Visualization analysis of university information literacy education research data

Yangyang Jiang[*], Xiaoyan Qin, Jia He

Library, Beihang University, Beijing, China

ABSTRACT

Based on objective data and visual knowledge graphs, this paper summarizes the main research content, theme evolution, research trajectory and development trend of international university information literacy education. It draws on high-quality and novel teaching concepts, methods and contents, and proposes constructive suggestions for the development plan of information quality education in China, and provides references for the curriculum construction of "Document Retrieval", as well as the future development and subsequent research of information literacy education.

Keywords: Visualization analysis, knowledge map, information literacy, literature retrieval, bibliometrics analysis

1. INTRODUCTION

In 1989, the American of College and Research Libraries (ACRL) issued Information Literacy Competency Standards for Higher Education[1], which opened the prelude to the official start of information quality Education in the United States. In 1995, China began to study the theory of information quality education, and proposed to carry out information quality education in the main way of Document Retrieval course. In 2002, the Ministry of Education issued the Regulations for General University Libraries, which clearly pointed out that information literacy education should be paid attention to. The Regulations showed that China's information literacy education entered a new stage. In March 2021, the Ministry of Education further clarified the cultivation methods and overall requirements of information quality education, and emphasized that information quality education is the cornerstone to support the high-quality development of education.

2. RESEARCH METHODS

In recent years, the educational community is very concerned about the development process of information literacy education, and academic research related to this has become an important force to push the development of teaching and research in universities. However, previous literature reviews were often limited to qualitative analysis from their own perspective[2-3], failing to conduct comprehensive quantitative research from a more objective third party perspective.

Quantitative and qualitative methods are used in this paper. Using bibliometrics and visualization tools, this paper presents the research status and development trend of information literacy education intuitively. On this basis, the essence is extracted, and combined with China's national conditions, constructive suggestions are put forward for the positive development of information quality education in China and the teaching of Document Retrieval.

The literature is from Science Citation Index Expanded database and Social Sciences Citation Index database. The retrieval conditions are as follows: Subject = ("information literacy" or "information education") and (UNIV * or college* or higher) and (educat* or teach*), The time span was from 2011 to 2021, and the literature type was Article. A total of 777 literatures were retrieved on May 27, 2021.

3. VISUALIZATION ANALYSIS

In this study, CiteSpace visualization tool is used for mapping.

3.1 Research trends

Figure 1 shows the publication trend of research related to information quality education in International universities in recent ten years. As 2021 is still in progress, the literature data of this year is not complete. However, from the collection

[*] yangyang@buaa.edu.cn

of complete literature data (2011-2020), it can be seen that scholars' research on information literacy education is on the rise as a whole, increasing from 46 in 2011 to 113 in 2020. This shows that the international research enthusiasm and attention to information literacy education are very high, especially in the past two years, the number of relevant research literature has increased rapidly, which depends on the strong publicity and policy support of the international community for information quality education in the global epidemic environment, as well as the urgent needs of the public for the improvement of information literacy skills in the Internet era. On the whole, information literacy education is still the focus of continuous attention in the educational circle.
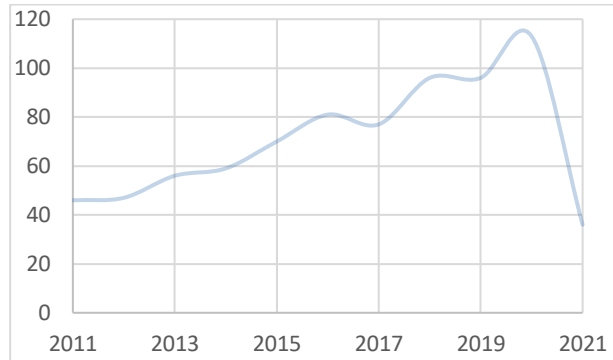

Figure 1. Annual distribution trend.

3.2 Research hotspot

Co-occurrence of keywords can effectively reflect the hot research in the subject field and provide reference and support for scientific research[4]. A total of 2012 keywords are involved in the study, among which 1604 keywords appear only once, accounting for 79.72%. In Citespace, the threshold is set to Top N=50, Thresholding = (2,2,20; 2,2,20; 2,2,20), and Pathfinder = (pruning networks; Pruning the merged network), then we obtain the co-occurrence network as shown in Figure 2.

By reading the literature in Figure 2, it is found that the research focuses on the cultivation of students' high-level abilities, such as the cultivation of students' digital thinking, execution and innovation abilities. And students' comprehensive ability to understand, judge, obtain and use information and technology. In addition, the judgment, evaluation and behavior choice of self-efficacy are also the focus of attention. At the same time, international attention is also paid to the teaching research of the combination of information literacy education and profession and its influence on professional development[5-10].

3.3 Theme analysis

Keywords clustering can understand the basic theme structure and evolution trend of information literacy education research. The logarithmic maximum likelihood algorithm is used to cluster the closely related keywords, as shown in Figure 3. Six clusters were formed in the literature (Q=0.7782, S=0.9329). The evolutionary paths of research topics are information Literacy in 2013, Knowledge in 2014, and university libraries, inquiry-based/discovery learning, media literacies, information skills in 2016 respectively.

In general, the research and development of information literacy education is relatively mature, with more diversified research topics, extensive knowledge coverage and strong interdisciplinary.

3.4 Research trajectory

Using the timezone function of CiteSpace to divide the time-zone line of keywords, combining with related studies[11-18], we can get a general understanding of the research trajectory and research frontier of information literacy education. Each circle in Figure 4 represents a keyword, the size of the circle represents the frequency of the keyword[19], the line represents the connection between the keywords, and the year represents the time when the keyword first appeared.

The initial stage of information quality education research mainly focuses on cultivating students' information literacy knowledge and skills, cultivating students' reading and writing ability and critical thinking. With the advent of the Internet era, improving the information ability, communication ability and service consciousness of librarians has become a new research focus. At the same time, teaching strategies are also changing quietly. The addition of new cultural themes such

as movies and music has improved students' acceptance and understanding of information literacy education. For students with professional background needs, such as nursing, biology, chemistry, mathematics, etc., many discipline-specific information literacy education has been added. In addition, the teaching mode has also begun to change, online learning, distance education has become popular. After 2017, improving students' self-efficacy has become a new research topic, and researches from multiple perspectives have been carried out around the meaning, object, behaviour, improvement methods, and implementation methods about self-efficacy. Since then, in scientific research literacy education, from the design, writing, evaluation of scientific research papers, training students' innovation ability and scientific research ability has become a new focus. Besides, media literacy has also become the focus of research, and the motivation, effectiveness, methods and attitudes of using media resources as well as the critical ability of media have aroused extensive discussion. In recent years, popularization of information quality education has become a new research topic. In addition, diversified information literacy education is also a research focus to adapt to the rapid development of the Internet era.
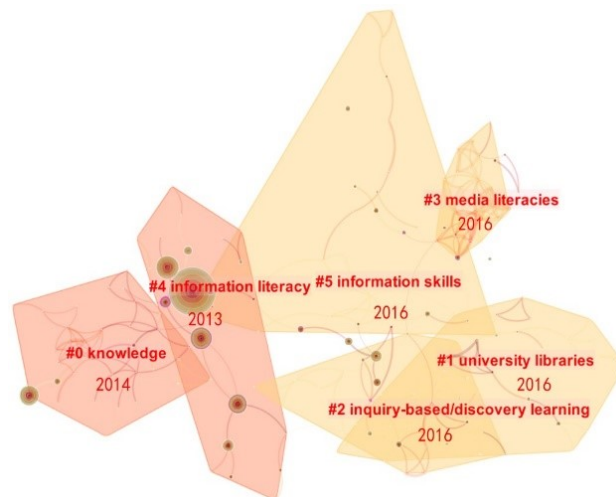

Figure 2. Keywords co-occurrence network.

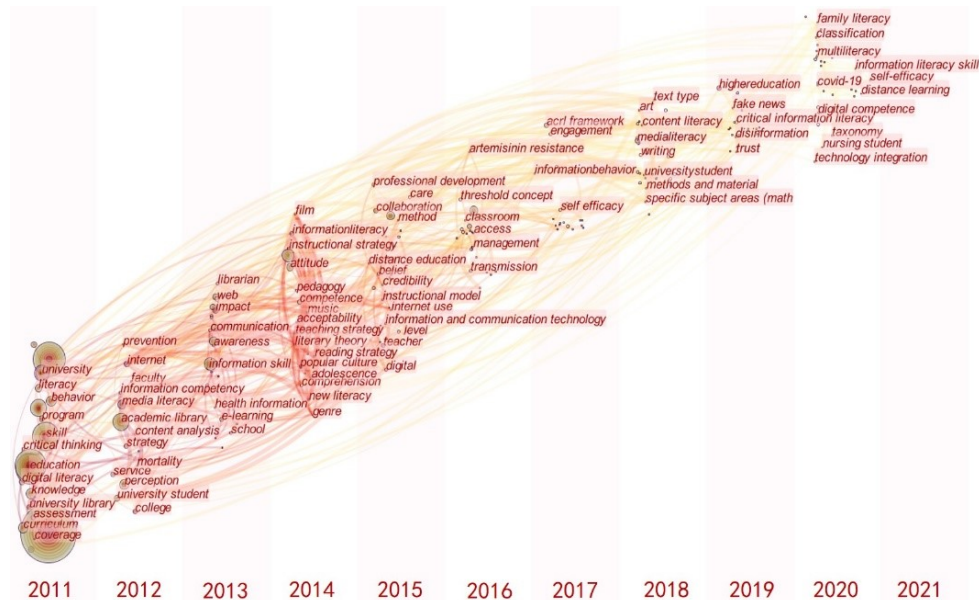Figure 3. Keywords cluster graph.

Figure 4. Keywords timezone.

4. ENLIGHTENMENT AND SUGGESTIONS

The reform and development of information quality education bring the following enlightenment and suggestions for the construction of the "Document Retrieval" course and Chinese information literacy education.

(1) Establish a hierarchical curriculum plan. Turn information literacy education from generalization and modularization to deepening and refinement, and establish multi-dimensional information literacy education courses for students of different levels and disciplines of basic type, improving type and professional type. The basic type is mainly for freshmen, lower grade students and learners without foundation. The course content focuses on cognitive education with basic retrieval skills and basic concepts such as meta-literacy, scientific literacy, data literacy. The improving type is mainly for students with a certain learning foundation. The main content of the course is to cultivate students' information ability and awareness, such as attitude, emotion, values, critical thinking, reflective ability and self-efficacy. The professional type is mainly for graduate students and other students with higher information literacy needs. The main content of the course is to cultivate students' scientific literacy and understanding of the information creation process, such as the design, investigation, writing, evaluation and other scientific research ability about scientific research papers, digital thinking, execution and innovation ability, etc. At the same time, At the same time, relying on majors and scientific research projects, we carry out personalized courses to improve students' professional quality and comprehensive ability.

(2) Develop diversified education models. With the rapid development of the Internet era, students' learning habits begin to change. The fragmented learning mode can not only improve the freedom of learning, but also increase students' attention and participation, so that students can carry out targeted self-knowledge structure supplement. Emerging new media, such as MOOC, SPOC, Micro-class, DOCC and Meta-MOOC, etc, has better decomposed knowledge content and effectively expand the education channels of information literacy. Universities can effectively integrate the existing teaching modes according to the actual situations, on this basis, integrate new media and information technology, constantly innovate and reform, and promote the diversified development of information quality education.

(3) Enrich and innovate teaching forms. Good teaching effect is inseparable from novel teaching methods, content and technology. The current popular embedded teaching, flipped classroom, case teaching, project teaching, PBL teaching, fun teaching, gamification teaching, mixed teaching etc. have effectively enhanced students' learning enthusiasm, promoted students' ability of positive thinking and bold innovation. On the one hand, our universities can actively refer to appropriate teaching forms, such as adding interesting contents (animation, film, music, video, etc.), interactive contents (discussion, competition, game, computer guidance, etc.), practical contents (on-site operation, process demonstration, practical practice, etc.), and technical cooperation (small procedures, APP, official account, microblog, web pages, etc.); on the

other hand, it is necessary to constantly innovate the teaching activity design, improve the teaching effect, promote the course construction and benign development of "Document Retrieval".

(4) Carry out special lectures on information literacy education. Special training lectures can be carried out according to students' actual needs for information literacy education. It can also be linked with the college to carry out embedded lectures on Information Literacy of professional courses, further refine the teaching content, and achieve targeted information literacy education and training. In addition, experts inside and outside the university and database providers are invited irregularly to carry out training lectures combining online and offline comprehensively covering the information literacy education needs of college students.

(5) Make full use of modern education technology to build learning platform, space and virtual learning environment. Using modern scientific and technological means such as artificial intelligence to assist information literacy education provides provide diversified teaching spaces suitable for information literacy education, such as virtual learning space, collaborative learning space, intelligent teaching, consulting and tutoring space, network robots, etc. In addition, according to the actual needs, build an information literacy education practice base, create sand table simulation, three-dimensional modeling, off campus training and other information literacy practice activities for teachers and students, and promote the transformation of information literacy ability from theoretical to practical. In addition, according to the actual needs, an information literacy education practice base can be built, where sand table simulation, three-dimensional modeling, off campus training and other information literacy practice activities are created for teachers and students, to promote the transformation of information literacy ability from theory to practice.

Information literacy education has a vigorous development space, and will develop towards the trend of general, personalized, intelligent and diversified in the future. Continuing to strengthen the universality of information literacy, further expand the audience of education, and effectively improve the information literacy of the whole people. All these are important measures to increase social benefits and promote the construction of a harmonious society in China.

ACKNOWLEDGMENTS

REFERENCES

[1] Kate, Z., "Exploring undergraduate student experiences with information literacy," Perform. Meas. Metr., 17(3), 241-251(2016).

[2] Yang, W. and Zhang, J., "Research on information literacy education innovation under the background of double first-class," New Century Libr., 2, 10-16 (2020).

[3] Huang, Y. and Pu, D., "Research on information literacy education of college teachers in the era of 'Internet plus'," Contemp. Educ. Res. Teach. Pract., 6, 20-21(2020).

[4] Oka I., Suwarno and Nur, A., "Research trends of serious games: Bibliometric analysis," J. Phys.: Conf. Ser., 1842(1), 12-36(2021).

[5] Sample, A., "Historical development of definitions of information literacy: A literature review of selected resources," J. Acad. Libr., 46(2), 102-116(2020).

[6] Sezer, B., "Implementing an information literacy course: Impact on undergraduate medical students' abilities and attitudes," J Acad. Libr., 46(6), 102246(2020).

[7] Purnell, M., Royal, B. and Warton, L., "Supporting the development of information literacy skills and knowledge in undergraduate nursing students: an integrative review," Nurs. Educ. Today, 95(s1), 104585(2020).

[8] Hammons, J., "Teaching the teachers to teach information literacy: A literature review," J. Acad. Libr., 46(5), 102196(2020).

[9] Gómez, G. G., Hinojo, L. F. J., Cáceres R. M. P., et al., "The contribution of the flipped classroom method to the development of information literacy: A systematic review," Sustain., 12(18), 7273(2020).

[10] Guo, J. and Huang, J., "Information literacy education in WeChat environment at academic libraries in China," J. Acad. Libr., 46(1), 102073(2020).

[11] Oakleaf, M., "A roadmap for assessing student learning using the new framework for information literacy for higher education," J. Acad. Libr., 40(5), 510-514(2014).

[12] Pinto, M., Fernandez, R. and Caballero, D., "Information literacy trends in higher education (2006-2019): Visualizing the emerging field of mobile information literacy," Scientometrics, 124(2), 1479-1510(2020).

[13] Pinto, M., "Viewing and exploring the subject area of information literacy assessment in higher education (2000-2011)," Scientometrics, 102(1), 227-245 (2015).

[14] Bombaro, C., Harris, P. and Odess, H. K., "A constellation to guide us an interview with Lisa Janicke Hinchliffe about the framework for information literacy for higher education," Ref. Serv. Rev., 44(4), 544-551(2016).

[15] Dolnicar, D., Boh, B., and Bartol, T., "A comparative study of three teaching methods on student information literacy in stand-alone credit-bearing university courses," J, Acad. Libr., 43(5), 601-614(2017).

[16] Gerrity, C., "The new national school library standards: implications for information literacy instruction in higher education," J. Acad. Libr., 44(4), 455-458(2018).

[17] Gross, M., Latham, D., and Julien, H., "What the framework means to me: attitudes of academic librarians toward the ACRL framework for information literacy for higher education," Libr. Inform. Sci. Res., 40(3-4), 262-268(2018).

[18] Pinto, M., Fernandez, R., Garcia, M., et al., "Self-learning of information literacy competencies in higher education: The perspective of social sciences students," Coll. Res. Libr., 80(2), 215-237(2019).

[19] Zhong, Q. M., Wang, L. and Cui, S. H., "Urban food systems: A bibliometric review from 1991 to 2020," Foods, 10(3), 662(2021).