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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

Digital technology has moved deep into the machinery of higher education, and the information environment students face is defined by massive data, diverse formats, and instantaneous dissemination. Recent development statistics for Chinese university libraries show physical collection growth slowing to low single digits, while e-journals and electronic theses keep expanding at double-digit annual rates, and digital materials now make up the bulk of collection growth. Students' information processing abilities are tested on several fronts at once: cross-platform retrieval, data visualization, academic integrity. The educational response has not kept pace. National monitoring data on higher education quality suggest that fewer than 40% of universities run information literacy courses as mandatory offerings, and more than 60% of students report that library resource retrieval training fails to meet their research needs. Between educational service provision and talent cultivation goals in the digital age sits a structural imbalance.

University libraries carry the main responsibility for information literacy education, and their educational functions are in the middle of a paradigm shift. The traditional model, anchored

in literature retrieval courses, was never designed for generative artificial intelligence; tools like ChatGPT raise questions of information validation and academic integrity that a retrieval course does not answer. Wang Sheng and colleagues have argued that critical information literacy education is the key defense against "digital blind obedience" as generative AI tools spread [5]. Collaboration, meanwhile, runs into walls: more than two-thirds of universities lack a cross-departmental joint meeting system for information literacy education, so libraries and academic departments coordinate by improvisation. Technological empowerment looks broad but runs shallow. 82% of "Double First-Class" university libraries have deployed intelligent Q&A systems, yet most operate at the level of basic consultation, and fewer than 30% bring advanced technical applications into course design [1][6].

This study takes up the innovative integration of information literacy and library education services against that backdrop, and two questions organize it. First, what would a content system for information literacy education that genuinely matches the characteristics of the digital era look like? Second, through what mechanisms can university libraries accomplish a paradigm shift in their educational service models? Both questions carry weight beyond the library. The answers bear on the modernization of library educational functions, and they reach into the classroom, since the core competencies of innovative talent in higher education depend in part on how well these services are designed.

1.2 Review of Domestic and International Research Status

Domestic scholarship on information literacy education dates to the 1990s, when the agenda was largely literature retrieval course reform. The release of the "Guidelines for Information Literacy Education in Higher Education Libraries" in 2020 redirected attention toward service systems built within a "big information literacy" framework. Recent contributions follow that line. Liu Caie and Han Lifeng systematically examined the challenges information literacy education faces in the AIGC context and proposed a development framework that integrates technical tools, cognitive ability, and ethical norms [6]. The Liu Hongwei team explored personalized learning support driven by AI, insisting that information literacy training run through the entire research data management process [1]. Practice has moved alongside theory. Fudan University Library used a "competency matrix" to push librarian role transformation, and the Intellectual Property Information Service Center at Shanghai Jiao Tong University built a patent information service model; both now serve as templates for subject-specific information literacy education [7][9].

International research takes its lead from the "Framework for Information Literacy in Higher Education" that the Association of College and Research Libraries (ACRL) published in 2016, with embedded education and digital academic literacy as recurring themes. Zai Bingxin and colleagues analyzed AI LibGuides at foreign university libraries and found a three-tiered progressive system at work, running from tool orientation through competency orientation to innovation orientation, with technical competencies such as machine learning and data visualization written into the curriculum [4]. Cambridge University Library's embedded model shows what collaboration can achieve: syllabus development shared with faculties lifted students' information retrieval accuracy by 40% [4]. Elsewhere, the Japan University Library Association (JULAC) maintains an information literacy certification system stretching from undergraduate to doctoral levels, with consistent emphasis on cross-cultural information processing skills.

For all the progress in frameworks and pathways, three gaps stand out. The connotations of information literacy keep being rewritten by digital technologies, blockchain and the metaverse being only the latest examples, yet dynamic analysis of that evolution remains thin. Collaborative mechanisms between libraries and other educational entities have been described in outline but rarely deconstructed in depth. And no closed-loop management system yet ties educational service performance evaluation to resource allocation optimization. Each gap is an opening for the research that follows.

1.3 Research Objectives and Significance

The study proceeds as a chain: theoretical framework, status diagnosis, strategy optimization. Three tasks define it. One is to deconstruct the core elements of information literacy and the coupling mechanisms that

connect them to library educational services. Another is to identify where the current service system actually struggles, in content design, in technological application, and in collaborative mechanisms. The third is to propose educational service strategies equal to the demands of the digital age, strategies that help libraries complete the move from resource providers to capability cultivators.

The contribution is meant to run on two levels. Theoretically, the research draws lifelong learning theory and information ecology theory together, which widens the interpretive dimensions of library educational functions and offers a fresh analytical framework for interdisciplinary work on "libraries + education." Practically, the findings are written to be used: they can inform the planning of information literacy education in university libraries, help correct the imbalance between educational service supply and demand, and in the end strengthen students' core competitiveness in the digital era.

1.4 Research Methods and Technical Route

(1) Bibliometric Method: core literature from the past decade is retrieved from CNKI and WoS, and Citespace then runs keyword co-occurrence analysis to trace how research hotspots have evolved.

(2) Cross-Case Study: 15 university library practice cases, 5 from "Double First-Class" universities, 3 from local colleges, and 7 from foreign universities, are compared side by side to extract transferable experience.

(3) Delphi Method: a twelve-member expert panel of librarians, educational technology specialists, and university faculty validates the evaluation index system for information literacy education services across multiple rounds.

The technical route follows the logical path of problem orientation, theoretical construction, empirical analysis, and strategy generation. Literature research settles the core concepts and theoretical foundations first. Empirical data then come from two instruments: surveys targeting 500 university students and 100 librarians, and in-depth interviews with leaders from 8 university libraries. NVivo supports the qualitative analysis through which key issues are identified. In the final stage, theoretical frameworks are combined with practical experience to produce optimization strategies that can actually be implemented.

2. Theoretical Foundations and Core Concept Definitions

2.1 Core Connotations and Components of Information Literacy

The concept of information literacy has never stood still; it has tracked information technology through three stages. The early 1970s reduced it to "information retrieval ability." The 1990s widened it into a composite ability that included information evaluation and utilization. Since the turn of the century it has hardened into a multidimensional capability system that covers digital ethics and innovative applications. Drawing on the ACRL framework and China's "Guidelines for Information Literacy Education," the core components can be decomposed as follows:

(1) Information Cognitive Ability: knowing what kinds of information sources exist, journals, gray literature, social media data, and understanding how information is produced and circulated, from academic publishing processes to data lifecycle management.

(2) Information Processing Ability: the hands-on skills of cross-platform retrieval strategy, Boolean logic and truncation included, of data cleaning and visualization with tools like Python and SPSS, and of writing a literature review that holds together.

(3) Information Evaluation Ability: judging information quality by the CRAAP criteria (Currency, Relevance, Authority, Accuracy, Purpose), with particular attention to recognizing "deepfake" information now that the generative AI era has arrived [5].

(4) Information Application Ability: turning retrieval results into academic output, which means observing citation standards (APA/GB/T 7714) and putting information resources to work in research design and innovative practice.

(5) Information Ethical Ability: observing the ethical norms that govern intellectual property, reasonable use and open access compliance among them, maintaining academic integrity against plagiarism and data fabrication, and protecting privacy [6].

2.2 Functional Positioning and Value System of Library Education Services

The educational service functions of university libraries rest on disciplinary neutrality and resource integration, two advantages that can be

analyzed from three angles:

First, the library serves as the information resource portal. By 2024, Chinese university libraries averaged 217 purchased Chinese and foreign databases alongside 56 self-built specialized databases, a resource assurance system that reaches into every discipline [7]. On top of that base sit the basic services, freshman library orientation and database training, which reach millions of users a year and lay the cognitive foundation on which information literacy training builds.

Second, the library extends classroom teaching. The Subject Librarian System, embedded in professional courses and reaching 92% coverage among "Double First-Class" universities, carries in-depth services such as literature research, research data management, and guidance on academic norms [9]. The arrangement reaches all the way up the innovation chain: the patent information service that Shanghai Jiao Tong University Library provides to key national laboratories has raised the technology conversion efficiency of those laboratories by 35% [7].

Third, the library assembles a three-dimensional learning ecosystem of resources, space, and services. Information literacy MOOCs are now offered by 78% of university libraries nationwide, and the "Information Literacy and Academic Research" course on the China University MOOC platform has passed 500,000 enrollments [1]. Makerspaces and academic workshops add the physical layer, strengthening students' capacity for self-directed learning and their cross-disciplinary habits of mind.

The value system behind these functions is not abstract. Information literacy training raises knowledge acquisition efficiency; research indicates that students with advanced information literacy cut their literature research time by 40% [6]. It lowers the risk of academic misconduct, with information ethics education improving the compliant citation rate by 65% [5]. And it serves, in the end, the fundamental mission universities answer to, to "cultivate virtues and talents" [8].

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

Lifelong learning theory, proposed by Paul Longworth, holds that education belongs to the whole arc of individual development rather than to any segment of it. University libraries fit the theory unusually well. As "walls-free classrooms" they offer openness through online resources available around the clock, autonomy through learning paths that users select themselves, and continuity through training segmented from enrollment to graduation. Fudan University Library's "Librarian Competency Matrix" gives the idea administrative form, dividing information literacy education into foundational, advanced, and research stages so that cultivation spirals upward instead of resetting [9].

Information ecology theory treats the information environment as a dynamic system of subjects, resources, and technology. University libraries occupy core nodes within it, and the theory assigns three duties. Resource allocation needs optimizing, open-access collections now standing at a 45% integration rate as of 2024. Technical support needs strengthening, where knowledge graph technology has already lifted cross-database retrieval accuracy by 30%. Subject interaction needs promoting, handled through user committees of students and faculty. Tended together, the three sustain a virtuous cycle of information literacy education [1][7].

A "user-centered" design philosophy completes the theoretical base, and it begins from an uncomfortable fact: user needs evolve faster than services do. Surveys show a marked rise in personalized service demands among post-90s university students, 62% of whom want libraries to deliver intelligent recommendations based on their learning behavior data [3][6]. Tools such as user experience maps and service blueprints respond by tracing the full user journey, from research topic selection through thesis writing to publication, and weaving information literacy education into every stop along it, a direction service innovation is already following [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 settled on a multi-layered curriculum framework of basic courses, advanced training, and thematic lectures. The base layer is broadest: 72% of "Double First-Class" universities require an "Introduction to

Information Literacy" course covering academic resource retrieval and literature management tools such as EndNote and Zotero [9]. Advanced courses for graduate students, "Data Literacy" and "Patent Information Analysis" among them, are in place at 45% of universities; Tsinghua University Library alone trains more than 2,000 graduate students a year through its workshop on research data management and paper writing [7]. Thematic lectures on current topics fill the remaining slot, and the appetite is real: over 3,000 lectures on subjects like the ethics of ChatGPT use were held across national university libraries in 2023, reaching more than 800,000 students [5].

Resource development has shifted from a "collection-centric" posture to one that weighs collection and usage together. CASHL, the Chinese University Humanities and Social Sciences Literature Center run jointly by the National Library and universities, now provides inter-library document delivery for 179 universities and moves 1.2 million articles a year [7]. Technological adoption runs on two tracks. AI customer service has reached 85% of university libraries, and systems like the "Smart Assistant" resolve over 70% of basic inquiries without human help [1]. Personalized learning platforms, deployed by 60% of "Double First-Class" universities, analyze user search logs and return customized resource lists, lifting resource utilization by 25% [6].

The subject librarian system has become the main vehicle for collaboration between libraries and academic departments, with 90% of universities assigning dedicated subject librarians to each college for course integration and topic consultation [9]. Peking University Library shows the model at its best: working with Yuanpei College, it folded information literacy education into the Undergraduate Research Training Program and improved the success rate of student project applications by 30% [1]. The system still hits ceilings. Only 28% of universities operate a joint meeting system that brings the academic affairs office, the library, and the colleges to one table, and without a normalized feedback and resource integration mechanism, most collaboration depends on personalities rather than institutions [6].

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

Harvard University Library, working under the ACRL framework, has produced an "Information Literacy Capability Map" of 12 core indicators, among them the ability to assess the intellectual property impact of information. Training happens through embedded courses, with two to three library sessions built into each major course [4]. UC Berkeley Library approaches the same problem from the data side: its "Data Lifecycle Management Guide" walks students through collection, analysis, and preservation, and has become standard equipment for STEM students [4].

Cambridge University Library organizes attainment through its "Information Literacy Certification Program," which runs in bronze, silver, and gold tiers. Progression requires passing practical assessments, database searches and literature reviews among them, and certification success correlates positively with thesis quality at r=0.68 [4]. University College London Library has invested in measurement instead: its "Education Services Effectiveness Dashboard" tracks user satisfaction and skill improvement in real time, giving service optimization a steady stream of evidence to work from [4].

The University of Tokyo Library ties information literacy education to a culture of "academic rigor," offering specialized courses such as "Japanese Literature Retrieval" that keep traditional print resources in play alongside digital ones [4]. Kyoto University Library pushes in an interdisciplinary direction. Its workshop format requires students to team up for cross-field topic research, which trains knowledge integration directly, and the model has since spread to 12 universities across Asia [4].

3.3 Common Characteristics and Development Trends of Domestic and International Practices

(1) Clear goal orientation. Domestic and international programs alike aim at "information citizens" for the digital age, and both write ethical standards and innovative ability into the training system rather than leaving them implied. (2) Service forms run in several dimensions at once, a matrix of course teaching, resource support, technological support, and experiential learning. Online and offline experiences are deliberately integrated, and blended workshops

already account for 65% of provision [4][6].

(3) Effectiveness assessment leans on data. A multi-dimensional evaluation system covering knowledge mastery, skill improvement, and user satisfaction is now standard, and some universities have gone further, adopting learning analytics to track how student capability actually develops [1][9].

(4) Development Trend Analysis

(5) Content is moving. As generative AI and blockchain spread, the center of information literacy education is drifting from "tool usage" toward critical thinking in intelligent technology environments, and courses with titles like "Academic Standards for AI-Generated Content" are the visible evidence [5].

(6) Technology is going deeper. Virtual reality will simulate academic scenarios, the literature review process being an early candidate, to sharpen the learning experience, while knowledge graphs can match resources, capabilities, and needs intelligently enough to make targeted services routine [1][6].

(7) Collaboration is widening. The four-way model of library, academic affairs office, colleges, and enterprises is on its way to becoming mainstream, with examples already in hand: industry-specific retrieval tools developed alongside database vendors, and digital ethics practice bases established together with technology companies [7][9].

Set side by side, the domestic and international practices describe a transformation in progress: from resource-driven to capability-driven provision, and from single services toward ecosystem construction. Neither shift is finished, and the unfinished parts are precisely where the problems live. The next sections dig into the deep-seated issues still embedded in the current service system and work out optimization strategies aimed directly at them.

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

Supply-side homogenization is the first structural problem. An analysis of syllabi from 100 universities of varying levels found that 83% of basic courses list "database retrieval methods" as a core module, 65% of advanced courses repeat "literature management tool usage," and coverage of emerging fields such as "data ethics" and "AI-generated content discrimination" stays below 12% [5][6]. Set against what students actually ask for, the mismatch is sharp. 78% of humanities and social science students need cross-cultural information retrieval, yet relevant courses are available at only 29% of institutions; 85% of STEM students want training in research data cleaning and visualization, but practical training occupies less than 40% of the curriculum [9]. The pattern holds across disciplines: what is taught most is seldom what is needed most.

Service forms compound the problem, because they are singular where demand is plural. Online training resources exist at 76% of university libraries, yet 62% of students report a lack of targeted guidance, and only 34% can independently complete complex retrieval tasks after training [1]. Local universities have it hardest: constrained by resources, they lean on standardized teaching templates, and the result is education that fits no one's personalized development needs particularly well [10]. A three-year user satisfaction survey at one local university library kept returning the same verdict, with "teaching content lacks professional specificity" locked among the top three complaints. Beneath all of this sits a design failure rather than an effort failure: no dynamic mechanism analyzes user demand, so the diverse capability demands that flow from disciplinary differences and learning stages simply never enter course planning.

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

Technology, for the most part, has arrived at the "tool replacement" stage and stopped there. Cross-library search platforms are deployed at 92% of "Double First-Class" universities, but they concentrate on resource aggregation and offer little support for the advanced capabilities that matter, refining retrieval strategies or evaluating information quality among them [7]. User behavior data expose the limit. Among students using intelligent search systems, only 28% can accurately identify which database fits which scenario, and 19% over-trust system-recommended results to the point of skipping manual filtering altogether [6].

Generative AI has pulled these shortcomings into the open. Training on ChatGPT use is offered by 67% of university libraries, yet the content usually stops at tool operation, leaving untouched the critical questions, what academic standards apply to AI-generated content, and how does one validate the reliability of a data source [5]. Monitoring data from one university library in 2024 quantify the consequence: among students who had received basic AI tool training, 45% still made citation format errors in course papers, and 32% failed to attribute AI-assisted content correctly. What looks like a training problem is really a goal misalignment, with services designed around the technology tool rather than the literacy capability, and the complete chain of tool usage, cognitive construction, and ethical cultivation never assembled.

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

Organizationally, collaboration remains fragmented. The subject librarian system connects libraries to departments, but the connection runs shallow: only 41% of subject librarians have taken part in revising professional course syllabi, and 23% of collaboration never gets past the one-off lecture, which is no way to build a continuous capability cultivation loop [9]. The cost of that shallowness has been measured. Empirical research at a "Double First-Class" university found that information literacy training delivered outside the curriculum leaves a knowledge retention rate of just 37% after three months, while modular teaching embedded in professional courses holds retention at 72% [1]. Collaborative mechanism and educational outcome, it turns out, rise and fall together.

Institutional barriers cut deeper still. Where libraries cooperate with academic affairs offices or educational technology centers, the arrangement rests heavily on personal relationships; only 28% of universities have anything resembling a normalized cross-departmental mechanism [6]. The technical infrastructure shows the same fault line. In building intelligent teaching platforms, 65% of university libraries have failed to achieve data interoperability with academic systems, which blocks precisely the kind of services that would follow a student's learning trajectory [7]. Support from technical departments lags in its own way: when a library requests development of personalized learning tools, the average response time is 12 weeks, and 40% of technical solutions have to be rebuilt because the requirements were misunderstood the first time. The cumulative effect is that information literacy education never fully enters the university's overall talent cultivation system, and the educational function of the library stays partly unrealized.

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

5.1 Constructing a Layered and Progressive Educational Content System

The remedy for supply-demand imbalance is a three-tiered training system: fundamental literacy, composite skills, innovative thinking. The foundational tier centers on information retrieval and ethical standards, bundling literature search, academic integrity, and intellectual property into core modules, and it teaches through cases; analyzing real "academic misconduct cases," for instance, does more for citation norms than any rule sheet [5]. The composite tier emphasizes interdisciplinary integration and technology application. Data literacy, visualization tools such as Tableau and Python, and research data management form the shared core, with differentiated tracks layered on top, "Evidence-Based Medicine Database Retrieval" for medical students and "Patent Information Analysis and Technology Roadmap Development" for engineering students [7][9]. The innovation tier aims at advanced skills for the digital age through courses like "Information Evaluation in the AI Era" and "Academic Innovative Thinking Training," where workshops train students to spot logical flaws in generative AI content and to use the tools critically rather than passively [5].

Content design cannot be static, and the mechanism for keeping it live is a curriculum committee that seats subject experts, student representatives, and librarians at one table. Each semester the committee collects user demand data, including high-frequency search queries mined from learning platform logs, so that educational content tracks both technological advance and academic need. The response to

ChatGPT shows the mechanism working: academic integrity concerns had barely surfaced before a module on the "Ethical Use of AI-Assisted Writing" entered the training system, bringing the newest technological scenario along with it [6].

5.2 Creating a Diverse Service Model through Technological Integration

To move technology past surface application, the service model itself has to widen, and the proposal is a combination of curriculum embedding, project-based learning, and community learning. Curriculum embedding starts with a jointly developed "Information Literacy Competency Training Checklist," in which skills like literature review and data cleaning are broken down into assessment criteria inside specialized courses. Fudan University Library and the Computer Science Department have already demonstrated the approach, embedding a module on research data compliance and analysis within "Introduction to Machine Learning" and recording a 58% rise in student data processing competency [9]. Project-based learning moves students into real research scenarios. Under "Information Literacy Practice Projects" they conduct patent information studies for local enterprises or build thematic resource libraries for campus academic events, and along the way pick up the full chain of skills from problem definition through resource integration to outcome transformation [1].

Community learning supplies the third dimension, and its fuel is user-generated content. A "Student Information Literacy Mutual Aid Community" invites users to share search strategies and tool experience, and the accumulated exchanges gradually form a knowledge co-creation ecosystem. Virtual reality contributes the "Simulated Academic Scenario System," which replicates real processes, writing a literature review, submitting a project proposal, for practice under immersive conditions. Behind all the tools sits a design principle: competency orientation. A smart recommendation system in this model does not stop at handing over resources; it explains why a piece of literature was recommended and how to judge its academic value, so that students build an information evaluation habit rather than a dependency [6][7].

5.3 Establishing a Dynamic and Collaborative Quality Assurance Mechanism

Breaking collaborative barriers takes work on two fronts, institutional design and technological support. The institutional centerpiece is an "Information Literacy Education Joint Meeting" chaired by a vice president and gathering the Office of Academic Affairs, the library, the colleges, and the technical departments; quarterly demand alignment meetings give it a pulse, and its purpose is to write library education services into the university's talent training programs rather than leave them beside them. Shanghai Jiao Tong University shows the payoff, its interdepartmental mechanism carrying patent information services to 85% of campus research teams and lifting technology transfer efficiency by 35% [7]. Organizationally, an "Educational Service Coordination Office" takes charge of resource integration and effect evaluation, keeping library services and professional training objectives in alignment [9].

The technological front is about connection. Library systems are linked to data interfaces from academic management and learning platforms to build a "Digital Profile of Competency Development," which gathers search behavior, coursework, and research project data, assesses information literacy levels dynamically, and gives personalized services something to stand on. Assessment itself follows a three-dimensional index system of knowledge mastery, skill transfer ability, and ethical practice level, with weights settled through the Delphi method; each academic year the machinery produces individual competency development reports alongside a collective literacy analysis white paper [1][6]. Evaluation then feeds back into content and service model optimization, closing the loop of demand collection, service design, effect evaluation, and iterative upgrade.

6. Conclusion

This study set out to analyze information literacy education services across higher education libraries and found three recurring issues: structural imbalance between supply and demand, technological empowerment that stops short of capability development, and collaborative mechanisms that never quite institutionalize. The response proposed here has three parts, a layered and progressive content system, a service model that integrates technology rather than merely deploying it, and a dynamic collaborative assurance mechanism.

What the findings add up to is a change of identity: libraries cannot remain in the traditional resource service role, and the road from "resource provider" to "competency cultivator" runs through precise alignment with user needs, deep integration of digital technologies, and collaboration that holds.

None of this is a finished project, because the technologies keep moving. Generative AI and the metaverse keep generating both challenges and opportunities for library education services [2], and the concept of "Information Literacy in the Intelligent Era," together with its cultivation pathways, deserves continued study rather than a settled definition. Two directions look especially promising: blockchain applied to academic integrity management, and the educational effectiveness of virtual learning communities. Work on either front would deepen the theoretical support and practical references available for building library service systems that can adapt to whatever shape future education takes.

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