Literature Information Retrieval and Utilization: Curriculum Design and Teaching Improvement

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Abstract As a core course for information literacy education in colleges and universities, *Literature Information Retrieval and Utilization* directly affects the cultivation of students' academic research ability and lifelong learning ability. Its design and improvement have become important research topics in the field of higher education. Focusing on the core dimensions of curriculum design including curriculum content construction, teaching model innovation, practical link design, and assessment system optimization, we emphasize the adaptive adjustments and improvement paths of curriculum design in the digital context. Based on relevant course research results, this paper analyzes prominent problems in current curriculum design, such as the disconnection between content and scientific research practice, rigid teaching models, and single assessment methods. To address these issues, it proposes that curriculum design should adhere to three guiding principles: being demand-oriented, practice-oriented, and technology integration-oriented. This paper aims to provide theoretical reference and practical support for colleges and universities to optimize the curriculum system and improve teaching quality.

Key words Literature information retrieval; Curriculum design; Teaching improvement

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With the explosive growth of knowledge, *Literature Information Retrieval and Utilization*, as a foundational course in colleges and universities for cultivating students' information literacy, bears the responsibility of enhancing students' abilities in literature information retrieval, information identification, and application of academic norms[1]. Meanwhile, it is both theoretical and practical in nature, striving to achieve an organic integration of "theoretical instruction, practical training, and academic application"[2]. In recent years, due to the digital transformation and upgrading of education as well as sudden public health events, online teaching platforms have become an important supplementary form of course instruction to some extent. However, due to issues such as poor platform adaptability, insufficient practical guidance, and inaccurate interactive feedback when online teaching platforms are used for highly practical courses, it is essential to explore how to leverage the advantages of online platforms, overcome the inherent limitations of online teaching, and truly achieve teaching effectiveness comparable to that of offline instruction[3]. According to statistics, over 60% of university students face problems such as low efficiency in literature information retrieval and weak resource screening ability in the early stages of academic research. At present, the course *Literature Information Retrieval and Utilization* in universities still faces many problems and difficulties. For example, the course content fails to keep pace with the application of up-to-date databases. Most courses primarily focus on theoretical instruction, which is detached from students' actual needs in conducting research and completing graduation projects. The adopted teaching methods lack innovation, with insufficient use of digital teaching tools. Additionally, the assessment methods are monotonous. In most courses, written exams account for over 50% of the final grade, making it difficult to effectively evaluate students' practical application and problem-solving abilities. All these factors affect the teaching effectiveness of the course, making it difficult for students' literature retrieval and utilization abilities to meet the requirements of academic research. In response to the above situation, this paper explores the underlying reasons for the problems in teaching, learning, assessment, evaluation, and management in the construction of the university course *Literature Information Retrieval and Utilization*. By combining existing research findings from both domestic and international sources and drawing on personal work experience, a more scientific and reasonable optimization pathway is proposed.

Teaching Plan Design

The course *Literature Information Retrieval and Utilization* faces certain challenges in terms of adaptability and practicality[4]. First, the course covers a wide range of knowledge points and is highly comprehensive, including topics such as retrieval fundamentals, database usage, search strategies, and information utilization. The fragmented nature of the knowledge, coupled with its strong logical connections, requires a combination of comprehension, memorization, and practical operation, which presents certain difficulties. Second, students from different majors have varying needs for the course. For instance, students in fields such as food science, agricultural engineering, and bioengineering exhibit differences in their literature retrieval and resource requirements, making it difficult to achieve precise alignment with general teaching content. Third, there is insufficient interaction and inadequate feedback on practical exercises. In a traditional teaching environment, instructors often cannot keep up with the practical progress of every student, resulting in many students failing to have their retrieval misunderstandings and operational difficulties corrected in a timely manner. Fourth, there is the problem of

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"understanding the theory in class but being unable to apply it in practice". That is to say, students acquire knowledge during lectures, but find themselves unable to complete the operations when faced with real-world tasks. This places high demands on students' learning initiative and the intensity of supervision. Therefore, a teaching plan centered on "ability orientation, practical core, and interactive reinforcement" has been developed by comprehensively considering three aspects: teaching content, teaching process, and assessment methods. The teaching plan for the *Literature Information Retrieval and Utilization* course is formulated accordingly.

Optimization of teaching content

The knowledge points of the course typically include several major modules: basic retrieval knowledge, database application knowledge, search strategy knowledge, and information utilization knowledge. However, it also encompasses most of the common foundational knowledge required for subsequent courses, making it highly practical. In response to this situation, the various knowledge points can first be sorted into three levels: "mastery", "familiarity", and "awareness", and visualized into a knowledge map using mind maps to clarify key points and highlight levels of difficulty. Abstract and hard-to-understand concepts, such as retrieval principles (*e. g.*, Boolean logic rules), can be presented as animated demonstrations. Step-by-step instructional videos can be created for database operations, such as CNKI advanced search videos and bibliometric analysis videos. Additionally, supporting PPT courseware and extended learning resources such as guidelines on academic misconduct detection and manuals for literature management software can be developed[5]. Moreover, subject-specific database resources can be supplemented according to the learning needs of students from different majors. For example, the ScienceDirect database, particularly its food science-related resources, can be introduced for students majoring in food science, while the CNKI agricultural subject database can be provided for students in agricultural sciences.

Organization of the teaching process

A teaching process design centered on the "pre-class—in-class—post-class" model is adopted, combining offline classrooms with platforms such as Rain Classroom and Chaoxing Learning Platform to complete teaching tasks.

Pre-class preview stage: Teaching materials such as electronic textbooks, knowledge mind maps, preview videos, and preview task sheets (*e. g.*, "Try using basic search to find literature on 'food preservation technology' and record any issues encountered") are uploaded to the course platform. A preview reminder is posted in the class group of the course to ensure students complete the preview tasks and submit any questions to the group. The teacher will teach the students the common confused problems by name.

In-class teaching stage: Combining online resources, the class adopts a model of "theoretical instruction + real-time practice + interactive Q&A". The teacher demonstrates database operations, engaging in shared learning and practice with students. After each key knowledge point, a practical test is conducted (*e. g.*, "Please use "Subject = Literature Retrieval AND Keyword = Teaching Practice" to retrieve information"). Two to three Q&A sessions are arranged per class (*e. g.*, "How can retrieval result accuracy be improved?"). Questions, answers, and quizzes allow for real-time monitoring of the teaching process, helping to identify and address gaps in learning and ensuring effective classroom progress. Common issues identified during students' pre-class learning are summarized, and unified Q&A sessions are organized to help students understand the norms and characteristics of database applications in scientific research. Specific research examples are used to illustrate the basic steps of literature retrieval and the methods of database utilization. For students unable to complete hands-on exercises during offline classes, the teacher provides one-on-one after-class guidance.

Post-class consolidation stage: Layered assignments are released on the platform. The basic level consists of database practice tasks (*e. g.*, "Complete a literature search report on a designated topic"), while the advanced level involves comprehensive application tasks (*e. g.*, "Use the retrieved literature to draft a literature review framework"). An online Q&A group is established, where teachers respond to student inquiries within 24 h, regularly share practical retrieval tips (*e. g.*, "methods for finding obscure literature"), and organize students to share their retrieval experiences and outcomes.

Assessment implementation

Assessment adopts a combination of "process-oriented evaluation and summative assessment", with a focus on evaluating students' practical skills and their ability to comprehensively apply knowledge. Process-oriented evaluation accounts for 40% of the total grade, including the completion of preview tasks (10%), participation in class interactions (10%), and the quality of after-class assignments (20%). Class interactions encompass various forms such as offline discussions, online Q&A responses, and other feedback mechanisms. The summative assessment accounts for 60% of the total grade and is conducted in the form of "offline practice + online theory". The question types integrate both theory and practice. Objective questions (multiple-choice, multiple-answer, and true/false questions, each accounting for 10%) are used to assess students' grasp of basic knowledge points and are completed online. Subjective questions (practical operation questions and case analysis questions, accounting for 30% and 20%, respectively) are designed to evaluate students' practical application abilities (*e. g.*, designing a complete retrieval strategy based on a given research topic and completing the retrieval operation on-site). These are conducted offline under instructor supervision. Before the exam, a simulating assessment is organized to familiarize students with the procedures and format. For the online assessment, anti-cheating measures are enabled (*e. g.*, prohibiting screen switching, requiring cameras to remain on throughout, and randomizing question order). For the offline assessment, strict examination room discipline is enforced[6].

Research on the Effectiveness of Information Literacy Enhancement

Tracking of core competency dimensions

A follow-up survey on information literacy competencies was

conducted based on the core dimensions of information literacy, including retrieval skills, information discernment, and academic application. By the end of the course, 85% of students were able to complete a search for core literature on a given topic within 15 min, representing a 40% improvement compared with the beginning of the course. Among them, 72% of students were able to flexibly use advanced retrieval techniques such as advanced search and cross-database search, resulting in more precise and comprehensive retrieval outcomes. From the tests on identifying false literature and judging source credibility, it was observed that students' accuracy in identifying low-quality literature increased from 58% at the beginning of the course to 83%. Students were able to clearly distinguish between various types of literature, particularly demonstrating the ability to accurately differentiate core journals, general journals, and various non-academic resources found online. Furthermore, 69% of students were able to correctly use citation formats in their academic reports. The proportion of students using literature management software increased from 21% at the beginning of the course to 76% by the end. Students demonstrated a strong awareness of preventing academic misconduct. However, their ability to formulate complex retrieval strategy combinations and conduct in-depth analysis of retrieval results remains insufficient, indicating a need to strengthen training in these areas in future teaching.

Analysis of typical practical cases

Three representative student practice cases were selected for detailed analysis to further validate the teaching effectiveness. In specific, a student working on his/her graduation thesis needed to retrieve literature on the "comprehensive utilization of by-products from food processing". Using learned methods such as topic clustering analysis and reference tracking, the student found over 200 Chinese and English papers from databases within one week. These papers were systematically organized and categorized, forming comprehensive background materials. The literature review for his/her graduation project received high praise from their supervisor. Three students formed a group to collaboratively complete the collection and synthesis of retrieval materials for the project "Research Status of Agricultural Product Preservation Technologies". They conducted their work through online collaboration, and divided tasks virtually. Each member searched different databases, performed statistical organization, and compiled the results into text that was shared with all group members. The data from different sources were aggregated and analyzed through shared platforms to produce the final results. This process effectively demonstrated the retrieval and utilization skills of the three group members. One month before the course began, a student was unable to locate the obscure literature they needed due to a lack of proper methods. Later, during the "Searching Skills for Obscure Literature" module in the course, they learned to use interlibrary loans and email inquiries to authors, successfully obtaining three key documents to address their research problem. This demonstrates that the course enabled students to apply what they learned in practice, achieving the teaching objective of "integrating learning with application".

Conclusions

As a core course in information literacy, "*Literature Information Retrieval and Utilization*" is highly practical in nature. However, the teaching process faces three major challenges: "difficulty in providing practical guidance, weak interactive feedback, and poor alignment with diverse student needs". Improvements and enhancements involve three aspects in this paper: optimizing teaching content (layering knowledge points, visualizing resources, and tailoring to professional needs), standardizing the teaching process (closed-loop design, online-offline coordination), and refining the assessment system (competency-oriented, diversified formats, and fairness assurance). As a result, this course has effectively addressed the challenges of "difficulty in providing practical guidance, weak interactive feedback, and poor alignment with diverse student needs". It has substantially enhanced students' practical information literacy capabilities and can serve as a valuable reference for the teaching of similar courses.

Future teaching should continue to be strengthened and improved in the following aspects. First, emphasis should be placed on diverse forms of interaction. While increasing teacher-student interaction, activities such as group collaborative retrieval and skills competitions should be introduced to stimulate students' learning motivation. Second, personalized guidance should be enhanced by fully leveraging the data analysis functions of the platform to identify students' specific problems through data mining and provide targeted solutions. Third, resource development should be strengthened by incorporating more database operation videos and research examples into the course materials, making the *Literature Information Retrieval and Utilization* course more applicable and up-to-date.

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