Reframing Information Literacy Competency Standards and Frameworks for Higher Education in the Age of Artificial Intelligence

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This study aims to explore the impacts of generative AI and ChatGPT on information literacy competency standards and frameworks for higher education. The content analysis method is applied to review the existing literature about basic concepts of information literacy, information literacy competency standards, and frameworks. These issues have been permanently controversial in academic society. To compensate for the deficiencies of existing literature, this interdisciplinary study intends to inspire more theoretical research and pedagogical practice for the ACRL information literacy competency standards and frameworks for higher education evolving in the age of artificial intelligence.

As an emerging disruptive technology, a new high tide of Generative AI and ChatGPT has been rocking the academic landscape worldwide.[1] Generative AI is an artificial intelligence technology that uses large language models and deep learning technology to generate new content, including text, images, audio or video.[2] According to OpenAI (https://openai.com/), ChatGPT stands for Generative Pre-Trained Transformer. Based on a large language model, ChatGPT is an AI-powered chatbot generating natural language responses when it interacts with online users.[3] Announced by OpenAI on September 25, 2023, ChatGPT(4.0) can speak, listen, and process images while interacting with users.[4] ChatGPT(4.0) will provide ChatGPT Plus users with two new innovative functions: voice interaction and image interaction. Instead of typing texts, users can directly talk to ChatGPT(4.0) and ChatGPT(4.0) will respond with five different synthetic voices, including different emotions, pitches, speeds, and tones, to create an immersive feeling like conversing with a real person. Also, the updated ChatGPT(4.0) can see and analyze the images uploaded by ChatGPT Plus users. The rise of Generative AI and ChatGPT has revived the scholarly enthusiasm of reinspecting information literacy competency standards and frameworks in the age of artificial intelligence.

Problem Statement

Since 1974, information literacy has been a controversial topic in the academic world.[5] In ever-changing academic learning environments, faculty in different subject fields defined the term information literacy from diverse perspectives. Also, the rapid development of the Internet and the World Wide Web (WWW) in the 1990's has completely changed ways of information delivery and dissemination. In the cyber space, web search engines like Google have been providing users with access to web-based information without any time and geographic limitations. The advent of wireless networks has further promoted another social revolution to exchange and share

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information from wired computing environments to wireless computing environments. Apparently, the rapid advance of cutting-edge and emerging technologies is continuously expanding the extension and connotation of information literacy in modern information society.

In today's service-oriented and student-centered academic libraries, the online library discovery services and the Online Public Access Catalog (OPAC) are widely used to search for the web-based academic information resources and services. These innovative ways of information retrieval demand that academic library users must possess new experience, knowledge, and skills before they can fully utilize web-based information resources and services available from academic libraries. Unfortunately, many undergraduates, especially first-year students, still do not meet the required information literacy capability when they come to the networked academic learning environment. Collaborating with faculty in different departments, reference librarians in academic libraries are taking their primary responsibility to promote information literacy instruction, while providing reference services in one-to-one or one-to-many academic library setting. From the perspectives of life learning, information literacy competency has become not only a key to promote excellence in teaching, learning, and research, but also a stepstone for student success beyond university and the global competition.

The purpose of this research is to explore impacts of Generative AI and ChatGPT on Information Literacy Competency Standards and Frameworks for higher Education. To compensate for the deficiencies among the existing literature, this study explores key answers to the following unresolved issues:

RQ1: Which concepts should be clarified first before we discuss information literacy competency standards and frameworks for higher education evolving in the age of artificial intelligence?

RQ2: From the standpoint of the lifecycle of information management and information retrieval procedure, how will Generative AI and ChatGPT impact information literacy competency frameworks and standards for higher education in the age of artificial intelligence?

To address these two research questions, the following literature was explored to validate this study:

Literature Review

Historical Evolution of Basic Concepts of Information Literacy

While serving as President of the Information Industry Association (IIA), Paul G. Zurkowski coined the term "information literacy" in November 1974 in his report to the US National Commission on Libraries and Information Science (NCLIS) in Washington D.C., United States.[6] Since then, academic experts, faculty, librarians, and scholars have been exploring the meanings of information literacy in various subject fields. In its "Presidential Committee on Information Literacy: Final Report" on January 10, 1989, the American Library Association (ALA) defined information literacy as a personal ability to search, evaluate, and use information.[7] Shirley J. Behrens did a retrospective study to systematically review the history of the term of information literacy evolving from the 1970s to the 1990s.[8] Also, academic librarians actively responded to their roles in support of the missions of institutions of higher education.[9] Defined by the Association of College and Research Libraries (ACRL) in 2000, information literacy (IL) is recognized as a set of skills "to locate, evaluate, and use effectively the needed information."[10] Since then, the term information literacy has become a buzzword in the academic learning environments. Many academic studies have debated

and paraphrased the concept of information literacy from various perspectives. As it follows a general way of human being's thinking and reasoning activities in a cognitive process, the ACRL's definition of information literacy in 2000 has been widely accepted and explored by thousands and thousands of academic researchers, such as Rader, Owusu-Ansah, International Federation of Library Associations, Ward, Babu, Tirado and Muñoz, Talley, Tewell, Singh and Kumar, Nowrin et al., Landøy et al., Rath, Gödert and Lepsky.[11] According to Saranto and Hovenga, "Information literacy proved to be an ambiguous concept. This concept was given a variety of definitions, which could be categorized into different educational levels."[12]

Information Literacy Competency Standards and Frameworks

Information literacy competency standards and frameworks are the two most significant cornerstones for information literacy competency instruction in higher education. A standard is a reference to provide a set of guidelines, norms, requirements, and specifications for production or services in a certain subject area.[13] Defined by the online dictionary titled Merriam-Webster, a framework is recognized as "a basic conception structure (as of ideas)."[14] The ACRL Information Literacy Standards for Higher Education (2000) has been used as an intellectual reference for "understanding, finding, evaluating, and using information."[15] It identified five standards, twenty-two performance indicators, and the eighty-seven associated outcomes for assessing information literate students in higher education:
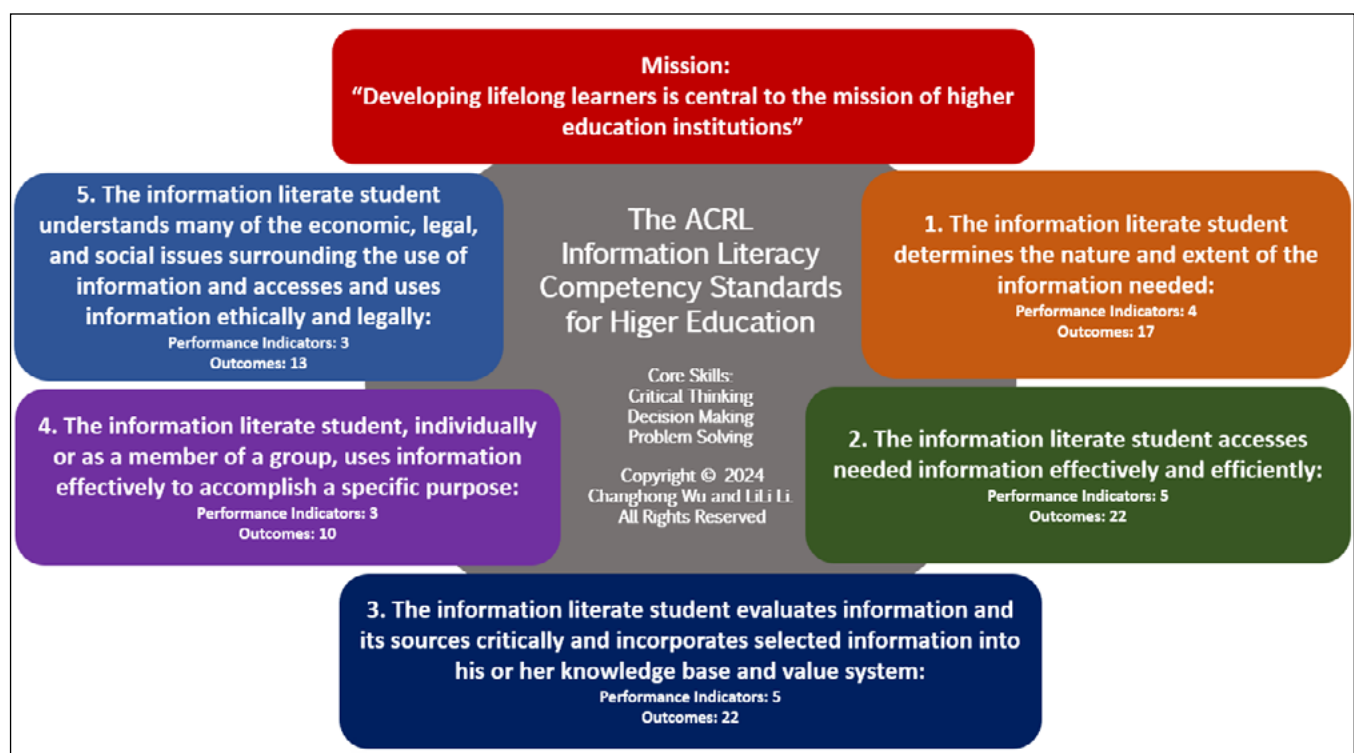

Figure 1. The ACRL Information Literacy Competency Standards for Higher Education (2000).

Since 2000, the ACRL Information Literacy Competency Standards for Higher Education has been widely accepted as a guidance for diverse pedagogical practice of promoting information literacy instruction and assessment tailored to the specific needs of a particular course or an academic program in different institutions of higher education.[16] Project SAILS (Standardized Assessment

of Information Literacy Skills) was also established in 2001 as a standardized test of information literacy skills in academic learning environments.[17] As a pioneer, the ACRL Information Literacy Competency Standards for Higher Education made an indelible contribution for the creation of the IFLA Guidelines on Information Literacy for Lifelong Learning[18] and the definition of the UNESCO Information Literacy.[19]

According to Mitchell and Watstein, the ACRL thoroughly changed the original information literacy standards to reflect its new thinking as "the creation and dissemination of knowledge, the changing global higher education and learning environment, the shift from information literacy to information fluency, and the expanding definition of information literacy to include multiple literacies, e.g., transliteracy, media literacy, digital literacy, etc."[20] However, this impetuous switch has been criticized and debated across the academic society.[21]

On June 25, 2016, the ACRL Board rescinded the ACRL Information Literacy Standards for Higher Education when the American Library Association (ALA) held its annual conference in Orlando, Florida, United States.[22] Instead, a brand new "Framework for Information Literacy for Higher Education" has been officially adopted. Explained by the ACRL (2016), this new framework "is called a framework intentionally because it is based on a cluster of interconnected core concepts, with flexible options for implementation, rather than on a set of standards or learning outcomes, or any prescriptive enumeration of skills."[23]
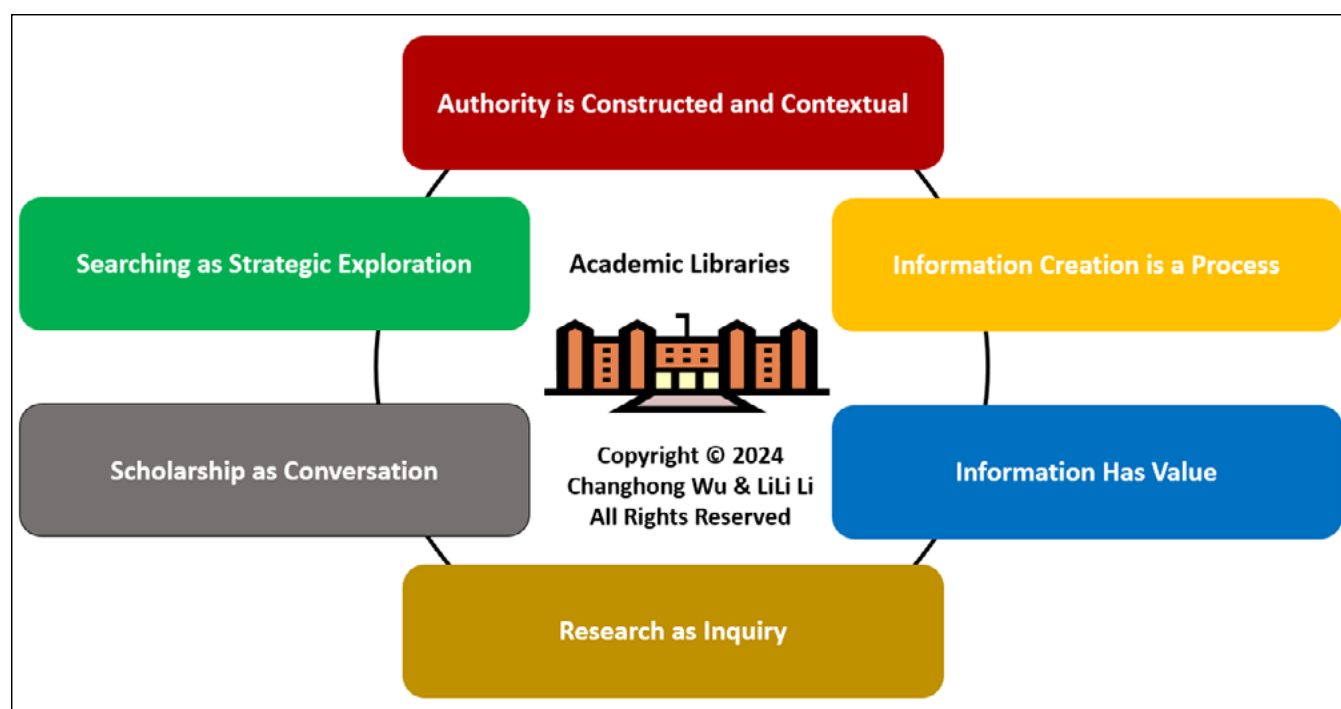

Figure 2. The ACRL Framework for Information Literacy for Higher Education (2016).

Research Methodology

This interdisciplinary study used Siegfried Kracauer's qualitative content analysis method[24] to review the existing studies about the impacts of Generative AI and ChatGPT on information literacy competency standards and frameworks for higher education:

Web Search Engine Selection

A web search engine refers to specific computer software utilized for searching web pages or websites available from the World Wide Web (WWW). As the most powerful web search engine in the English-speaking world, Google (https://www.google.com) is primarily used for general information retrieval while Google Scholar (https://scholar.google.com/) is specially used for academic resources retrieval.[25] However, library discovery systems are also recognized as additional online tools to search for a wide range academic materials, including academic articles, books/ebooks, conference proceedings, dissertations/theses, reports, reviews, videos, etc., available from academic libraries and academic library consortia.[26] Currently, EBSCO Discovery Services (https://www.ebsco.com/products/ebsco-discovery-service), EBSCO Folio (https://www.ebsco.com/academic-libraries/products/ebsco-folio), ExLibris Primmo (https://exlibrisgroup.com/products/primo-discovery-service/), ExLibris Summon (https://exlibrisgroup.com/products/summon-library-discovery/), and OCLC WorldCat Discovery (https://help.oclc.org/Discovery_and_Reference/WorldCat_Discovery) are five top library discovery systems available from academic libraries in the United States.

Therefore, the EBSCO Discovery Service installed at the Georgia Southern University Libraries (https://www.georgiasouthern.edu/library/) was primarily selected to retrieve the related literature for this study. Google Scholar (https://scholar.google.com/) was also used to search for additional research works. Running as a one-stop comprehensive and personalized cloud-based online search engine, discovery service systems are often accessible on the homepage of an academic library:
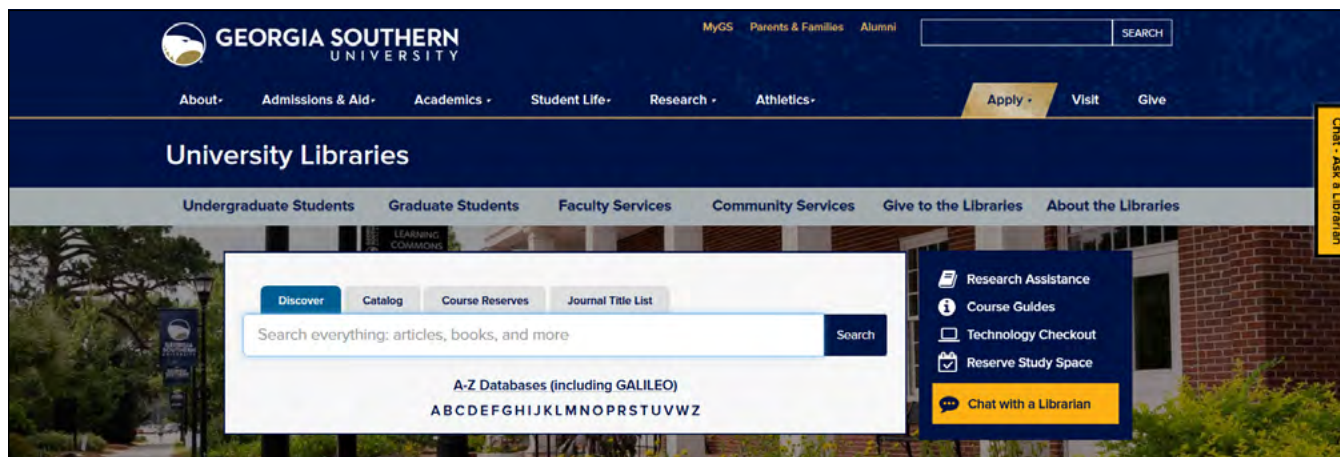

Figure 3. The EBSCO Discovery Service (EDS) embedded on the homepage of the Georgia Southern University Libraries. Web Reference: https://library.georgiasouthern.edu/.

Keywords Selection

A keyword is a descriptive word or a phrase representing an author, code, concept, event, name, news, place, subject, title, topic, etc. Keyword search is one of the most common and powerful search methods widely used for web-based information retrieval.[27] According to the keyword(s) input by users, a web search engine, which is a software system to retrieve web pages, will generate a list of web pages with any identical keywords input by users.

Based on the RQ1 and RQ2 in the Problem Statement, the authors divided the selected keywords into two groups. Group A has three keywords: Academic Intelligence, ChatGPT, and Generative AI, while Group B has four selected keywords: Academic Libraries, Information Literacy, Information

Literacy Competency Standards, and Information Literacy Framework. These selected keywords in Group A and Group B connected by the Boolean Operator "AND" consisted of the primary queries to target specific peer-reviewed journal articles and books for this study. Their logical associations can be seen below:
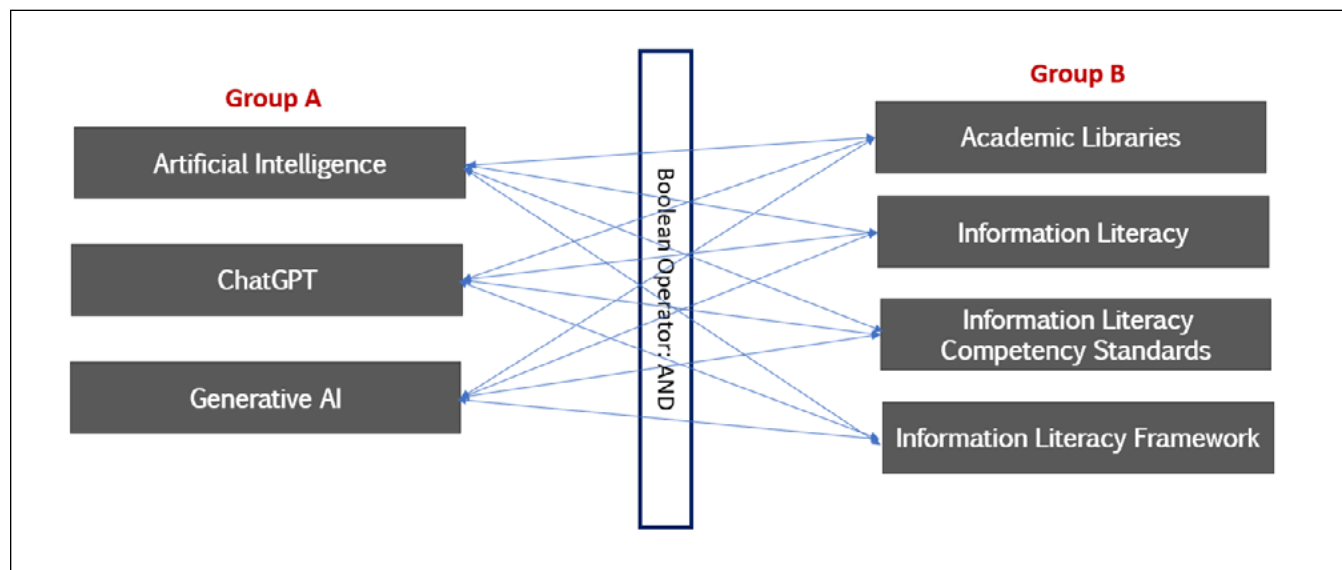

Figure 4. Primary associations between Boolean Operator (AND) and selected keywords.

Time limit
For retrospective historical literature reviews, the time limit selected was from 1900 to 2024.

Search Result Evaluation
The content analysis was applied to select the most appropriate studies and reports as a validation for this research.

Findings
Findings are categorized as they relate to the two research questions in the Problem Statement section:

Basic Concepts of Information Evolving in the Age of AI
From the ACRL Information Literacy Competence Standards for Higher Education (2000) to the ACRL Framework for Information Literacy for Higher Education (2016), the ACRL has never defined information before they defined information literacy. This is a major defect existing inside these two guidelines, which could mislead the direction of information literacy competency standards and frameworks for higher education. Without defining information, how can ACRL define information literacy competency standards for higher education correctly? As an interdisciplinary term, the concept of information can be defined in different ways in different subject fields.[28] Shannon and Weaver, founders of information theory who first used bits as the unit to measure the amount of information, pointed out that "information is a measure of one's freedom of choice when one selects a message."[29] Wiener, Father of cybernetics, defined that "Information is a name for the content of what is exchanged with the outer world as we adjust to it, and make our adjustment felt upon it."[30]

From the perspectives of education and cognitive psychology, Bloomfire identified information as "knowledge gained through study, communication, research, or instruction."[31] From the standpoints of semantics, information can be identified as appearances, codes, colors, events, facts, graphs, images, letters, lights, messages, news, numbers, pictures, signs, signals, smokes, sounds, tables, texts, timetable, voices, waves, etc. From the viewpoint of information technology, information is collected, organized, and processed data stored in relational database management systems (RDBMS), such as Amazon Aurora, Firebird, MySQL, Oracle, and SQL Server to name a few examples. In the networked computing environment, information can be collected, evaluated, processed, retrieved, synthesized, transformed, and used for specific purposes. Therefore, information has a broad domain. Information is everything perceivable around us. The rise of Generative AI and ChatGPT, which has dramatically expanded the connotation and denotation of information literacy, is challenging the ACRL information literacy competency standards and frameworks for higher education. From the perspectives of different subject fields, the interdisciplinary concept of information literacy can be paraphrased in various ways. The mysterious meanings of information literacy will become an eternal theme.

Basic Concept of Information Literacy Competency for Higher Education in the Age of AI

Which information literacies are strongly associated with the information literacy competency for higher education? The ACRL has never explicitly outlined them since they published the ACRL Information Literacy Competence Standards for Higher Education (2000) and the ACRL Framework for Information Literacy for Higher Education (2016). Freeman stressed that "understanding of the terms information literacy, digital literacy and information and communication technology (ICT) literacy is frequently vague, with blurred boundaries and unclear meanings in everyday conversations and in some academic communications" (p. 63).[32] Based on their literature reviews and analyses, the authors found that the following information literacies have close associations with the concept of information literacy competency for higher education in the age of artificial intelligence (see figure 5).

In Figure 5, information literacy competency standards and information literacy frameworks are two indispensable foundations to support information literacy competency for higher education in the age of artificial intelligence. Also, there is a close association between information literacy and skills for critical thinking, decision making, and problem solving.[33] Although Welsh and Wright explored the concepts of various information literacies from an evidence-based approach,[34] the study made by Shannon et al., proved that information literacy is still a huge challenge to many instructors, graduates, and undergraduates in the networked academic learning environment.[35] Based on the ACRL definition of information literacy, these eight information literacies are identified to support information literacy competency for higher education in the age of artificial intelligence.

1. **Academic literacy** refers to a set of ability, knowledge, and skills that undergraduates and graduates as future creators, leaders, and scholars should master in fast-changing academic learning environments. They include skills for academic writing, collaboration, communication, competitiveness, critical thinking, decision making, innovation, globalization, learning style, lifelong learning, problem solving, time management, etc. Otherwise, students cannot be competitive to change the world beyond university environments.
2. **Academic library literacy** means experience and skills of utilizing academic information resources and services, including digital library, Discovery search, ILL/DD, LibChat, LibGuides,
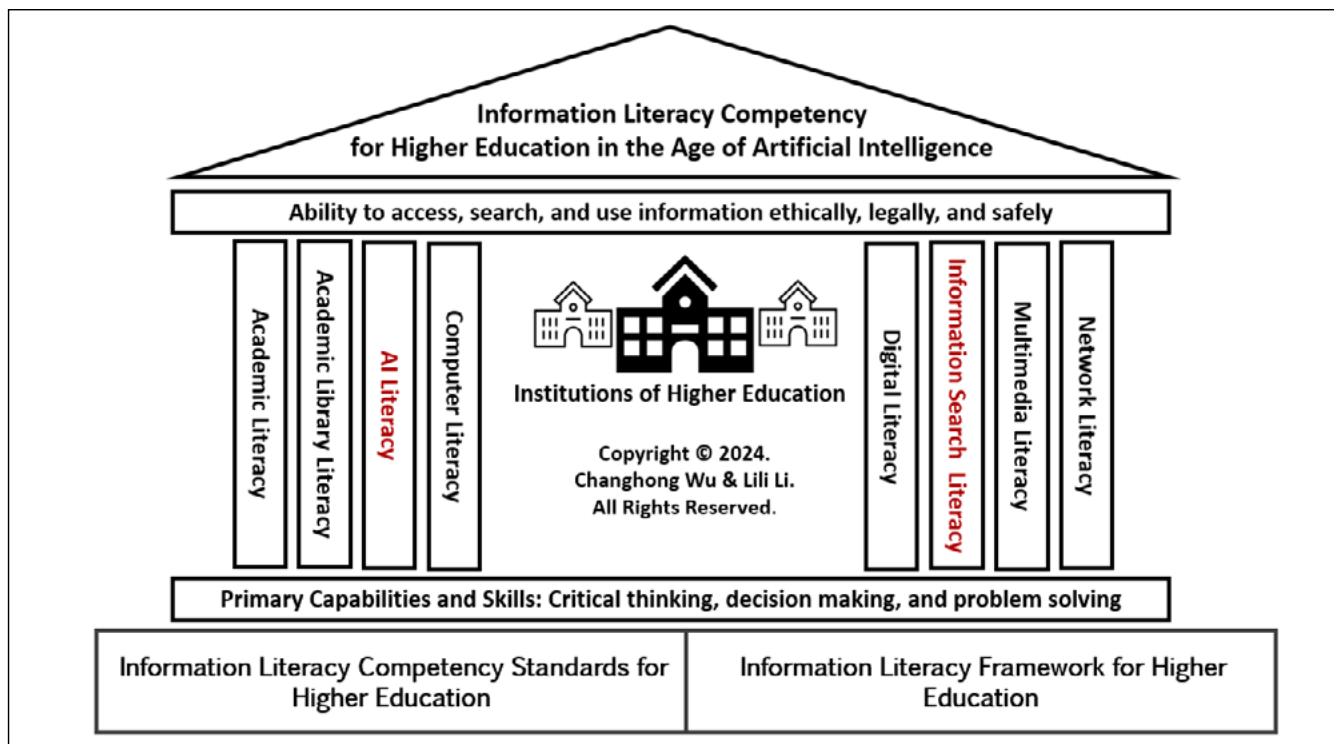
Figure 5. Eight pillars closely associated with the information literacy competency for higher education in the age of artificial intelligence.

library catalogs, library databases, etc., provided by an academic library and its consortium services.

3. **AI literacy** covers the related experience, knowledge, and skills of utilizing AI applications effectively and ethically.
4. **Computer literacy** is a set of experience, knowledge, and skills of utilizing hardware and hardware of computing devices, including desktops, laptops, tablets, and smartphones. Computer hardware includes external hardware, such as keyboard, monitors, mouse, printers, and scanners, and internal hardware, such as CPU (Central Processing Unit), GPU (Graphical Processing Unit), RAM (Random Access Memory), and storage device like a hard drive or a flash drive. Computer software usually is application software (Adobe Acrobat, Google Docs, Microsoft Office, etc.), programming software (Java, JavaScript, Python, SQL, Visual Basic, etc.), and system software (MacOS and Windows 10 or 11).
5. **Digital literacy** is defined by UNESCO-UNEVOC as "the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for employment, decent jobs and entrepreneurship."[36]
6. **Information search literacy** includes the behaviors and methods of querying and obtaining information. Information search literacy refers to experience, knowledge, and skills of accessing, retrieving, and using printed and online information via library catalogs, databases, Discovery search, and other web-based sources.
7. **Multimedia literacy** refers to the experience, knowledge, and skills of using different multimedia applications to design, process, and synthesize animation, audio, graphics, images, text, and video effectively and efficiently.

8. **Network literacy** indicates the ability, knowledge, and skills of accessing, searching, and using electronic information via wired and wireless computing networks, including Internet, LAN (Local Area Network), WAN (Wide Area Network), etc.

Impacts of Generative AI and ChatGPT on Information Literacy Competency Standards and Frameworks for higher Education

The rise of Generative AI applications including ChatGPT have reignited a new frenzy of research on information literacy for higher education.[37] Among the published literature, the study made by two librarians at Baylor University Libraries caught our attention. Their study is the first peer-reviewed literature published to examine whether ChatGPT could be used as an innovative tool to customize information literacy instructions. Based on the ACRL Framework for Information Literacy for Higher Education (2016), James and Filgo mapped ChatGPT with the ACRL's six frames (2016) to see how well ChatGPT could fit into them.[38] Their academic analysis is categorized briefly into the following table:

Table 1. Impacts of ChatGPT on the ACRL Framework for Information Literacy for Higher Education (2016)

Frame	Roles of ChatGPT
1. Authority is Constructed and Contextual	ChatGPT enables students to view information resources in a skeptical way.
2. Information Creation as a Process	ChatGPT enables students to understand the complete process of information creation.
3. Information has Value	ChatGPT challenges a student's ability to identify the real values of the information generated.
4. Research as Inquiry	ChatGPT can clarify the research questions from different perspectives regarding a research topic.
5. Scholarship as Conversation	ChatGPT can be consulted as a scholarly virtual machine.
6. Searching as Strategic Exploration	ChatGPT works as a brand-new information source.

At Miami University Libraries (https://www.lib.miamioh.edu/), Boehme Ginny and her library colleagues also created three templated lesson plans to examine how well ChatGPT could be used to promote information literacy competency based on three of ACRL frameworks: Research as Inquiry, Scholarship as Conversation, and Searching as Strategic Exploration.[39] The limit for these two studies made by academic librarians is that they only connected the roles ChatGPT with the ACRL six threshold concepts (2016), instead of using the roles of ChatGPT to view where or whether these ACRL six threshold concepts could be modified or revised.

Impacts of Generative AI and ChatGPT on information retrieval

Information retrieval is the process of accessing, searching, and selecting the needed information from printed or online information resources. Among the existing literature, there are many studies available to assess the capabilities of ChatGPT for information extraction and information retrieval.[40] Furthermore, there are increasing scholarly interests to compare the differences between ChatGPT and web search engines like Baidu, Bing, and Google, too.[41] Summarized by Tiernan et al., "Recent developments in AI have the potential to dramatically change what it means to be information and media literate, impacting every stage of the information retrieval and generation process, including accessing, searching, filtering, evaluating, and creating."[42] Their

studies will help us revise information literacy competency standards and frameworks in the age of artificial intelligence.

Discussion

After carefully examined the published academic literature, this study presented its perceptions for rethinking the six threshold concepts of the ACRL Framework for Information Literacy for Higher Education published (2016) as follows:

Authority Is Constructed and Contextual

The ACRL should not mysteriously overcomplicate simple things. What can be identified as "basic indicators of authority?" Which criteria should be available to identify "basic indicators of authority?" Under which contexts are authorized information sources identical to peer-reviewed information sources in academic learning environments? From the perspective of a pedagogical approach, it is more practical to teach students how to identify peer-reviewed information resources, instead of entangling what is called the authority and who has the authority in which contextual situations.

Information Creation as a Process

Never put the cart before the horse! In millions of worlds, what is not a process? Career development is a process; information access is a process; information collection is a process; information search is a process; food digestion is a process; job seeking is a process; life is a process; marriage is a process; thinking is a process; writing is a process; etc. In academic learning environments, it is more practical for students to learn how to access and search for the needed information effectively, instead of understanding why information creation is a process first.
In the digitized information society, which one plays more crucial role, information creation or information format, for information delivery and dissemination? The answer is information format! In the networked cyberspace, information format refers to ways of creating, organizing, sharing, searching, and storing information. To follow certain rules or specifications, information formats are changeable in different computing environments for various purposes. A piece of information with different information formats will have multiple locations in the networked information world. It will help students understand why they must search for printed and online information from different locations by different means.

Information Has Value

Not always. Information only has value when it is accessible or when it is needed. During different historical periods, the same information has different values for different users with different information needs. From different perspectives, the same information may have different values in different subject fields, too. According to the principle of information management lifecycle, the old information needs to be purged at the end of its life cycle, while the new information needs to be saved at the beginning of its life cycle. Therefore, it is not an eternal truth that information always has value. While making this statement, the ACRL did not consider the impact of life cycle of information management on the value of information. The lifecycle of information management refers to the entire managing process for information creation, information preservation, information retrieval, information usage, and information retirement. Chen argued, "The information value determines its *timeliness of accessibility, reliability, and availability* constraints, and drives ILM management policies and optimizations."[43]

Research as Inquiry

This threshold concept can be merged with the threshold concept called "Searching as Strategic Exploration," since they both are associated with the initial stage of the academic research. Academic research is always a process of exploration full of mysteries and uncertainties. This is a common sense. Not a threshold concept.

Scholarship as Conversation

During the process of an academic research, what is the difference between "Scholarship as Conversation" and "Scholarship as Inquiry"? No difference! To optimize the framework for information literacy for higher education, the ACRL should realize that scholarly research represents a process of exploration from the known world to the unknown world. Do not manipulate a common sense as a way of new thinking.

Searching as Strategic Exploration

True. Students need to prepare a search plan before searching for the needed information. To dig out the needed information, they must have the ability to select various keywords combined with the Boolean Operators (And/Or/Not) during the process of information retrieval. According to the processes of cognitive psychology, the connotation of this threshold concept is similar with that one covered by "Research as Inquiry."

Meyer and Land outlined, "A threshold concept can be considered as akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress."[44] However, these six threshold concepts defined by the ACRL in 2016 do not represent an innovative way of generating deep perceptions for information literacy competency standards and frameworks for higher education. Instead, they are leading information literacy competency instruction into a dark labyrinth. Lutkevich believed, "In general, a framework is a real or conceptual structure intended to serve as a support or guide for the building of something that expands the structure into something useful."[45] From the standpoint of the lifecycle of information management and information retrieval procedure, these six threshold-concepts the ACRL defined in 2016 cannot serve as the most essential core modules of information literacy competency instruction for higher education. They are only fragmented patchworks picked up from different subject fields. Contrary to the viewpoints of Garcia and Labatte, this study found that the existing ACRL six so-called threshold concepts cannot be qualified to be the most essential integrated frameworks for information literacy for higher education.[46] Without them, academic information literacy instruction can still be designed and measured.

Jackman and Weiner argued that "The 2000 ACRL Information Literacy Standards for Higher Education should remain as the principal foundation for any future iterations of standards or understandings of information literacy practice."[47] So far, the ACRL Information Literacy Standards for Higher Education is still widely accepted as a reference when designing information literacy instructions and rubrics by academic librarians in the United States.[48] The ACRL Information Literacy Standards for Higher Education is still not completely useless at all. Although they are not perfect, these original standards, performance indicators, and outcomes should not be tossed away so easily. The ACRL Board of Directors made a very wrong decision to give up its global leadership when it rescinded those original information literacy competency standards, performance indicators, and outcomes published in 2000.

Limitations and Future Research

To encourage more academic studies discussing about information literacy, this study does not create a prototype for frameworks of information literacy for higher education. Additional research needs to be conducted for information literacy instruction regarding academic integrity, AI ethics, AI supervision, copyrights, plagiarism, privacy, etc. in the age of artificial intelligence.

Conclusion

The surging waves of Generative AI applications including ChatGPT have been disrupting the existing teaching modes in higher education. This study has contributed to understanding basic concepts of information literacy competency standards and frameworks for higher education, which have been a long-term controversial theme across the academic landscape.[49] By examining impacts of Generative AI and ChatGPT, this study has identified existing deficiencies of the ACRL information literacy competency standards and frameworks for higher education. From the viewpoints of the life cycle of information management and information retrieval, this study has conceptualized eight pillars to support the framework for information literacy competency for higher education in the age of artificial intelligence. Among hundreds and thousands of published research literature for information literacy, first and foremost, it is the first time for these eight pillars to unambiguously illustrate the internal associations among Information Literacy Competency Standards for Higher Education, Information Literacy Framework for Higher Education, and Information Literacy Competency for Higher Education in the Age of Artificial Intelligence in a graphical way. Secondly, these eight pillars are bridges to connect Information Literacy Competency Standards for Higher Education and Information Literacy Framework for Higher Education with Information Literacy Competency for Higher Education in the Age of Artificial Intelligence. Thirdly, these eight pillars can be used as a reference for academic faculty, librarians, and other scholars to design the related academic courses, training programs, tutorials, etc. to promote more information literacy instructions at institutes of higher education. Fourthly, these eight pillars are very significant to the values of academic reference services, such as avoiding plagiarism, fostering skills for critical thinking, decision making, and problem solving, promoting excellence in teaching, learning, and research, setting up innovative frameworks for information literacy instructions, supporting lifelong learning, etc., in academic library settings. Fifthly, these eight pillars shed light on which primary information literacy is needed for undergraduates and graduates to seek more success at or beyond university. Finally, these eight pillars will motivate more academic studies for the future revision of the ACRL information literacy competency standards and frameworks for higher education in the coming years of the 21st century.

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