

Practical Exploration of Embedded Teaching for First-Year Undergraduate General Education Writing Courses: A Case Study of the Southern University of Science and Technology Library Postprint

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Date: 2024-04-03T00:00:00+00:00

Abstract

[Purpose/Significance] Through a case study of the information literacy instruction embedded by the Southern University of Science and Technology Library in the first-year undergraduate general education required course “Writing and Communication”, this study provides reference and guidance for libraries of high-level research universities to conduct embedded instruction in academic writing general education courses for lower-division undergraduates under the background of “cultivating top-notch innovative talents”.

[Methods/Process] Based on nearly five years of teaching collaboration, this study explores and analyzes an integrated teaching model for information literacy and writing; and by constructing an embedded information literacy instruction assessment model, with student learning outcomes as the starting point, it comprehensively evaluates the teaching effectiveness using both direct and indirect assessment methods.

[Results/Conclusion] Writing ability and information literacy ability are positively correlated. The information literacy competency structure and characteristics of first-year undergraduates differ from those of senior students; libraries should emphasize the cultivation of information thinking and cognition when conducting information literacy instruction, and enhance teaching effectiveness through models such as full-process embedding, flipped classroom, and blended learning.

Full Text

Embedded Teaching Practice in General-Purpose Writing Courses for Undergraduate Freshmen: A Case Study of Southern University of Science and Technology Library

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Abstract

[Purpose/Significance] Through a case study of the Southern University of Science and Technology (SUSTech) Library's embedded information literacy instruction in the general education required course "Writing and Communication" for undergraduate freshmen, this paper provides reference for research university libraries to develop embedded teaching for lower-division students in academic writing general education courses within the context of cultivating top-tier innovative talent.

[Method/Process] Based on five years of teaching collaboration, this study explores and analyzes an integrated teaching model that combines information literacy with writing instruction. By constructing an embedded information literacy teaching evaluation model and focusing on student learning outcomes, the study employs both direct and indirect assessments to comprehensively evaluate teaching effectiveness.

[Results/Conclusions] Writing ability and information literacy ability are positively correlated. The information literacy competency structure and characteristics of undergraduate freshmen differ from those of senior students. Libraries should emphasize the cultivation of information thinking and cognition when delivering information literacy instruction, and enhance teaching effectiveness through full-process embedding, flipped classrooms, and blended learning models.

Keywords: embedded teaching; undergraduate freshmen; general-purpose writing; curriculum integration; information literacy assessment

Introduction

In 2015, the State Council issued the "Overall Plan for Coordinating the Construction of World-Class Universities and First-Class Disciplines," placing undergraduate education at the core of talent cultivation [1,2]. In 2019, the Ministry of Education's "Opinions on Deepening Undergraduate Education and Teaching Reform to Comprehensively Improve Talent Cultivation Quality" identified academic writing courses as an important learning model for undergraduate

freshmen, emphasizing that the integration of academic writing and general education cultivates students' expression and critical thinking abilities [4,5]. Since then, general education writing courses with academic writing as the theme have emerged in Chinese universities. Leading institutions such as Tsinghua University and Southern University of Science and Technology have successively made Chinese academic writing courses compulsory for undergraduate freshmen to meet the urgent demand for improving undergraduate education quality and strengthening the research-education nexus [3].

General writing courses typically adopt a thematic approach, focusing on argumentative writing through problem-awareness stimulation to cultivate students' logical thinking and academic dialogue abilities, enabling them to produce academically normative arguments and enhance innovation and practical skills through high-level scientific research [6-8]. Top research universities worldwide regard strong writing and communication skills as essential components of innovative talent cultivation. Unlike traditional one-shot information retrieval lectures or one-time embedded sessions, SUSTech's information literacy training runs throughout the entire writing course. The Tsinghua University Writing and Communication Teaching Center, based on years of undergraduate teaching experience, proposes that the most effective way to cultivate students' information literacy is to integrate it into the curriculum [13]. The ACRL "Framework for Information Literacy for Higher Education" released in 2015 emphasizes that information literacy education should be combined with authentic contexts and research processes [14]. A 2016 ACRL empirical research report confirmed, based on case studies of embedded teaching in general education courses at Temple University and other institutions, that information literacy instruction enhances the effectiveness of inquiry-based and problem-solving general education [15].

2 Overview of Embedded Information Literacy Education

2.1 Current Research Characteristics of Embedded Information Literacy Education

Embedded information literacy education represents a typical integrated teaching approach that cultivates comprehensive abilities to analyze and evaluate information by embedding content such as information retrieval skills and information ethics into general and professional courses [11]. Bruce argues that information literacy cannot be learned without addressing specific disciplinary contexts [12]. Jacobson et al. note that without integration into particular subjects, information literacy education is ineffective [13]. Current domestic research and practice on embedding information literacy into academic writing courses remain limited, largely because Chinese universities have only recently begun offering such general education courses. As one of the earliest institutions to provide embedded information literacy instruction, Tsinghua University Library has established long-term, in-depth collaborations with academic departments, primarily in professional courses and graduate programs, while also actively embedding into general education courses. However, these efforts

mainly take the form of lectures rather than true classroom embedding [24].

2.2 Research Status of Information Literacy Embedded in Academic Writing Courses

The integration of writing and information literacy instruction has long been a consensus in American general education. Armstrong redesigned Western Washington University's writing course and found that information literacy and critical thinking are inseparable elements of academic writing ability [20]. Rapchak et al. constructed a learning community at Duquesne University where a librarian and writing mentor jointly guided first-year students' writing courses, discovering that collaborative teaching effectively improved student learning outcomes [21]. Shao et al. conducted information literacy instruction in first-year general writing courses at Appalachian State University and found through assessment that information literacy skills positively correlated with students' writing scores and final grades [22]. Kim implemented information literacy instruction in STEM writing courses and, by scoring research papers from experimental and control groups, found that information literacy skills related to information evaluation and utilization positively correlated with research paper grades [23].

Domestic research on embedded information literacy education primarily focuses on macro planning, collaboration models, teaching model exploration, and teaching team construction, with few empirical studies on embedded teaching cases for undergraduate academic writing general education courses. SUSTech Library has collaborated with the Humanities Center since 2018 on the "Writing and Communication" course, completing instruction for 53 freshman classes and accumulating rich teaching experience through diverse teaching practices. This paper presents a typical case of writing-embedded information literacy instruction based on five years of collaborative teaching practice, focusing on integrated instructional design, teaching process, and comprehensive evaluation of pre- and post-instruction competency assessments, aiming to provide reference for research university libraries developing embedded information literacy instruction for lower-division undergraduates in academic writing general education courses.

2.3 Current Status and Characteristics of Freshmen Information Literacy Competencies

Today's college students, having grown up in the internet era with abundant information resources, are "digital natives" who skillfully use search engines, social networks, and other tools to find and share information. A Shanghai Jiao Tong University Library survey shows that 100% of students choose search engines as their preferred channel for academic resources, and 80% believe they possess efficient abilities in collecting, processing, and organizing information [25]. However, nearly five years of classroom observation and research reveal that academic resources and information retrieval remain challenging tasks for most

freshmen [26]. Only 10% of freshmen know about CNKI, and this significant gap between self-perception and reality highlights the importance of embedded information literacy education for academic writing general education courses targeting lower-division undergraduates.

Freshmen exhibit distinct information usage behavior patterns [25,27]. Academic writing demands high-level literature retrieval, reading, and synthesis skills, differing considerably from the creative writing training in secondary school. The primary challenge for freshmen in retrieval is transforming personal interests into academically meaningful questions. Breaking through their information cocoons requires not only teaching conventional search techniques but also stimulating their information awareness in academic contexts. This demands embedding information literacy instruction throughout the entire course and creating problem-discovery processes where students identify knowledge gaps and learn through problem-solving. Information literacy encompasses more than simple information querying and retrieval; it involves cultivating information thinking and cognition such as source selection, collaboration, and communication. Good information awareness and normative retrieval methods should be established at the initial stage of academic training, gradually deepening understanding of databases, retrieval, and academic communities through group collaboration and communication.

3 Embedded Information Literacy Teaching Practice and Evaluation in “Writing and Communication”

3.1 Instructional Design

Over the years, SUSTech Library and writing instructors have continuously explored and practiced an integrated teaching model for information literacy and writing, trying one-time embedding, full-process embedding, and online-recorded offline-flipped blended teaching models. One-time embedding is limited by class time, focusing on skill improvement but allowing limited practice time, leading to easy learning and forgetting. Conventional offline teaching enables face-to-face interaction and problem identification but poses challenges for library instructors. The course has established eight teaching units: topic selection, paragraph and language, material search and reading, and academic norms and paper revision [19]. The first four themes directly relate to information literacy.

The instructional design scheme is detailed in Figure 1 [Figure 1: see original paper]. The teaching model emphasizes student-centered learning and personalized tutoring. Librarians record instructional videos, demonstrate the process from broad to precise literature investigation, and show how to use CNKI’s bibliometric visualization analysis to view research hotspots, Wanfang’s keyword word clouds, DuXiu academic search for key literature, and author and keyword knowledge nodes to understand leading scholars’ research areas and publications. Librarians leverage resource advantages to provide teaching materials and cases

for writing instructors, explain relevant components, and primarily take responsibility for the material search and paper topic selection components. They enter the classroom for two consecutive weeks, participate in student presentations, review retrieval assignments in the teaching system (Blackboard) as teaching assistants, and participate in final paper grading. Students, as teaching subjects, fully participate through video self-study combined with classroom presentations, stimulating information awareness and problem-solving ideas through peer learning, achieving teaching effects where $1+1>2$.

3.2 Teaching Practice

General writing courses adopt a thematic writing model. Starting from broad themes, students refine topics through direction determination and complete research papers after literature reading and synthesis. Compared with senior undergraduates or graduate students, freshmen face challenges in transforming interests into academically meaningful questions. In flipped classroom practice, student groups collaborate to complete class assignments, presenting not only successful experiences but also trial-and-error processes with specific cause analysis. This peer teaching enhances learning effects. Table 1 shows specific teaching content and key points, aiming to cultivate freshmen's information awareness and basic literature retrieval skills, information screening and evaluation methods.

During teaching, librarians and writing instructors discover differentiated retrieval problems. For instance, students mistake sentences for search terms, use inappropriate English search terms when finding foreign literature, or improperly apply Boolean logic operators. When reviewing retrieval assignments, instructors provide personalized feedback to solve practical retrieval problems. The embedded information literacy teaching emphasizes continuity. Assessment before embedding and at semester end reflects freshmen's current information literacy competency structure and characteristics. Figure 3 [Figure 3: see original paper] shows scores for each indicator from 108 assessment questionnaires in one semester. Students scored relatively higher in "information management and utilization" but lower in "information inquiry and access" and "information regulation and security." This indicates that while students can utilize and integrate information based on resource retrieval to complete papers, they still need feedback after class, particularly in resource types and application.

3.3 Teaching Evaluation

The evaluation model uses both direct and indirect assessments. Direct assessment includes pre- and post-tests measuring five indicators: information awareness, information inquiry and access, information evaluation, information management and utilization, and information regulation and security. Indirect assessment involves a "librarian-writing instructor" dual evaluation based on course papers. The librarian and writing instructor independently score three dimensions each: the librarian evaluates search strategy appropriateness, resource

selection appropriateness, and reference standardization (ensuring citations are relevant and correctly formatted), while the writing instructor assesses critical thinking, persuasive argumentation, and reference citation quality. Each dimension uses a 1-5 scale, with final scores calculated as averages. Figure 2-A [Figure 2: see original paper] shows the evaluation model, while Figure 2-B [Figure 2: see original paper] illustrates the dual assessment approach.

Comparison of pre- and post-test scores shows improvement across all indicators, demonstrating the significance of integrated teaching. Scoring 108 final course papers reveals a positive correlation between writing performance and information literacy ability. As shown in Figure 4 [Figure 4: see original paper], the trend line indicates that students with better writing performance also have higher information literacy scores, suggesting that information literacy competency affects writing quality.

4 Discussion

4.1 Building a Hierarchical Information Literacy Education System Starting from Freshmen Embedded Teaching

Freshmen differ from senior students in information literacy competency structure and disciplinary background. Libraries should build a hierarchical, systematic information literacy education system aligned with undergraduate learning trajectories, targeting different user groups and establishing long-term mechanisms for different learning stages. Academic general writing courses, driven by themes and training in material collection, writing, and academic thinking, provide an effective entry point for library embedded teaching for freshmen. Beyond this, libraries should offer diverse information literacy support around students' learning and research needs, such as English learning resources and common office software training for lower-division undergraduates, research literacy training for upper-division undergraduates and graduate students, and thesis proposal and dissertation writing support for graduating students.

4.2 Building an Integrated Information Literacy Assessment Framework Aimed at Lifelong Learning Ability

In 2018, the Ministry of Education issued "Opinions on Accelerating the Construction of High-Level Undergraduate Education and Comprehensively Improving Talent Cultivation Capacity," emphasizing that information literacy is foundational for knowledge innovation and professional learning ability. Assessment is a long-term, continuous process. China lacks systematic assessment standards and methods, making systematic evaluation of embedded information literacy teaching effects difficult. This study constructed an evaluation model for undergraduate academic writing courses from the perspective of student learning outcomes, finding improved information literacy competencies after instruction and exploring the relationship between information literacy and writing ability through final course papers. Further development of a widely applicable

assessment framework would significantly promote integrated information literacy teaching.

4.3 Strengthening Multi-party Collaboration to Promote Student-Centered Flipped Classroom Strategies

SUSTech Library annually provides embedded information literacy instruction for seven departments, including two required Chinese and English general writing courses. Years of practice demonstrate that flipped classrooms effectively enhance student initiative and classroom engagement. The library should continuously strengthen collaboration with course instructors, integrating into curriculum design and assignment grading around shared goals. Through flipped classrooms, peer collaboration, and interdisciplinary cooperative teaching, libraries can promote teacher-teacher and student-student collaboration to cultivate innovative interdisciplinary talents.

4.4 Enhancing Technology Application to Promote Mixed Online-Offline Teaching Models

This embedded teaching adopted a blended online-offline model. Students flexibly controlled video learning progress according to their needs. During instruction, librarians used shared documents to enhance interactivity. After instruction, library-created MG animations, information literacy MOOCs, and LibGuides provided a virtual learning environment. Blended teaching models foster autonomous learning, increase engagement and appeal, and offer a development approach for library information literacy instruction in mobile internet environments. Libraries should continuously strengthen information technology integration to promote teaching model innovation and enhance teaching effectiveness.

5 Conclusion

The information literacy competency structure and characteristics of undergraduate freshmen determine that embedded information literacy teaching for general writing courses differs from instruction for professional courses or graduate programs. Based on five years of collaborative teaching practice for the “Writing and Communication” course, this paper discussed integrated teaching practice from instructional objectives, content design, and evaluation, providing a reference case for embedded information literacy instruction in undergraduate academic writing general education courses. This represents an effective exploration of SUSTech Library’s service to first-class undergraduate education. Particularly in small-class general academic writing courses, student-centered flipped classroom teaching strategies enhance learning outcomes. This collaboration model between librarians and writing instructors offers a replicable framework for peer institutions.

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