

Research on the Current Situation and Countermeasures of Information Literacy Education for Chinese College Students — Take Southwest Universities as an Example

Chengxi Sun[†], Chenyu Li^{†,*}

Sichuan University, Sichuan, Chengdu, China

*Corresponding author

[†]These authors contributed equally.

Abstract: Information literacy education for teachers and students in university libraries is an important measure to meet the needs of society for information talents and to train high-quality comprehensive talents and innovative talents in universities. This study adopts the research methods of literature analysis, network survey, comparative analysis, questionnaire survey, etc. to analyze the current situation of information literacy education in southwest universities and their students' information literacy status, aiming at exploring the existing problems in information literacy teaching in university libraries and proposing feasible solutions.

Keywords: Information literacy education; University students; Information literacy

1. Introduction

College libraries are important parts of colleges and universities. Traditionally, the work and services of university libraries focus on guiding teachers and students to check out and return books and organize literature resources. With the development of technology and Internet, the pressure of librarians' work such as guiding the checkout and return of books and organizing literature resources is gradually weakened with the help of computers and machines. Therefore, the work of librarians gradually changes to providing information education, cultivating information literacy and improving information literacy skills for teachers and students.

Information literacy education for teachers and students in university libraries is an important step to meet the demand of society for information talents and to adapt to the cultivation of high quality comprehensive and innovative talents in universities. Comprehensive and innovative talents must have good information literacy. Only with strong knowledge retrieval ability and information extraction ability can college students effectively acquire and organize high-quality information, and with strong screening and judgment of information can they determine the scope of information among many information data, reasonably use effective information and reduce the risk of being misled by invalid information.

At present, information literacy education has been given a high priority in the libraries of major universities in China. However, can information literacy training activities really meet the information literacy needs of college students? What are the problems and possible drawbacks of information literacy training activities in Chinese university libraries? What should universities do to solve these problems? To explore these questions, firstly, we should clarify the specific connotation of information literacy, secondly, we should understand and analyze the current information literacy development activities in university libraries and assess the information literacy level of students. Finally, according to the requirements of information literacy competence, the information literacy cultivation activities and students' information literacy level are compared and analyzed, and the problems and solutions of information literacy competence activities in college libraries at the present stage are identified by combining the implementation of related activities in other schools.

2. Research Overview of Information Literacy Education

2.1. Information Literacy and Data Literacy

Information literacy, also known as information quality, was first introduced in 1974 by Zurkowski, president of the American Information Industry Association, who believed that "information literacy is the ability to use diverse information retrieval tools and effective information sources to solve relevant problem". [1] In 1998, *Information Competence: Creating Partners for Learning* was published to further deepen the meaning of information literacy as an important component of lifelong learning, and in 2000, a more standardized definition of information literacy was proposed by the Association of College & Research Libraries (ACRL) Standards Committee --Information literacy is the ability of individuals to understand when they need information and to retrieve, evaluate, and use it effectively. [2] The most authoritative definition of information literacy is the one in the ACRL Information Literacy Framework for Higher Education, adopted by the ACRL on January 6, 2015: "Information literacy is a set of skills that reflects the ability to discover information, understand production and value of information, using information to create new knowledge, and engaging in community learning as a comprehensive set of competencies". [3]

Currently, no uniform description of data literacy has emerged from the academic community. Specific elaborations on data literacy are summarized in Table 1 below.

Table 1: Data Literacy Related Research

Authors	Data Literacy Definition
Tibor Koltay	Data literacy is about the ability and skill of acquiring research data for critical evaluation and use, and provides a relevant discussion of the relationship between data literacy and other literacies.
Krall	Students who are data literate are able to ask valuable questions, find relevant data to solve problems, identify valuable data and collect and analyze data in a logical way.
Carlton	Data literacy refers to the need to obtain the required data in a reasonable manner, and on the other hand, to understand the meaning of the data and draw appropriate conclusions in conjunction with the data
Meng Xiangbao	Data literacy consists of three levels of data awareness, basic data knowledge and skills, and the use of data resources to discover, analyze and solve problems
Zhang Jingbo	The researcher's ability to collect, organize and manage, process and analyze, share and collaborate on the innovative use of scientific data, as well as the researcher's ethics and conduct in the production, management and dissemination of data

Although researchers have defined data literacy differently, in summary, it can be found that data literacy focuses more on the retrieval and utilization of data in information than information literacy, i.e., data literacy focuses more on the more technical aspects of data production, preservation and management. [4]

With the development of the information society, the amount of data is increasing and the form of information is becoming more and more visualized and data-driven, the traditional information literacy is no longer sufficient to understand the connections and changes between data in information. In 2011, Vitae's research development model and the Social University [5], The Society of College, National and University Libraries' (SCONUL) seven-pillar information literacy model considers data processing skills as a component of information literacy competencies. [6] In 2013, ACRL conducted a social survey in the humanities and social sciences on whether Digital Literacy should be integrated into information literacy. [7] Zhang points out that data literacy is closely related to information literacy, data can be seen as a form of specific information, data literacy is a subset of information literacy, and data literacy is an extension and concretization in the field of professional skills. [8] Therefore, data literacy and information literacy have gone through a process from mutual independence to mutual integration. After absorbing data literacy, information literacy has greatly expanded its connotation and extension, so that information literacy can adapt to the development trajectory of science and technology. [9]

Since information quality in this paper mainly refers to the acquisition, evaluation, processing and utilization of data in information, information literacy in this paper is a combination of traditional information literacy, i.e., finding and using information, and data literacy, i.e., the production and management of data, etc.

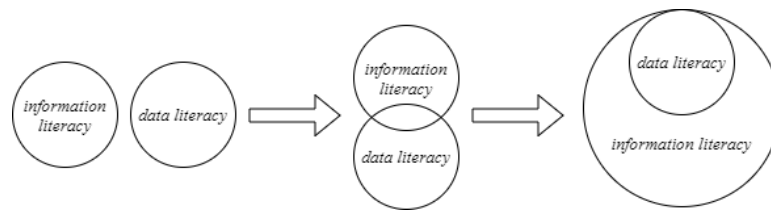


Figure 1: The evolution of the relationship between information literacy and data literacy

2.2. Information literacy skills and evaluation indicators

Regarding information literacy, our scholar Wang Jiqing [10] considered that information literacy is a kind of cultivation and ability to acquire, use and develop information in the information society, which can be cultivated through education and teaching. It includes information consciousness and emotion, information ethics, information knowledge and information ability, etc. It is a comprehensive and common evaluation of the society. With the rapid development of computer networks, the connotation of information literacy has been changing.

Information literacy competencies are a set of competencies that come with being information literate, and Doyle's 1990 National Information Literacy Forum annual report outlines nine areas of information literacy competencies [11]. The ACRL issued the U.S. Information Literacy Competency Standards in Higher Education in 2000. The standard consists of five primary indicators, 22 secondary indicators and 86 tertiary indicators. At present, the standard has reached a consensus and is widely used in U.S. college libraries. In China, based on the content of "Information Literacy Competency Standards in American Higher Education" in 2005, the Beijing Literature Retrieval Research Association completed a set of standard system for evaluating the information quality competency of students in Chinese colleges and universities, "Information Quality Competency Index System for Colleges and Universities in Beijing Region". The system includes 7 primary indicators, 19 secondary indicators and 61 tertiary indicators. This system has become a more comprehensive information quality measurement standard for higher education in China [12].

There have been scholars [13] [14] [15] carried out extensive empirical research, combined with the actual situation of the survey respondents, the author summarized information literacy into four aspects from information awareness, information knowledge, information ability and information ethics. Among them, information consciousness refers to information awareness refers to the human for. The perceptiveness, judgment and insight of information resources and the ability to determine the characteristics and scope of their information needs. Information knowledge mainly includes information technology knowledge and the understanding of information-related theories and concepts. Information ability mainly refers to the ability to select, process, transmit, absorb and utilize information, which involves information demand organization and expression, information organization, information analysis, information application, information evaluation, etc. Information ethics, on the other hand, is mainly defined as the ethics and laws and regulations that people comply with when acquiring, using and evaluating information.

2.3. Information Literacy Education

Information literacy education refers to the educational process of universities to provide knowledge and information services through some courses in the construction of libraries, so that students or other users can use high-tech information means to obtain information[16]. Foreign information literacy education started earlier education framework is more perfect, such as the United States in the "1990 national education goals" (now called the 2000 goals) pointed out: "By the year 2000, every adult should be literate and master the knowledge and skills necessary to compete in the global economy skills to fulfill the rights and responsibilities of citizenship."

Although information literacy education in China started late, scholars have never stopped exploring information literacy education for higher education after 2000. In terms of information literacy education practice for colleges and universities, Hong discusses the feasibility of gamification of information literacy education in China from the comparison of information literacy education programs in China and the United States, as well as specific suggestions for construction[17]. Chen He-yang explores the educational model of college students' information literacy in the MU environment from three aspects, including the composition of the teacher team, learners' selection preferences, and the information

processing process, and proposes specific initiatives for the development of a MOOC on college students' information literacy, such as a multi-participant lecture model, a course framework infused with social objectives, and course content integrated with subject knowledge and specific contexts[18].Zhu Junqing discusses microblogs as a good tool and channel for information literacy education in libraries in the social network era and discusses the advantages and effects of microblogs on information literacy education in university libraries.[19]



Figure 2: Statistics on the number of relevant articles from 2000-2021

3. Current status of Information Literacy Development Activities in University Libraries

Taking a university in southwest China as an example, after investigation and visits, combined with questionnaires and interviews with relevant staff, and after analysis and collation, we got the five main ways to carry out information literacy education in Chinese university libraries at present. The following table shows.

Table 2: Main pathways of universities now

Main Pathways	Details
Related courses	The library provides relevant courses such as "Information Retrieval and Utilization" for college students, covering the whole process of literature retrieval, acquisition, evaluation, utilization, management and dissemination, including the search methods and techniques of various information resources, databases, full-text access, the use of search engines and other online resources, reference management software, thesis selection and research frontier tracking, academic paper writing specifications and submission, etc., so as to meet the needs of college students' daily study and research.
Embedded - teaching	Actively carry out information literacy embedded teaching with the college, incorporate information literacy cultivation into the study of various professional courses, improve students' professional information literacy, understand professional authoritative information sources, and facilitate targeted guidance for students to carry out professional research and study.
Fresher Education	The library started orientation for all new students in order for them to better understand the library and make good use of the library's rich resources to help their studies and research.
Lectures	The library regularly offers relevant lectures with rich content, which can be booked by students and faculty, and supports simultaneous listening online and offline.
Online resources	The library has launched a wide range of information literacy learning resources on its websites, where students and faculty can study online.

4. Analysis of information literacy of college students

Based on the literature research, this study combines the existing research on information literacy and designs the questionnaire with reference to the mature scale. The questionnaire consists of three parts:

the first part is mainly about the respondents' basic personal information, the second part is about the students' participation in information literacy education provided by schools, etc. The third part is to investigate the information literacy of college students from the four dimensions of information awareness, information knowledge, information ability and information ethics, combining the characteristics of the study with the existing mature scales. The variables were measured by means of a five-level Likert scale, i.e., for each question item, five options were set to indicate different degrees, and the respondents chose the option that best met their personal perceptions according to the degree of recognition. This is shown in Table 3 below.

The questionnaires were distributed online. Finally, a total of 109 questionnaires were collected, excluding invalid questionnaires such as short answer time, incomplete answers and inconsistent answers, 103 valid questionnaires were obtained, with an efficiency rate of 94.49%.

Table 3: Variable question items for information literacy

Indicators	Abbreviations	Observed variables	Sources
Informational Consciousness	IC1	I can find and grasp useful information quickly and efficiently	Huang[20]etc.
	IC2	I can find and grasp useful information quickly and efficiently	
Informational Knowledge	IK1	I clearly understand the meaning of information literacy	Zhang[21]etc.
	IK2	I understand the commonly used information sources (knowledge network, Wanfang, Google Scholar, web of science, etc.) and conduct searches	
Informational Ability	IA1	I can express my information needs accurately	Podgornik B.B[22]
	IA2	I am familiar with the library's resources and services (off-campus visits, reference consultations, book lending)	Zeng[23]
	IA3	I can sort and organize the information I obtain	
	IA4	I am willing to share the information I have obtained with others	
Informational Morality	IM1	I understand cybercrime and comply with the law and platform rules	Zhao[24][25]etc.
	IM2	I can comply with the ethics of knowledge utilization (including intellectual property protection, writing articles with attribution, not applying pirated resources, and not maliciously disseminating false information)	

4.1. Descriptive Statistics

Among the respondents, the proportion of students from freshmen to seniors is more than 90%; in terms of majors, the number of science and technology students is higher, reaching more than half of the respondents. In terms of resource usage, compared with offline resources, online resources are more frequently used by students due to their convenience, but the utilization rate of both needs to be further strengthened. In terms of participation in activities, the level of participation in the activities held by the students was low, mainly because the students found it too troublesome to run offline, the library activities were not well publicized and they were not interested in the training contents.

4.2. Reliability Test

In this study, Cronbach's alpha coefficient and combined reliability (CR) were used to test the reliability of the questionnaire. The Cronbach alpha coefficient and CR of all variables in this study are greater than 0.8, and the data obtained from this questionnaire can be considered to have good reliability.

4.3. Data Analysis

4.3.1. Information literacy of college students

In this survey, a five-level scale was used in the questionnaire to make students score their information literacy in a total of four dimensions: information awareness, information knowledge, information competence and information ethics. Their total scores are shown in the table 4 below, out of 50 points.

As shown in the table, it can be seen that overall the information literacy of the university students selected in the sample is high, with the mean and median ranging from 36-37, which is high in general, but there are still a few students who have too low information literacy.

Table 4: Information literacy of college students

Variable	Size	Max	Min	Avg.	Standard Deviation	Median	Variance	Kurtosis	Bias	CV
TOTAL	103	50	25	36.602	5.503	37	30.281	-0.298	0.228	0.15

4.3.2. The differences in information literacy of students with different participation

ANOVA was conducted after passing the chi-square test. As shown in Table 5, it can be seen that for students with different information literacy(IL) and their educational participation(EP), there are significant differences in information knowledge (IK), information ability (IA), information ethics (IM) and information literacy among students who adopt different attitudes, except for their information awareness (IC), which does not differ significantly (its p-value is greater than 0.05). It is evident that information literacy education in libraries has a significant impact on students' information literacy. To further investigate, the relationship between the degree of participation in library information literacy education and information literacy, Pearson correlation analysis was conducted, and the results are shown in Tables 6. It was found that the two showed a significant positive correlation ($0.00 < 0.01$). Then, it can be concluded that the higher the degree of participation in information literacy education in libraries, the higher their information literacy. This indicates that information literacy education activities conducted by libraries have a significant positive impact on students' information literacy, i.e., active participation in information literacy training in libraries is beneficial to improving students' information literacy.

Table 5: ANOVA

Variable	Value	Size	Average	Standard Deviation	F-value	p
IC	2	45	7.778	1.259	3.041	0.084*
	1	58	7.328	1.33		
	Total	103	7.524	1.312		
IK	2	45	7.178	1.267	6.56	0.012**
	1	58	6.552	1.202		
	Total	103	6.825	1.264		
IA	2	45	14.978	2.472	6.159	0.015**
	1	58	13.759	2.473		
	Total	103	14.291	2.535		
IM	2	45	8.467	1.358	8.836	0.004***
	1	58	7.569	1.634		
	Total	103	7.961	1.578		
TOTAL	2	45	38.4	4.952	9.22	0.003***
	1	58	35.207	5.543		
	Total	103	36.602	5.503		

Table 6: Pearson correlation analysis

	EP	IL
EP	1.000(0.000***)	0.365(0.000***)
IL	0.365(0.000***)	1.000(0.000***)

4.4. Result Discussion

4.4.1. Students have low information literacy and do not pay attention to information literacy education

A significant proportion of the students interviewed do not pay attention to the cultivation of information literacy, do not understand the concept of information literacy, and score at a low level on four indicators: information awareness, information knowledge, information ability, and information ethics. Inability to accurately identify their information needs, lack of information organization and classification ability, lack of learning information knowledge theory, and inability to develop strict information ethics are all problems that emerged in this survey.

4.4.2. Low percentage of students' participation in information literacy education and lack of objective knowledge of libraries

56.31% of students said they had not participated in information literacy education courses offered by their schools, and 26% of students said they had no desire to participate in related training, most of them thought the courses were boring or could be done through self-learning. Meanwhile, 38.07% of the students have never used the library services. In the survey, some students said they basically did not know about the library and thought it was just a study room and a place to borrow and return books.

4.4.3. Lack of innovation in courses and poor multi-platform connectivity

A small number of curriculum designs lack change and innovation. In the information age, students have been exposed to electronic devices and online information resources since they were young, and their information literacy levels are constantly changing. However, some courses still continue the previous teaching programs, resulting in students finding the courses too basic or boring.

At present, many university libraries have opened official accounts on media platforms such as B-site, StudyTalk, and Public, to release information literacy education contents. However, in this process, the information literacy education contents of multiple platforms are similar to a high degree, so to some extent the platforms are mutually exclusive and the linkage needs to be improved. The advantages of multi-end synergy should be used to promote information literacy education in libraries.

4.4.4. Lack of reasonable and effective publicity and unattended events

In the actual survey, we found that students know little about the library activities and services, which largely depends on the library publicity work has some problems. Firstly, many university libraries do not have a prominent position on the official website of the library for related activities; secondly, the public number of university libraries is weak in promoting activities; finally, university libraries do not coordinate the positioning of the publicity of each publicity platform, so that they cannot cooperate with each other.

4.4.5. Lack of quantitative standards

The existing information literacy development system lacks a clear and quantitative assessment standard, which results in students not knowing their true level of competence in this area before they participate in activities related to information literacy development, and not knowing how much they have actually learned after they have participated in such activities, and teachers not being able to well develop teaching programs of different levels of difficulty according to students of different levels.

5. Countermeasures

5.1. Strengthen publicity efforts and form a publicity matrix

Universities can further learn from the universities in China with better library construction, such as Peking University and Wuhan University. Take the advantage of the official website of the library to strengthen the publicity of library activities, and let the official website of the library become the main position for the publicity of activities as well as the publicity of library information literacy services. Besides, for the promotion of activities, the library can consider the platforms such as WeChat public number and Qzone for the full coordination of activity promotion and intensive promotion before the start of activities.

5.2. Effective in-depth student survey needs, design training content

At present, the library's lectures and other activities are reflected by students as "uninteresting content" and "not very interesting". In response to this, the content of the library's information retrieval courses has been adjusted accordingly, such as starting from the information retrieval needs required by life scenarios and leading students to truly use information retrieval methods to solve real life problems. However, for information literacy training activities such as lectures, the library's training content should be innovative in content and form based on the survey of students' needs, so that such activities can not only improve students' information literacy skills, but also stimulate students' enthusiasm to improve their information literacy skills.

5.3. Increase the fun and innovation of information literacy training

A well-designed game system can be introduced for library information literacy teaching to help students increase the fun of learning. In addition, the lectures can be conducted by "practical problems + interesting solutions" that students often encounter to enhance their interest in listening to the lectures. In addition, creative training methods such as sand painting can also be added.

5.4. Establishing a sound incentive mechanism for activities

The library can motivate students to participate in lectures, competitions, etc. about information literacy development activities and set up more generous in-kind prizes in each activity. This will increase the participation rate of lectures and enable students to learn better. In addition, the lecturer can also invite students to interact in the lecture, similar to the form of "flipped classroom" in the classroom, so that students can also speak enthusiastically in the lecture and mobilize their enthusiasm, so that students can feel that they are really learning useful knowledge, rather than completing a task that must be done. Only when students are willing to develop their information literacy skills can we make teaching and learning more effective.

5.5. Further improve the information literacy cultivation system

Libraries should understand the needs of students of different majors and grades for information literacy training activities. The library should carry out information literacy training activities according to specific needs, refine the information literacy training system, and divide information literacy education into three levels, such as "primary," "intermediate," and "advanced," for The system is divided into three levels of information literacy education, such as "beginner", "intermediate", and "advanced", which are tailored to different university levels, so as to teach students of different majors and grades special skills appropriate to their majors and grades throughout their university years.

6. Conclusion

After the previous analysis, it can be seen that Chinese university libraries, as the institutions responsible for information literacy education, have extensively carried out information literacy education courses and organized various, flexible and characteristic information literacy education activities in order to fully develop information literacy education for university students.

Although it is found in the research that the information literacy of students in domestic colleges and universities needs to be improved at present, the overall level is good. At present, the state attaches great importance to the development of information literacy of college students, and domestic experts are constantly exploring innovative ways of information literacy education, so it is believed that information literacy education in college libraries will continue to develop in the future, and at the same time the information literacy situation of students will be greatly improved.

In this paper, the survey was only conducted in southwestern colleges and universities, and there are certain geographical restrictions, so some results of the questionnaire cannot represent all college students in China. It is hoped that more extensive research will be conducted in the future to make the results more convincing and representative.

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