Research on Embedded Information Literacy Education Models in University Libraries: A Case Study of Chongqing University Library (Postprint)

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Date: 2023-08-27T00:00:00+00:00

Abstract

[Purpose/Significance] University libraries serve as a crucial force in knowledge discovery and scientific and technological innovation, and constitute an important foundation for cultivating high-quality innovative talents. The implementation of embedded information literacy education in university libraries represents a fundamental requirement for talent cultivation in the new era of higher education, as well as a basic requirement for executing national development strategies. [Method/Process] Grounded in a systematic review of embedded information literacy education practices in university libraries, and utilizing the practical case of Chongqing University Library as a focal point, this study examines the educational subjects, platforms, and target audiences of embedded information literacy education, endeavoring to construct a generalizable, multi-level, multi-perspective, multi-channel, and three-dimensional embedded information literacy education model. [Results/Conclusion] University libraries should establish professional information literacy education teams, student service teams, and university-community collaborative education teams; develop an embedded teaching platform that fosters synergy between online and offline modalities while tightly integrating the triad of “teaching-learning-research”; concurrently, formulate long-term embedded academic career education mechanisms and progressive embedded information literacy education mechanisms tailored to different educational targets; construct a “three-all” embedded information literacy education model encompassing all personnel, all dimensions, and the entire process; and continuously advance the level, capacity, and quality of embedded information literacy education implementation across university libraries in China.

Full Text

Preamble

Embedded Information Literacy Education Models in University Libraries: A Case Study of Chongqing University Library

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Abstract

[**Purpose/Significance**] University libraries serve as vital forces in knowledge discovery and scientific innovation, and as crucial bases for cultivating high-quality innovative talents. Developing embedded information literacy education in university libraries represents both a fundamental requirement for talent cultivation in the new era and a prerequisite for implementing national development strategies. [**Method/Process**] Based on a review of embedded information literacy education practices in university libraries and using the Chongqing University Library as a case study, this research examines the educational subjects, platforms, and objects of embedded information literacy education, aiming to construct a scalable, multi-level, multi-dimensional, multi-channel, and three-dimensional embedded information literacy education model. [**Result/Conclusion**] University libraries should establish professional information literacy education teams, student service teams, and school-society collaborative education teams; build embedded teaching platforms that integrate online and offline collaboration with close linkages among teaching, learning, and research; and develop long-term embedded academic career education mechanisms and advanced embedded information literacy education mechanisms tailored to different educational objects. By constructing a "Three Alls" embedded information literacy education model covering all personnel, all dimensions, and all processes, libraries can continuously enhance the level, capacity, and quality of embedded information literacy education in Chinese university libraries.

Keywords: university library; embedded information literacy education; education model

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1. Introduction

The expansion of information capacity, intelligentization of information processing, and globalization of communication scope have become major trends in today's information age. Since the 18th National Congress of the Communist Party of China, the Party Central Committee with Comrade Xi Jinping at its core has attached great importance to informatization and cybersecurity,

proposing a series of new ideas and concepts. The 19th Party Congress report clearly states that socialism with Chinese characteristics has entered a new era, fully affirming the historic achievements of the past five years. It is precisely because of the solid progress in network and informatization work over these five years that we can ensure and promote the long-term development of various fields during this critical period. The report also puts forward fundamental requirements such as "accelerating the construction of an innovative country," "strengthening internet content development," "upholding overall national security," and "promoting a strong synergy throughout society to safeguard national security." To meet the demands of this new era, we must continuously improve technological, scientific research, and informatization levels to provide strong support for building China into a cyber power and digital powerhouse. All of this depends on improving the information literacy of the entire population and cultivating a talent pool for informatization.

As educational and research institutions providing resource services and teaching support, university libraries are key forces in information literacy education for college students in the new era. Student groups are both important forces in national informatization construction and cyberspace governance, as well as reserve forces for the network talent pool. Embedded information literacy education has become the primary pathway for university libraries to deliver knowledge services. Therefore, research on embedded information literacy education in university libraries is particularly necessary.

2. Overview of Embedded Information Literacy Education Research

2.1 Connotation of Embedded Information Literacy Education

Embedded information literacy education represents an innovation in traditional information literacy education methods. According to the definition by the Association of College and Research Libraries (ACRL), embedded information literacy education integrates information retrieval skills, information knowledge, and information ethics into the teaching processes of general education and specialized courses, comprehensively cultivating students' abilities to analyze, utilize, and evaluate information. Unlike traditional approaches, university library embedded information literacy education is no longer undertaken independently by librarians but involves collaboration among full-time teachers, librarians, and students to integrate library resource utilization and services into professional teaching. This educational model combines professional knowledge instruction, scientific research, and information capability practice. Based on the depth and breadth of embedding, university library embedded information literacy education can be divided into three types: (1) "One-time embedding," where librarians participate in professional course teaching once; (2) "Partial participation embedding" or "relevant embedding," where librarians participate in part of the professional course teaching; and (3) "Full participation embedding"

or "complete embedding," where librarians participate throughout the entire professional course teaching [2].

2.2 Research Overview of University Library Embedded Information Literacy Education

Embedded information literacy education originated in the late 1960s and early 1970s. Foreign university medical libraries pioneered this practice, and since the 1990s, it has become increasingly prevalent worldwide, particularly in Europe, America, Australia, and Japan. With the rapid development and widespread application of information technology, embedded information literacy education has become one of the main services of university libraries for user groups and an important measure for libraries to provide services for teaching, learning, and research. Using CNKI as the primary data source and "embedded information literacy education" as the search term, we retrieved 154 papers published between 2010 and 2018. Current research on university library embedded information literacy education focuses on three aspects: (1) Exploration of the conceptual connotation, with interpretations from different theoretical perspectives including constructivist learning theory, synergy theory, the concept of metaliteracy, and actor-network theory. Some scholars argue that embedded information literacy education is problem-solving oriented and user-centered [3], while others note that it has gradually gained widespread social recognition and is acclaimed as the best method for information literacy education [4]. (2) Empirical research, mainly including interpretations of foreign education characteristics and evaluations of domestic education status. Foreign studies focus on curriculum content, cooperation models, and technological applications in university libraries of developed countries such as Europe and America, while domestic studies are dominated by case studies and localized reflections. (3) Research on implementation pathways. With the emergence of new educational concepts, explorations of embedded information literacy education methods such as literature retrieval-based, gamified, and multi-level three-dimensional approaches have become mainstream, playing important roles in the reform and development of embedded information literacy education [5].

In summary, theoretical research on university library embedded information literacy education in China has received increasing attention, achieving certain results and accumulating rich experience. However, there are few studies on models that can be borrowed and promoted.

3. Analysis of Practical Effects of University Library Embedded Information Literacy Education

As mentioned above, China's embedded information literacy education started later than abroad. In recent years, due to the introduction of emerging library service concepts such as embedded education, curriculum-integrated education, information commons, and subject services, information literacy education has

gained new research perspectives and development space. However, overall, current development of embedded information literacy education in Chinese university libraries faces certain problems and deficiencies.

3.1 Education Subject Needs Strengthening

China's university library embedded information literacy education overly relies on the role of individual subject librarians and has not achieved high-level integration with full participation in classroom teaching. Moreover, there is a relative shortage of high-quality teaching staff. In the process of embedded information literacy education, instructors are primarily library staff who must both complete their regular library duties and conduct information literacy education. This "dual responsibility" phenomenon leads to limited energy, while the instability of the teaching staff also exacerbates the loss and waste of human resources. Meanwhile, embedded information literacy education is mostly based on spontaneous cooperation between librarians and teachers, lacking long-term cooperation mechanisms. It neglects demands from students themselves and requirements from the state and society. The focus should be on readers to construct an information assurance environment adapted to their personalized information needs and provide intensive, in-depth information services.

3.2 Education Platform Needs Strengthening

Embedded information literacy education is an important way for university libraries to participate in the teaching process and fulfill their educational functions. In the Web 2.0 era, although continuous development of information technology has brought opportunities for innovating embedded information literacy education models and methods, promoting the upgrading of educational informatization, and online education resources and virtual teaching platforms have been developed to some extent, offline education still primarily relies on face-to-face classroom teaching. The teacher-centered, knowledge-instillation-dominated teaching model struggles to stimulate student interest and participation enthusiasm. Moreover, the randomness and contingency in course offerings and content settings remain prominent. Additionally, insufficient attention has been paid to the structural system of educational content. The curriculum fails to innovate teaching content according to the needs of different professional courses, still focusing mainly on information retrieval skills and knowledge application while neglecting real-time updates of teaching materials and the integration of information ethics and information awareness education content with practical application. Teaching practice is insufficient or ineffective.

3.3 Education Object Needs Refining

Some Chinese university libraries have attempted cooperation between subject librarians and faculty members, embedding information literacy education into specialized courses, effectively compensating for many deficiencies in current information literacy education. However, in the current embedding process, most

still adopt modular or staged relevant embedding, where librarians provide partial embedding in specialized courses or information literacy teaching at certain academic stages, concentrating on answering students' questions and meeting their needs. Although this can address students' confusion in using literature resources to some extent, it fails to provide full-process tracking participation in the entire educational process, including determining teaching objectives and plans, designing research tasks, evaluating relevant grades, and assessing the entire embedded teaching process. It cannot form complete, systematic information literacy teaching content for all stages of academic careers [6]. Meanwhile, China lacks systematic and scalable information literacy standard design and teaching assessment methods, making it impossible to evaluate the effectiveness of embedded information literacy education.

4. Case Study: Embedded Information Literacy Education Practice at Chongqing University Library

In the context of new-era education, Chongqing University Library has comprehensively deepened reforms. Through progressive and in-depth teaching exploration, guided by diverse student needs, and focusing on educational subjects, platforms, and objects, the library has creatively constructed a comprehensive, multi-level, multi-channel, three-dimensional embedded information literacy education system covering curriculum teaching, lecture training, and personalized education, connecting both physical and virtual spaces as well as online and offline environments.

4.1 Building Embedded Information Literacy Education Subjects

The education subject is the organizer and implementer of educational practice activities and constitutes a basic element of embedded information literacy education. Chongqing University Library actively focuses on the university's goal of cultivating "high-quality innovative talents who can adapt to and lead the future," updates educational concepts, reforms education mechanisms, and constructs a "management-teaching-evaluation" trinity of embedded information literacy education subjects, as shown in Figure 1 [Figure 1: see original paper].

4.1.1 Library Embedded Information Literacy Education Management Subject

Chongqing University Library has incorporated information literacy education into the management scope of subject services, establishing a standardized, scientific, and systematic organizational management system. This system mainly includes the Office, Resource Development Department, Network Services Department, Interlibrary Cooperation Department, Cultural Education Center, and Special Collections Department. Each department has clear division of labor while coordinating with each other. The Resource Development Department and Interlibrary Cooperation Department conduct infrastructure construction, refine information resource requirements, and integrate and share all resource

allocations among university departments, between the university and colleges, and among colleges, providing resource guarantees for teaching management. The Network Services Department builds a solid technical support system, providing reliable technical guarantees for embedded information literacy education.

4.1.2 Library Embedded Information Literacy Education Teaching Subject

Based on actual teaching needs, the library breaks down original teaching barriers and educational barriers, formulates information literacy education plans and library service plans, optimizes the academic and geographical structure of the teaching staff, and arranges librarians with professional disciplinary backgrounds as "vanguards" to embed into six major academic divisions: Humanities, Social Sciences, Science, Engineering, Architecture, and Information Science. Relying on specialized branch libraries such as the Science and Technology Library, Architecture Library, Huxi Liberal Arts Library, Huxi Science Branch Library, and Historical Documents Library, as well as three student dormitory area reading rooms, the library has formed an educational pattern with multi-party participation and joint promotion, ensuring effective connection and smooth operation of embedded information literacy education work [7].

4.1.3 Library Embedded Information Literacy Education Evaluation Subject

Chongqing University Library aims to build a distinctive, rigorous, and scientific evaluation methodology and has established the "Academic Evaluation and Analysis Research Center." This center is committed to building a global literature resource big data analysis basic data platform and creating a professional academic evaluation and analysis team. As a member library of the "Research and Formulation of Information Literacy Education Standards and Evaluation System" working group, Chongqing University Library also actively participates in data surveys on the current status of information literacy education, exploring specific and operable multi-dimensional evaluation standards for different levels and disciplines of higher education.

4.2 Building Embedded Information Literacy Education Platforms

The education platform serves as the teaching carrier for embedded information literacy education in the ubiquitous knowledge environment. Through subject librarians embedding into academic research and curriculum teaching processes, Chongqing University Library has gradually formed a comprehensive information literacy education interaction platform that relies on both physical and digital spaces and combines physical embedding with virtual embedding.

4.2.1 Popularizing and Promoting Physical Space

In classroom teaching, researching embedding models of information literacy education in specialized courses and building information literacy education courses suitable for disciplinary development needs are teaching practice explo-

rations supported by Chongqing University as one of the first "Management and Service Innovation Projects." Chongqing University Library firmly grasps the main channel of traditional teaching, directly establishing teaching linkage mechanisms with university administrative departments, key laboratories, research teams, and college classes, integrating library resource utilization into systematic general education and specialized course classroom teaching, and continuously integrating, optimizing, and sharing information literacy education resource allocation to collaboratively build new, widely-covered embedded information literacy education classroom teaching platforms [8]. In lecture training, Chongqing University Library has established a training lecture system covering information resources and data retrieval, disciplinary research and thesis writing, and tool/software operation through a combination of regular and rolling training, special lectures and appointment-based training. The library also emphasizes cultivating students' critical thinking and media literacy awareness.

4.2.2 Expanding and Deepening Virtual Space

Embedded information literacy education is carried out based on big data and mobile internet technology. On one hand, Chongqing University Library actively expands online education space, building a new student library orientation platform and an information literacy education platform, and developing online education resources based on these carriers. The most representative example is the "Construction and Practice of a New Graduate Information Literacy Teaching Framework under the SPOC (Small Private Online Course) Model." This model draws on advanced concepts from MOOCs and "flipped classrooms," integrates traditional learning with digital and networked learning (E-Learning) technologies, adopts the SPOC format, and makes structural adjustments to the existing graduate information literacy public course "Scientific and Technical Literature Retrieval." It builds a "Composite 8+8" blended teaching model that combines fixed-class theoretical teaching with open seminar lectures and physical classes with online courses. This breaks the traditional practice of full teacher instruction, implementing a composite design of "basic module + advanced module," "classroom teaching + open lectures," and "physical classes + online teaching," creating an interactive and personalized learning process [9], as shown in Figure 2 [Figure 2: see original paper].

On the other hand, Chongqing University Library relies on new information technology to establish a user-centered knowledge service portal system, launching a mobile library with mobile phones as terminals and a WeChat library based on smartphone applications. Regarding the mobile library, since developing the "Chongqing University Mobile Library Service System" in 2007, the library has been committed to providing users with collection inquiries and one-stop retrieval services based on metadata, promoting the integration of physical and virtual libraries and the combination of print and digital resources [10]. Regarding the WeChat library, Chongqing University Library strengthens guidance and training on library resource utilization in mobile environments, highlighting the characteristics and advantages of information acquisition and utilization in mobile internet environments. The library provides personalized information

retrieval guidance and mobile information consulting services to meet users' anytime, anywhere learning needs and enhance library service effectiveness and utilization rates of various professional databases.

4.3 Refining Embedded Information Literacy Education Objects

Education objects are the targets of embedded information literacy education. Refining education objects has special value for improving teaching quality, achieving teaching objectives, and completing educational tasks. Chongqing University Library emphasizes systematic, hierarchical, and flexible structures in its teaching framework and creatively integrates online and offline dual channels in the educational process, relying on two-way collaborative and diversified personalized education methods to further refine education objects.

First, subject librarians at Chongqing University Library have been committed to cooperating with professional teachers from different disciplines and research teams from different colleges, jointly discussing curriculum arrangements and teaching content. They have launched embedded information literacy education in general education courses, specialized courses, and freshman seminar courses, fully utilizing the systematic nature of classroom teaching to meet the personalized and professional information needs of students from different disciplinary backgrounds. This helps them become familiar with and master disciplinary literature resources more conveniently and quickly, achieving knowledge transformation and innovation, thereby improving scientific research innovation capabilities, as shown in Table 1 .

A representative example is the literature retrieval course jointly offered by the library and colleges. For instance, subject librarians invited expert teachers from the School of Construction Management and Real Estate to embed into the "Scientific and Technical Literature Retrieval and Utilization" course. Subject librarians first assigned undergraduate students the task of writing course reports. The course report required students to propose a topic title, explain how to conduct information collection and organization, how to process and transform knowledge information (decomposition, reorganization, association, questioning, hypothesis, etc.), and based on this, explore the research value and direction of the topic. Finally, subject librarians and college expert professors jointly provided feedback and guidance on the scientific validity of research methods, understanding and standardization of key academic concepts, and critical reading of relevant literature in students' course reports [11]. Additionally, teachers from the School of Materials Science and Engineering invited subject librarians to collaboratively offer the course "How to Conduct Literature Review: Embedded Teaching of 'Mechanical Behavior of Metallic Materials.' " This course includes two parts: literature retrieval and thesis writing, covering resource services, retrieval basics, literature management, topic selection, and writing and submission processes. This "two-way embedding" collaborative teaching method between subject librarians and college faculty promotes the integration of information literacy education and specialized course teach-

ing, expands educational depth, enhances interaction between teachers and students, and achieves internalization of both information literacy knowledge and specialized disciplinary knowledge, improving differentiated learning outcomes for students.

Second, the library continuously optimizes its resource structure and conducts heterogeneous information literacy education based on the information service needs of teachers and students from different colleges, grades, and disciplines, providing professional, multi-level, and guided reference consulting and information services. On the PC-side information literacy education platform, subject librarians can conduct targeted customized training according to user requirements, such as the annual "Entering Chongqing University Library" new student orientation training and monthly information literacy series lectures, including science and engineering special training, social science special lectures, news information officer special training, and literature resource research special sessions. Training objects cover undergraduates, master's and doctoral students, international students, young teachers, and research teams, using interactive communication as the basic form to optimize and upgrade educational functions such as information literacy education and information resource services. Simultaneously, students can access SPOC courses and EBSCO online courses provided by the information literacy platform through identity authentication for online open learning. Through clicking videos, embedded online quizzes, online discussions, online Q&A, online examinations, and online homework submission, students engage in autonomous and interactive online learning, using "flipped classrooms" to enhance offline teacher-student interaction and closely integrate information literacy teaching with information resources to fully meet students' diversified and personalized learning needs [12], as shown in Figure 3 [Figure 3: see original paper].

5. The "3All" Model for University Library Embedded Information Literacy Education

Based on practical reflection and case analysis of university library embedded information literacy education, to better improve the quality and effectiveness of information literacy education, the authors propose constructing a "3All" model as the implementation path for university library embedded information literacy education. The "3All" concept originated from General Secretary Xi Jinping's important speech at the National Conference on Ideological and Political Work in Colleges and Universities in December 2016. He pointed out that colleges and universities should closely focus on the main line of "cultivating virtue and nurturing talent," follow the laws of education and teaching, student growth, and ideological and political work, and strive to achieve an ideological and political education pattern involving all staff (all-staff), all dimensions (all-around), and all processes (all-process). The "Three Alls" education concept provides a research paradigm and model framework that university library embedded information literacy education can learn from. The "3All" model for university

library embedded information literacy education means that university libraries should, on the basis of clarifying educational subjects and objects, scientifically grasping educational content, and rationally utilizing educational platforms, advance with the times and adapt to new situations. By consolidating systematic educational forces, they should strive to achieve a "Three Alls" embedded information literacy education pattern involving all staff, all dimensions, and all processes.

5.1 Building All-Staff Education Subjects to Improve Multi-Level Education Quality

Building a high-quality information literacy education team is the basic guarantee for effective embedded information literacy education. "All-staff" means that in addition to subject librarians and professional teachers, student service personnel, school technical management personnel, and social forces can also participate in information literacy education, establishing connections and communication among different subjects to form educational synergy.

5.1.1 Building Professional Information Literacy Education Teams

University libraries should hire information literacy education backbones and experts who possess both library professional basic theoretical knowledge (including informatics, information resource management, information processing technology) and other disciplinary professional knowledge to fully participate in information literacy course teaching. They should conduct quantitative assessments of academic works, research levels, teaching achievements, qualification certifications, and professional title evaluations for information literacy education research and professional talents, improving the openness and transparency of evaluation and assessment to motivate the teaching enthusiasm and research passion of professional teams. Simultaneously, they should strengthen long-term cooperation with college teachers, actively explore the construction of scalable and multi-level "two-way embedding" teaching systems, and attempt to absorb diverse specialized course teachers into information literacy course teaching to lay a foundation for large-scale embedded education [13].

5.1.2 Building Student Service Teams through Student Organizations

In the new media environment, information literacy education should highlight dynamism, flexibility, and relevance to college students' personal growth. Through subtle and progressive methods integrated into student learning, and leveraging college students' dual identities as both information users and creators, libraries can rely on the affinity, appeal, and cohesion of mass student organizations. By fully utilizing student organizations' roles in self-management, self-education, self-service, and self-supervision, libraries can conduct targeted student and reader services, organization, and management work, emphasizing participatory and cooperative information literacy education to enhance students' subjective initiative. This establishes a long-term positive interaction mechanism between the library and students, building an academic exchange and information sharing service platform.

5.1.3 Building School-Society Collaborative Education Teams

Factors influencing students' information literacy levels are complex and diverse. University libraries should adopt a comprehensive orientation, adhere to the teaching principle of facing all students and progressing step by step, and gather full participation from all university staff and social forces to complement each other's strengths and expand richer teaching forms and activities. This achieves the integration of individual teacher education forces and social system education forces, the integration of school education and non-school education, and the integration of school education and lifelong education, mobilizing all forces to the maximum extent into the teaching environment to construct a comprehensive support system for information literacy education.

5.2 Building All-Around Education Platforms to Enhance All-Element Education Capacity

All-around education means not using only a special carrier for information literacy education such as information retrieval skills education or database utilization education, but rather permeating the concepts and goals of information literacy education into various education carriers such as student comprehensive quality assessment, student organization construction and management, campus culture construction, and social practice. Based on information literacy education goals, it achieves systematic integration of different education carriers and resources. The education platform is a teaching carrier that integrates teaching concepts, methods, content, and evaluation systems.

5.2.1 Adhering to Online-Offline Collaborative Embedded Teaching Methods

University libraries should deepen embedded information literacy teaching reform, fully utilizing the advantages of strong planning and rigor in the credit system to standardize, standardize, and quantitatively manage required courses, elective courses, and lecture training related to information literacy education. They should expand and deepen teaching objectives, plans, content, methods, and means; coordinate the embedding layout of other disciplines and majors; conduct integrated and infiltrative teaching pilots across campuses and branch libraries in collaboration with teachers of various disciplines and majors; and strengthen the establishment of comprehensive, innovative, and research-oriented courses. They should achieve rational allocation of information literacy education resources, fully utilizing time flexibility and curriculum flexibility to expand information literacy education from offline to online. Relying on network teaching platforms, they should form an open information literacy education and service model driven by user needs, with active interaction and flexible support for knowledge innovation [14].

5.2.2 Adhering to Teaching-Learning-Research Integrated Embedded Teaching Methods

The integrated teaching-learning-research model reform for information literacy education represents an exploration to achieve innovative talent cultivation

goals that meet contemporary needs. As an academic institution serving teaching and scientific research, university libraries have dual functions of intelligence and education. They should adopt problem-oriented teaching methods, uphold student-centered teaching concepts, and provide students with integrated teaching content covering "information awareness cultivation - information knowledge teaching - information skills practice - information ethics standardization," comprehensively improving students' abilities in information acquisition, management, analysis, and utilization to effectively enhance the efficiency and quality of teaching, learning, and research [15].

5.3 Refining All-Process Education Objects to Enhance Full-Chain Education Levels

All-process education means not conducting information literacy education only at a specific stage or time point, but providing continuous, comprehensive, and targeted information literacy education for different students from enrollment to graduation and from course beginning to course end, compensating for education gaps during critical periods of student growth and maintaining persistence and stability between different education stages. A sound institutional system is the action guide for developing embedded information literacy education.

5.3.1 Establishing Long-Term Embedded Academic Career Education Mechanisms

The initial education stage, namely freshman orientation, focuses on "guiding" students ideologically, mainly through permeation and guidance of information awareness and information ethics concepts to set the correct direction for students' information concepts in the early university stage. The growth education stage focuses on "exploring paths" for students in their learning. University libraries can arrange information literacy education themes according to grade progression, following the main line of guiding students to become adults, teaching them to accomplish tasks, cultivating them to become talents, and motivating them to succeed, while balancing basic general education in theory and specialized education in application. The employment stage focuses on providing "outlets" for students in their careers. The positioning and goals of information literacy education ultimately guide and serve students. University libraries should conduct personalized information literacy education and services based on senior students' personality traits, ability levels, interests and needs, professional directions, and employment requirements.

5.3.2 Establishing Advanced Embedded Information Literacy Education Mechanisms

University libraries should treat embedded information literacy education as a systematic, standardized, and normalized project, establishing an advanced embedding mechanism. They should conduct information literacy education according to the actual needs of students at different grades, such as library resource and service orientation for freshmen to help them quickly understand library resources and services, and training on literature review, pre-project

literature research, and thesis writing and submission guidelines for senior students to improve their ability to acquire various resources and lay foundations for scientific research innovation. Simultaneously, they should formulate scientific and effective stage-based information literacy ability quantitative standards from macro, meso, and micro levels, establish scientific education evaluation and incentive mechanisms, and refine information literacy ability indicator structure systems based on professional discipline levels and general levels to ensure teaching quality of embedded information literacy education and form a closed-loop system with supervision, evaluation, feedback, guidance, and improvement.

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Author Contributions

Liu Qingqing: Paper writing, framework design, system construction;
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Yang Xinya: Research positioning, direction guidance;
Li Yan: Framework guidance, paper review.

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