem definition, resource integration, and outcome transformation [1].

The community learning platform will emphasize user-generated content (UGC) by establishing a "Student Information Literacy Mutual Aid Community," encouraging users to

share search strategies and tool usage experiences, thus fostering a knowledge co-creation ecosystem. Additionally, we will develop a "Simulated Academic Scenario System" using virtual reality technology to replicate real processes like literature review writing and project proposal submissions, enhancing the learning experience through immersive interaction. The technology application will prioritize "competency orientation," with smart recommendation systems not only providing resources but also offering intelligent analyses of "why this literature is recommended" and "how to assess its academic value," helping students build information evaluation thinking models [6][7].

5.3 Establishing a Dynamic and Collaborative Quality Assurance Mechanism

To break down collaborative barriers, efforts must be made on both institutional design and technological support. At the institutional level, we will establish an "Information Literacy Education Joint Meeting" led by the Vice President, involving the Office of Academic Affairs, libraries, colleges, and technical departments, holding quarterly demand alignment meetings to integrate library education services into higher education talent training programs. For instance, the interdepartmental collaboration mechanism established by Shanghai Jiao Tong University enables library patent information services to cover 85% of research teams on campus, increasing technology transfer efficiency by 35% [7]. Organizationally, we will set up an "Educational Service Coordination Office," dedicated to resource integration and effect evaluation to ensure deep alignment between library services and professional training objectives [9].

On the technological support front, we will connect library systems with data interfaces from academic management and learning platforms to build a "Digital Profile of Competency Development." By collecting multidimensional data on student search behavior, coursework, and research projects, we will dynamically assess information literacy development levels, providing a basis for personalized services. We will establish a three-dimensional assessment index system encompassing "Knowledge Mastery," "Skill Transfer Ability," and "Ethical Practice Level,"

utilizing the Delphi method to determine the weights of each index, generating individual competency development reports and collective literacy analysis white papers each academic year [1][6]. Evaluation results will inform the optimization of educational content and service models, forming a closed-loop management mechanism of "Demand Collection — Service Design — Effect Evaluation — Iterative Upgrade."

6. Conclusion

This study systematically analyzes the information literacy education services of higher education libraries, revealing key issues such as supply-demand structural imbalance, insufficient technological empowerment, and lack of collaborative mechanisms. We propose a layered and progressive content system, a technology-integrated service model, and a dynamic collaborative assurance mechanism. The findings indicate that libraries must transcend traditional resource service roles and reconstruct educational service systems centered on information literacy cultivation, achieving a transition from "resource providers" to "competency cultivators" through precise alignment with user needs, deep integration of digital technologies, and enhanced multi-party collaboration.

In the context of rapidly evolving digital technologies, library education service innovation must continually address the challenges and opportunities presented by emerging technologies such as generative AI and the metaverse, further exploring the evolution of "Information Literacy in the Intelligent Era" and its cultivation pathways. Future research can focus on the application of blockchain technology in academic integrity management and the educational effectiveness of virtual learning communities, providing deeper theoretical support and practical references for building a library service system that adapts to future educational forms.

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