International Information Literacy Paradigm Evolution Post-print

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Abstract

[Purpose/Significance] To elucidate the overall development trajectory of international information literacy and provide references for national development. [Methods/Process] Taking literature on information literacy from SCI and SSCI databases as the data source, bibliometric methods were applied for analysis, and conceptual literature within the analytical results was selected for focused interpretation. [Results/Conclusions] Based on information environment, information technology, the connotation of information literacy, content frameworks, educational philosophy, and practice, the developmental history of information literacy can be chronologically divided into four stages: the 1970s, the 1980s, 1990s-2004, and 2004-present, as well as two paradigms: first-generation and second-generation information literacy. Specifically, second-generation information literacy expands the context from the educational domain to the workplace and daily life domains, guided by social constructivism and connectivism. In terms of connotation, it extends from a series of individual skills to collaborative social practices encompassing multiple factors including cognition, metacognition, emotion, and attitude. Regarding educational content, it evolves from emphasizing the resource, technology, behavior, and process dimensions to placing greater emphasis on the process dimension, communication dimension, and threshold concepts of information literacy.

Full Text

The Evolution of International Information Literacy Paradigms

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[**Purpose/Significance**] This paper aims to elucidate the overall development trajectory of international information literacy and provide references for domestic development. [**Method/Process**] Using literature on information literacy from the SCI and SSCI databases as the data source, this study employs bibliometric methods for analysis, with focused interpretation of conceptual literature identified in the results. [**Result/Conclusion**] Based on the information environment, information technology, information literacy connotation, content frameworks, and educational philosophy and practice, the development of information literacy can be chronologically divided into four stages: the 1970s, 1980s, 1990s-2004, and 2004-present, representing two major paradigms: first-generation and second-generation information literacy. Second-generation information literacy extends the context from education to workplace and daily life domains, guided by social constructivism and connectivism. In terms of connotation, it expands from a set of individual skills to collaborative social practices encompassing cognitive, metacognitive, emotional, attitudinal, and other factors. Regarding educational content, it shifts from emphasizing resource, technical, behavioral, and process dimensions to placing greater focus on process, communication dimensions, and threshold concepts of information literacy.

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Since its proposal in 1974, information literacy research and practice has spanned 45 years. Numerous studies have emerged on its development and evolution, which can be categorized into four main types: First, subjective experience-based reviews, such as Min Hongwu's study of Chinese information literacy journal literature from 1995-2007 [1] and other scholars' reviews of information literacy development in the United States, United Kingdom, and Australia [2-4]. Second, research employing bibliometrics and knowledge mapping, exemplified by Cai Mingyue and Fang Biling's "A Bibliometric Study of Information Literacy Literature" from Taiwan [5] and M. Pinto's comparative analysis of information literacy research in social sciences and health sciences [6]. Third, studies using systematic review or meta-analysis methods, such as T. Nagasawa's systematic review of collaborative information literacy education between librarians and faculty [7]. Fourth, discourse analysis of information literacy concepts [8], as seen in S. Spirane's discourse analysis of library user education, information literacy, and information literacy 2.0 concepts [9]. Building upon these studies, this paper draws on T. S. Kuhn's paradigm evolution theory, references O. Sundin's analytical dimensions for information literacy education practice, and consults visualization analysis results from CiteSpace developed by Chen Chaomei. It focuses on qualitatively analyzing literature that conducts discourse analysis on information literacy concepts, macroscopically describing the paradigm evolution in the development of information literacy connotation and educational practice, thereby both 梳理ing the developmental history of information literacy and delineating the latest

research advances.

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1 Theoretical Framework

1.1 Paradigm Evolution Theory

Paradigm is a theory of scientific development patterns proposed by American philosopher of science T. S. Kuhn. He argued that a paradigm represents the shared beliefs adhered to by a scientific community in a particular discipline or profession, encompassing common theories, viewpoints, or methods. In the model of scientific development, a paradigm marks the transformation of a field into a science; only when a unified paradigm is formed does a discipline enter the period of normal science. However, as research deepens, anomalous phenomena that challenge the current paradigm emerge, precipitating crises in normal science. As these anomalies accumulate, the field enters a revolutionary phase until a new paradigm replaces the old one, and the cycle progresses. In summary, scientific advancement is an iterative process encompassing normal science, crisis, and revolution [10].

In addition to T. S. Kuhn, A. M. Shneider proposed four stages of scientific research processes: In the first stage, research objectives are established and the task is to answer research questions related to these goals. In the second stage, research tools are developed to explore potential research objects. In the third stage, these new tools are employed for investigation, solving research problems and generating substantial research outcomes. The deepening of research may trigger new unknown phenomena, thereby promoting development in the second stage. In the fourth stage, building upon knowledge from the previous three stages, research questions are translated into practical applications and tacit knowledge is transformed into conventional knowledge [11].

1.2 Dimensions of Information Literacy Education Practice

In addition to providing a reference for the conceptual development and evolution of information literacy, paradigm evolution theory reveals that information literacy education encompasses multiple dimensions in its practical development. The succession of these dimensions also serves as a basis for analyzing the

evolution of information literacy, drawing specifically on the research findings of O. Sundin. Through reference to other researchers and study of 31 online information literacy tutorials, O. Sundin proposed four dimensions of information literacy education: resource, behavior, process, and communication [12]. The resource dimension focuses on introducing resource types and genres; the behavioral dimension emphasizes teaching users information retrieval patterns; the process dimension, grounded in constructivism and cognitive learning theory, shifts the focus from information to users, viewing information retrieval as a goal-based problem-solving process; the communication dimension treats information retrieval as a social practice occurring within institutional contexts, with attention focused neither on information nor users but on the community, emphasizing user interaction during the information retrieval process. In addition to these four dimensions identified by O. Sundin, a technical dimension should also be included, as information technology constitutes an important component of information literacy education, encompassing applications of computer technology, social media technology, document management technology, information analysis technology, and other technologies. These five dimensions—resource, behavior, process, communication, and technology—are distributed across different periods of information literacy development and intersect with one another.

1.3 Overview of Information Literacy Paradigm Evolution

The information literacy paradigm refers to the shared theories, concepts, and methods adhered to by information literacy researchers and practitioners during a particular period. Information literacy has a long developmental history and broad geographical scope. Throughout its development, the information environment constitutes the fundamental context for information literacy's existence; information technology serves as the driving force for its advancement; information literacy concepts, standards, and frameworks reflect the cognitive heights of information literacy in specific periods, guiding and promoting the development of information literacy education practice. The information environment, information technology, information literacy connotation, content frameworks, educational philosophy, and practice all constitute important bases for dividing the developmental stages and paradigm evolution of information literacy.

Information literacy literature serves as the carrier reflecting these elements, and bibliometrics can visualize the progress of information literacy. On January 8, 2019, a search for "information literacy" in the title field of the Web of Science (hereafter WoS) Core Collection SCI/SSCI database (coverage from 1900 to the search date) yielded 1,772 English-language journal research articles and review articles. The search results were analyzed using Excel and CiteSpace. Figure 1 [Figure 1: see original paper] shows the publication trend chart, while Figure 2 [Figure 2: see original paper] detects burst documents lasting five years or more in the information literacy development process based on CiteSpace co-citation

analysis.

Integrating paradigm evolution theory, bibliometric analysis, and reading of classic literature, this paper systematically divides the development of information literacy into four chronological stages—the 1970s, 1980s, 1990s-2004, and 2004-present—and two major paradigms: first-generation information literacy (abbreviated as first-generation IL) and second-generation information literacy (abbreviated as second-generation IL), as illustrated in Figure 3 [Figure 3: see original paper]. The 1970s represent the initial stage when the information literacy concept was proposed; the 1980s mark the early development stage when WoS began indexing relevant literature; the 1990s saw information literacy enter an exploratory development period, with several developed countries establishing professional associations and WoS-indexed literature entering a steady growth phase, producing some influential works (e.g., publications by S. J. Behrens, L. Snavely, and C. S. Bruce [13-15]). After 2004, first-generation information literacy entered its mature stage; with the development of Web 2.0 technologies, the traditional information literacy field began experiencing crises, and second-generation information literacy gradually emerged and developed, ushering in a period where both paradigms coexist. The number of WoS-indexed information literacy publications has increased annually, exceeding 50 per year.

2 First-Generation Information Literacy

First-generation information literacy is rooted in traditional libraries and the first-generation internet. It broke away from the traditional library user education paradigm and, alongside information technology development, aimed to cultivate individuals with information awareness, capable of independent retrieval, possessing information knowledge, and utilizing information to solve problems. In educational practice, dominated by behaviorism, it emphasized resource-based learning and generic education independent of context and subject matter, teaching primarily authentic and reliable knowledge such as library print resources and electronic databases. First-generation IL can be divided into four stages: initial, early, development, and normalization. Early information literacy primarily referred to information technology and computer literacy skills, later evolving into a comprehensive capability spectrum encompassing information acquisition and utilization, as shown in Table 1 .

2.1 Initial Stage: 1970s

The 1970s marked the development stage of library user education and the phase when the information literacy concept was proposed and objectives established. At that time, information began to be generated in machine-readable formats, requiring connection to mainframes to use information services, which demanded a series of professional skills possessed by only a few companies [21]. Meanwhile, library user education, after more than a century of progress, entered a rapid development stage, but its content primarily focused on teaching card catalogs, indexes, bibliographies, and reference tools [22], creating a crisis in response to

information technology development. In 1974, Paul G. Zurkowski, Chairman of the U.S. Information Industry Association (IIA), first formally proposed "information literacy," defining it as the skill of using major information sources to solve problems. He emphasized the need for widespread information literacy education and transforming the roles of traditional libraries and information service providers to build an information literacy powerhouse [23]. In 1979, R. S. Taylor formally connected the library profession with information literacy, expanding beyond problem-solving skills to emphasize information resources and information acquisition strategies [24]. Outside the library and information science field, information literacy was also viewed as the ability to think independently when facing mass media and to make clear decisions effectively for democratic politics. In summary, the 1970s proposed the information literacy concept and established its goals but did not address the practical skills and knowledge needed to acquire information literacy.

2.2 Early Stage: 1980s

The 1980s represented the early stage of information literacy, with the United States taking the lead. During this period, computers gradually permeated society, with graphical user interfaces, icons, menus, and mice emerging. In 1982, *Time* magazine selected the personal computer as "Machine of the Year." In 1983, F. W. Horton proposed that information literacy should extend beyond computer literacy using computer hardware and software to encompass the ability to use computer-assisted tools (online databases, email, abstracting and indexing services, etc.) to obtain information for decision-making or problem-solving [17]. In the mid-to-late 1980s, with advances in computer and network communication technologies, U.S. academic libraries began examining user education from a future-oriented perspective. Teaching library skills alone was considered "too narrow in scope" for the information age, and the user education paradigm gradually shifted toward information literacy [13]. In 1987, the American Library Association (ALA) established the Presidential Committee on Information Literacy. In the same year, C. C. Kuhlthau published *Information Skills for an Information Society*, emphasizing that information literacy should also include lifelong learning capabilities [25]. In 1989, the United States established the National Forum on Information Literacy, attracting nationwide attention to information literacy. In the same year, ALA issued its final report on information literacy, defining it as "the ability to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" [26]. This report elevated information literacy from a purely skill-based level to a capability spectrum encompassing information awareness, retrieval, evaluation, and utilization, while emphasizing lifelong learning and critical thinking. This marked the first significant response from library and information institutions to information literacy and represented an important milestone in its development. From this point, information literacy was no longer an embryonic concept but was clearly articulated, with the skills and knowledge required for the field detailed comprehensively.

In terms of information literacy education, U.S. librarians convened the "Libraries and the Pursuit of Academic Excellence" symposium in 1987 to explore the role of information literacy in educational reform. The Big6 information literacy education model was established in 1988 and continues to influence the field today. In 1989, the book *Information Literacy: Revolution in the Library* was published. As the importance of information literacy was emphasized, people believed that information skills should be integrated into curriculum instruction, with library media teachers taking a leading role, while also exploring the role of librarians in teaching critical thinking. During this period, in New Zealand and the Netherlands, information literacy was closely related to computer literacy and information technology literacy, placing greater emphasis on computer technology capabilities.

2.3 Exploration and Development Period: 1990s-2004

The 1990s witnessed rapid development of global information infrastructure and the internet in the late 1990s. The meaning of information literacy proposed by ALA began to be recognized by educational institutions and experts. Information literacy started to become popular in developed countries. In 1997, the United Kingdom established the Information Literacy Advisory Committee; in 1998, Australia established the Australian Forum on Information Literacy (AFIL), gradually forming the "information literacy movement" [27]. Various educational activities were carried out, with emphasis on teacher training and librarian training, and its influence became increasingly widespread.

Entering the 21st century, information infrastructure became more complete, and internet access in homes and schools grew. The importance of information literacy gained further recognition. In 2001, the Nordic countries established the Information Literacy Forum; the U.S. Education Technology Forum listed information literacy as an important component of "21st-century skills." In 2002, China's Ministry of Education included developing information literacy education as one of the five main tasks of university libraries. To promote global attention to information literacy and its integration into systematic educational planning, the United Nations convened two world conferences, issuing the *Prague Declaration* (2003) and the *Alexandria Proclamation* (2005), positioning information literacy as a fundamental human right for lifelong learning and a global policy for promoting human development.

In practice, the development of information infrastructure and the first-generation internet facilitated the informatization of education, providing tools for information literacy education. In the United States, United Kingdom, Australia, and other developed countries, university libraries began collaborating with faculty and other campus institutions to develop online information literacy education platforms, such as the Uwried project at the University of Washington (1994), the TWIST project at the University of Iowa (1996-1999), the Texas Information Literacy Tutorial (TILT, 1996), and the Utah Academic Library Consortium (UALC) Internet Navigator course

(1996). These projects employed innovative teaching styles and technological means, achieving integration of library resources and subject curricula through collaboration among librarians, faculty, educational technologists, evaluators, and administrators.

After entering the 1990s, the number of WoS-indexed publications entered a sustained growth phase. Influential theoretical literature during this period primarily explored the information literacy concept, such as S. J. Behrens's historical review of the information literacy concept [13] and L. Snavely's summary of arguments for and against the information literacy concept [14]; both documents show high burst values in CiteSpace (see Figure 2). Additionally, C. Doyle used the Delphi method to survey 136 respondents from the United States and Canada on their understanding of information literacy concepts and published the monograph *Information Literacy in an Information Society: A Concept for the Information Age* [28], which had considerable influence. Although scholars debated and showed a trend toward expanding the term "information literacy," L. Snavely argued that information literacy, being user-centered, held advantages over other terms after comparing and summarizing 36 alternative terms and 34 literacy-related terms [14].

The development of information literacy promoted exploration of educational models and establishment of relevant standards. In educational models, J. Herring proposed the PLUS model comprising goals, acquisition, use, and self-assessment in 1996; D. Wray explored a ten-stage model supporting reading and writing in 1997; and the Society of College, National and University Libraries in the UK published the *Seven Pillars of Information Literacy* model in 1998, which had significant influence. In standards, the Association of College and Research Libraries issued the *Information Literacy Standards for Student Learning* (1998) and the *Information Literacy Competency Standards for Higher Education* (2000), while the Council of Australian University Librarians (CAUL) issued *Information Literacy Standards* (2000). These provided references for implementing and evaluating information literacy.

2.4 Rapid Development and Normalization Period: 2004-Present

After 2004, Web 2.0 gradually led a new round of information technology revolution in internet-related fields. While information literacy connotation achieved consistency, new crises emerged simultaneously. The application of Web 2.0 technologies promoted prosperity in related research. After 2005, WoS-indexed information literacy publications exceeded 50 annually, particularly reaching over 100 per year after 2011 (see Figure 1). Concepts such as transmedia information literacy, critical information literacy, information literacy 2.0, and metaliteracy emerged successively. First-generation IL gradually became the norm in information literacy education and gradually evolved toward the second-generation paradigm, resulting in the coexistence of user education, first-generation IL, and second-generation IL. As information literacy gained increasing attention, specialized journals in the field emerged,

such as *Communications in Information Literacy*, *The Journal of Information Literacy*, and *Nordic Journal of Information Literacy in Higher Education*, signaling the maturation of the information literacy field.

In specific practice, the focus shifted from information literacy platforms, educational models, and standard formulation to evaluation of information literacy education, particularly concerning its impact on student learning outcomes, such as the U.S. Standardized Assessment of Information Literacy Skills (SAILS), the University of California's context-based information literacy instruction evaluation project, the Information and Communication Technology Literacy Assessment project, and the University of Washington's Project Information Literacy (PIL).

3 Second-Generation Information Literacy

3.1 Context of Second-Generation IL Emergence and Development

After 2004, participatory technologies and social networks (blogs, wikis, Facebook, Twitter, etc.) became increasingly accessible. In recent years, big data, mobile networks, the Internet of Things, and artificial intelligence have further transformed the environment in which users acquire, evaluate, create, and utilize information. Combined with contemporary philosophical concepts and methods (social constructivism, practice theory, connectivism, discourse analysis theory, etc.), these technologies have reshaped the discourse connotations of information, knowledge, authority, authenticity, and accuracy. Meanwhile, learning environments have become increasingly globalized, networked, mobile, and fragmented, gradually changing the global educational ecology and further reshaping information literacy connotation and educational practice. First-generation IL has gradually transformed into second-generation IL.

3.2 Connotation of Second-Generation IL

Second-generation information literacy is a transcendent, comprehensive literacy spectrum that draws upon and incorporates concepts such as digital literacy, media literacy, visual literacy, data literacy, metaliteracy, critical information literacy, etc., aiming to cultivate students into successful knowledge producers and consumers. It advocates critical thinking, participatory learning, metacognitive reflection, and collaboration, representing an organic whole encompassing knowledge acquisition, production, utilization, sharing, communication, and reflection. Second-generation information literacy also breaks through the educational system, penetrating into daily life and workplace domains, integrating information behavior concepts and developing into social practice.

Second-generation IL originates from critiques of first-generation IL. Since the early 21st century, continuing through the formal promulgation of the U.S. 2016 new framework, critiques have focused on three main aspects: First, conceptual critique, arguing that first-generation IL (ALA, 1989 [26]; C. S. Doyle,

1994 [28], etc.) viewed information literacy as generic individual skills applicable across numerous disciplines or learning environments, focusing on the information utilization process rather than higher-order thinking skills. Second, standards critique, pointing out that ACRL's 2000 standards oversimplified complex knowledge and abilities into independent units, incompatible with social constructivism, because learning does not occur merely between individuals and knowledge but within certain groups. Third, contextual limitations, noting that first-generation IL was mainly confined to the education domain without considering the sociocultural attributes and specific application contexts of information literacy, making it unsuitable for workplace and daily life domains.

Building upon critiques of old concepts, some researchers reinterpreted information literacy. In 2005, K. Tuominen proposed that the exploding information environment transformed information literacy into sociotechnical practice information literacy 2.0 (hereafter IL 2.0) [29]. In 2006, J. Elmborg proposed critical information literacy [30]. In 2009, S. Špiranec explored the connotation and characteristics of IL 2.0 [9], identifying recognition of information production contexts and judgment of authority and authenticity as important features of IL 2.0. In 2010, M. Farkas viewed IL 2.0 as key acquisition skills for the social media era; in 2012, he further explored the relationship between participatory technologies, pedagogy 2.0, and information literacy [31]. In 2011, T. P. Mackey and T. E. Jacobson proposed metaliteracy, exploring its seven frameworks [32]; L. Townsend proposed using threshold concepts to identify the most fundamental core critical concepts of information literacy [33]. Among these researchers, A. Lloyd has had significant influence. Drawing on site ontology, practice theory, and social constructivism, she extended information literacy from the education domain to workplace and daily life domains, viewing information literacy as an information practice that reflects not only people's rational and instrumental abilities but also the physical and emotional aspects of identity establishment in social contexts [34-35].

Attention to context, emotion, and metacognitive factors represents an important characteristic of second-generation IL. In 2016, ACRL formally promulgated the *Framework for Information Literacy for Higher Education*, stating that "information literacy is the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning" [36]. This definition places greater emphasis on emotion, metacognition, knowledge creation, and community learning, highlighting communication and process dimensions. It breaks through ALA's 1989 definition of individual information literacy capabilities from a procedural perspective, becoming a classic and guiding definition for second-generation IL.

3.3 Second-Generation IL Education Practice and Framework

Second-generation IL education practice began with using social media technology for information literacy education. Social media technology supports student participation and interaction, offering advantages in promoting critical, creative, and reflective thinking. For example, blogs can organize and display course-related content, stimulating student participation and communication, enabling reflection on learning processes; Flickr tags can help students understand keyword and subject searching; games can be used to teach information technology and related concepts; wikis are effective brainstorming tools for organizing students to negotiate and discuss core information literacy concepts, collaboratively editing and creating entries; podcasts allow students to explore using multiple media and software to tell digital stories, enhancing information, media, visual, and technological literacy. Web 2.0 encourages social constructivist learning and diverse educational practices (such as reflective teaching) [37], providing more pathways for second-generation IL education. Notably, in teaching practice, social media should not merely serve as content platforms for displaying course resources and lecture notes but should be dedicated to promoting student interaction, collaboration, and reflection, changing student learning behaviors, cognition, and metacognition, and enhancing understanding of information literacy threshold concepts.

With advances in information literacy practice and research, countries have successively supplemented and revised information literacy standards. For example, AASL (2007), ISTE (2007), UNESCO (2008), ETS (2008), and SOU/NUL (2004, 2011) have revised or issued new standards for information literacy, educational technology models, or frameworks. However, the most milestone achievement is ACRL's comprehensive revision, the *Framework for Information Literacy for Higher Education* [36]. The new framework consists of six interconnected threshold concepts: "Authority Is Constructed and Contextual," "Information Creation as a Process," "Information Has Value," "Research as Inquiry," "Scholarship as Conversation," and "Searching as Strategic Exploration," rather than a list of standards, learning outcomes, or skills. The framework explains information literacy threshold concepts, clarifies their origins, and elucidates learners' understanding of threshold concepts through knowledge practices. Through affective indicators, it clarifies emotions, attitudes, and values in learning, providing flexibility for second-generation IL education practice.

The *Framework for Information Literacy for Higher Education* has prompted second-generation IL education to shift from information retrieval process instruction to emphasizing information literacy threshold concept education, attracting exploration from higher education researchers and practitioners (R. Z. Kuglitsch [38], L. F. Guth [39], D. Harmeyer [40], J. M. Burkhardt [41], etc.). Among them, J. M. Burkhardt interpreted the six threshold concepts and provided 58 matching exercises. Each exercise comprises two major parts: learning outcomes and teaching guidance. Learning outcomes refer to the learning goals to be achieved through the exercise, while teaching guidance directs

student learning through a series of questions. Each exercise is relatively specific, compensating for the framework's abstractness and operational difficulty, providing references for second-generation IL education practice. Among these, "Scholarship as Conversation" involves authority, formal communication, informal communication, etc., with 11 exercises. Table 2 briefly introduces three of them.

Table 2 "Scholarship as Conversation" Exercises (J. M. Burkhardt [41])

Informal Communication: Understanding Blogs as Sustained Conversation Among Groups | Select two controversial blogs for comparison and answer: What is the blog's purpose? Who is the author? Does the author's identity guarantee authority in this area? Does evidence support the viewpoints? Are citations provided? Do commenters agree with the blogger? How does the conversation advance scholarly progress on the topic? |
Expert Mutual Communication: Understanding How Expert Dialogue Promotes Ideas | How long does the conversation last? What are the core themes? Does it reflect bias? Does it propose new topics? Does it influence subsequent works? How does the socio-historical context affect the dialogue? |
Identifying Important or Highly Cited Information | What topics does the author discuss? Does it describe previous research? What are the conclusions? Are citations provided? What is the earliest citation? The most recent citation? Quickly browse the most recent citation—is the topic consistent? Repeat three times, comparing three citations—what similarities exist? Can you 描绘 the chronological evolution pattern of the theme? |

4 Research Discussion

4.1 Expansion of Scenarios and Contexts

The development of information literacy has involved changes in research domains and practice domains. In the 1970s and 1980s, information literacy emerged in the workplace domain, intersecting with computer and information technology fields and receiving attention from communication and political science scholars. By the late 1980s, information literacy began replacing library user education. By the 1990s, although some scholars (e.g., C. Bruce [42] and W. B. Cheuk [43]) investigated workplace information literacy, it remained primarily confined to knowledge workers. After the 21st century, some researchers began questioning whether school-based information literacy education could prepare students for the workplace and noted differences in information literacy across various contexts. Information literacy research domains began expanding from education to workplace and daily life domains, with representative researchers including A. Lloyd [34-35].

From the perspective of A. Lloyd and other relevant scholars, information literacy in the education domain has been primarily defined by librarians and their leading organizations (ACRL, AASL, SCOUL, ANIZIL, etc.), centered around

"learning how to learn." Information literacy was regarded as a neutral set of individual skills for effectively retrieving, acquiring, and utilizing information that could support students' lifelong learning and facilitate the development of critical thinking and problem-solving skills. However, in practice, information literacy in the education domain was mainly limited to textual practices for effectively using print resources and information technology practices for effectively using databases. In contrast, information literacy in workplace, daily life, and community domains involves various complex contexts, and information literacy varies across different contexts. For example, firefighters, paramedics, elderly individuals, and refugees engage in physical practices and interpersonal practices beyond print texts and information and communication technology practices. A. Lloyd, drawing on practice theory, social constructivism, and site ontology, posits that information literacy is a complex, comprehensive sociocultural practice involving holistic information experiences between people, objects, texts, and bodily experiences in social contexts, understanding information contexts to engage in information practice [34-35]. Her research has expanded the contexts of information literacy.

4.2 Paradigm Evolution of Information Literacy Connotation in Higher Education

As the information environment has changed, the connotation of information literacy has undergone paradigm evolution. What, then, does the new paradigm extend/enhance/elevate? What does it abandon/weaken/replace? What does it retrieve/recover/restore? What does it reverse/flip? (These questions are proposed by drawing on McLuhan's "four laws of media" [44]).

First-generation IL encompasses generic capabilities including information awareness, retrieval, evaluation, and utilization, advocating lifelong learning and critical thinking. It weakened the focus on print literature, re-emphasized the ability to cope with vast amounts of information, and broke down library walls. Second-generation IL weakened the focus on text-based information, positing that information literacy is an organic whole of reflectively discovering information, understanding information production processes, effectively evaluating information, and collaboratively creating information, with greater emphasis on metacognition, emotion, context, and process.

First-generation IL is closely related to concepts such as computer literacy, information technology literacy, information capability, and network literacy, emphasizing the technical dimension. Second-generation IL is a transcendent, comprehensive concept related to information literacy 2.0 (information literacy 2.0), metaliteracy, social networking literacy, literacy 2.0, critical information literacy, information and communication technology literacy (ICT literacy), and transmedia literacy. Among these, critical information literacy, proposed by J. Elmborg, advocates not only teaching students research processes and skills but also cultivating students' critical consciousness by engaging them with current social issues and active knowledge production, enabling students to move be-

yond knowledge acquisition to identify and engage with significant world issues and learn to control their own lives and learning [30]. Critical information literacy expands the connotation of second-generation IL, emphasizing the role of education in political and cultural agendas.

4.3 Paradigm Evolution of Information Literacy Education

In educational practice, second-generation IL has achieved renewal in educational philosophy, content, and methods. In educational philosophy, first-generation IL was guided by behaviorism and individual cognitive constructivism, focusing on information retrieval and viewing information seeking as an independent user behavior. Second-generation IL, influenced by social constructivism and connectivism, treats knowledge acquisition and creation as collaborative products of dialogue and negotiation, placing greater emphasis on collaborative learning and strengthening the communication dimension.

In terms of educational methods, although first-generation IL explored numerous learning approaches such as resource-based learning, embedded curriculum learning, and problem-based learning, the primary teaching method was top-down, hierarchical, teacher-centered instruction. Second-generation IL advocates student-centered approaches, replacing lectures with collaborative, dialogic, participatory, reflective, blended, fragmented, and informal learning.

Regarding educational content, although first-generation IL mentioned in its concept that information literacy comprises a series of capabilities for acquiring, evaluating, and utilizing information, actual teaching content focused on teaching computer literacy, search engines, databases, Boolean logic retrieval, and controlled vocabulary around information acquisition, emphasizing technical, behavioral, and process dimensions while neglecting the communication dimension. Teaching content lacked important components such as information analysis, evaluation, collaboration, and creation. The application of search engines, academic search engines, and discovery systems has reduced information retrieval pressure. Second-generation IL instruction has shifted from individual information retrieval to community collective learning, reading, and writing, encouraging students to use social technologies to build personal learning networks for knowledge analysis, evaluation, management, creation, sharing, collaboration, and reflection. By creating a series of learning questions and teaching segments, it provides exercises for information literacy threshold concepts to foster collective understanding and self-awareness of these concepts. Second-generation IL also integrates information literacy with students' research processes, teaching not only information acquisition but also reading and writing after information acquisition, covering not only cognitive knowledge but also procedural and conceptual knowledge. Teaching content has become increasingly interdisciplinary and deepened.

Second-generation information literacy expands the contexts of first-generation information literacy, extending research domains from traditional libraries and

higher education to workplace, daily life, and specific communities. In terms of connotation, it expands from individual information retrieval skills to collaborative information retrieval, evaluation, sharing, and creation encompassing cognitive, metacognitive, emotional, attitudinal, and other factors. It emphasizes not only textual information but also contexts, focusing on holistic information experiences between people, objects, texts, and bodily experiences from social and cultural perspectives. In information literacy education, educational content has gradually expanded from resource, technical, behavioral, and process dimensions to strengthening process, communication dimensions, and threshold concepts, shifting from emphasizing information retrieval skills to encompassing academic research processes including literature reading, thesis writing, journal submission, and academic publishing. Currently, some domestic university information literacy education continues to focus on cultivating individual information retrieval skills and resource-based learning. In the future, we should draw on advanced domestic and international concepts and experiences to reform and explore information literacy philosophy and educational practice.

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Author Contributions

Peng Liwei: Data collection, paper writing; Gao Jie: Topic proposal, research discussion.

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