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亞洲國家資訊素養教育趨勢與洞見探究

Exploring Trends and Insights of Information Literacy Education in Asian Countries

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摘要

本研究的目的是通過使用文獻計量學、內容分析和訪談法，探討亞洲各國資訊素養教育的趨勢和見解，以回答與研究方向和趨勢、研究文章的特徵和分佈以及高等教育中資訊素養研究和教學情況相關的三個主要問題。研究樣本分為三部分：1）對2000年至2022年期間Web of Science社會科學引文索引（SSCI）資料庫中收錄的亞洲各國高等教育資訊素養研究的150篇文章進行內容分析；2）使用文獻計量分析方法，分析作者和期刊的產出，並進行引文分析、共引分析以及對出版物中常用關鍵字的分析，並利用VOSviewer系統將資料視覺化；3）採用半結構化訪談方法，對臺灣和泰國的九位資訊素養教育相關學者專家進行訪談。

關於亞洲各國高等教育中與資訊素養相關的研究問題的特徵和分佈的研究結果顯示，在2000年至2022年期間，研究的出版物數量逐漸增加。中國大陸、臺灣、韓國、馬來西亞和日本是最具生產力的國家。大學部學生是最常見被研究的對象、定量方法是最常用的研究方法；研究領域各不相同，重點放在未指定領域、混合學科、語言和圖書館與資訊科學方面。雖然大多數文章中沒有明確提到具體的資訊素養標準或框架，但研究人員認識到在課程設計中引用任何標準或框架的重要性。

關於資訊素養教育在高等教育中的趨勢方向的研究結果揭示了一些關鍵見解。首先，通過引文分析和期刊共引分析，觀察到該領域中最常被引用的期刊有《電腦輔助語言學》、《電腦與教育》和《學術圖書館員雜誌》。其次，從作者的引文分析和共引分析來看，Lai, Chun是最有產出的作者，其次是Gu, Ming-Yue和Sin, Sei-Ching Joanna。值得注意的是，Lai, C.和Gu, M.合著的題為《利用技術進行課外自我調節語言學習》的研究接收到了最多的引用次數。此外，研究還確定了資訊素養教育研究中經常使用的關鍵字，如「資訊素養」、「數位素養」、「高等教育」、「學術圖書館」和”大學生」。

根據對泰國和臺灣的圖書館與資訊科學教育工作者的訪談，高等教育中的資訊素養被視為在當今資訊驅動的世界中至關重要，使個體能夠獲取和有效利用資訊。研究強調了統一標準的必要性以及圖書館在促進資訊素養方面的作用。教授資訊素養技能涉及教授、圖書館員和學生之間的共同責任，合作和融入課程是關鍵。挑戰包括教師缺乏專業知識以及需要良好結構化的教學方法。資訊素養技能的發展受到

學習者特徵、教師知識、社會因素、研究應用挑戰和教育相關政策的影響。促進資訊素養面臨著快速技術變化和有限意識的挑戰。然而，教師期望政府的支援，並強調需要進行研究並採用新的典範(paradigm)來提升學生的資訊素養技能。

為了加強對高等教育中資訊素養的未來研究，建議利用包括國際和國內來源在內的綜合資料庫，以更全面地瞭解該領域的趨勢和方向。擴大搜索詞的範圍，包括與資訊素養相關的新興詞彙，以確保全面分析。進行涉及亞洲不同國家教師的定性研究，可以提供資訊素養教育在高等教育中的細緻見解。此外，探索各個教育層次（如中學和小學教育）中的資訊素養，將能夠進行比較分析，並全面瞭解資訊素養的發展。

關鍵字：資訊素養、高等教育、亞洲國家、文獻計量分析、內容分析、訪談方法、臺灣、泰國

Abstract

The purposes of this research were to explore trends and insights of information literacy education across Asian countries using three methods: bibliometric, content analysis, and interview methods. To answer three main research questions related to the direction and trend, characteristics and distribution of research articles, and the education situation of information literacy research and instruction in higher education. The study sample was divided into three parts: 1) content analysis study of 150 information literacy research in higher education across Asian countries from 2000 to 2022 indexed by Web of Science's Social Sciences Citation Index (SSCI) database. 2) bibliometric analysis analyses productive of authors and journals with citations analysis and, co-citations analysis, and frequently used keywords in the publications and creates data visualization by VOSviewer program, and 3) interview methods were conducted semi-structured with nine key informants from Taiwan and Thailand as a case study using purposive sampling.

The results of the study on characteristics and distribution of research themes related to information literacy in higher education (ILHE) across Asian countries show during 2000-2022, the publication of research has been increasing steadily over time. People's Republic of China, Taiwan, South Korea, Malaysia, and Japan were the most productive countries. Undergraduate students are the most common research participants used studied. Quantitative methods were the most employed research methods. The research domains varied, with an emphasis on unspecified domains, mixed disciplines, language, and library and information science. While specific information literacy standards or frameworks were not explicitly mentioned in most articles, researchers recognized the importance of referencing any standards or frameworks in curriculum design.

The results of the study on the trends including directions of ILHE research revealed several key insights. Firstly, through citation analysis and co-citation of journals, it was observed that the most frequently cited journals in the field were "Computer assisted language learning," "Computers & education," and "Journal of academic librarianship." Secondly, in terms of citation analysis and co-citation of authors, Lai, Chun emerged as the most productive author, followed by Gu, Ming-Yue, and Sin, Sei-Ching Joanna. Notably, the study by Lai, C., & Gu, M. titled "Self-regulated out-of-class language learning with technology" received the highest number of citations. Additionally, the research identified

frequently used keywords in ILHE research, such as "information literacy," "digital literacy," "higher education," "academic libraries," and "college students."

For the situation of information literacy research and instruction in higher education based on interviews with LIS educators from Thailand and Taiwan. Information literacy was seen as crucial in today's information-driven world, enabling individuals to access and effectively utilize information. The study highlighted the need for consistent standards and the role of libraries in fostering information literacy. Teaching information literacy skills involved shared responsibility among professors, librarians, and students, with collaboration and integration into the curriculum being key. Challenges included instructors' lack of expertise and the need for well-structured teaching methods. The development of information literacy skills was influenced by learner characteristics, instructors' knowledge, societal factors, research application challenges, and education-related policies. Promoting information literacy faced challenges such as rapid technological changes and limited awareness. However, instructors expected government support and emphasized the need for research and the adoption of new paradigms to enhance students' information literacy skills.

To enhance future research on information literacy in higher education, it is recommended to utilize comprehensive databases, including international and national sources, for a broader understanding of trends and directions in the field. Expanding search terms to include emerging words related to information literacy will ensure a comprehensive analysis. Conducting qualitative studies involving instructors from different Asian countries will provide nuanced insights into information literacy instruction in higher education. Additionally, exploring information literacy across various educational levels, such as secondary and primary education, will enable comparative analysis and a holistic understanding of information literacy development.

Keywords: information literacy, higher education, Asian countries, bibliometric analysis, content analysis, interview methods, Taiwan, Thailand

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Chapter 1. Introduction

1.1 Background and motivation

This study explores trends and insights of information literacy education across Asian countries using three methods: bibliometric, content analysis, and interview methods, taking into consideration four key factors. These include disruptive technology, population growth trends, expectations of employers and the job market, the learning style of learner in the digital age, and continuity of research publications. These factors are highly relevant to the background and motivation of this study. For instance, the adoption of new technologies can potentially impact how information literacy (IL) is taught and studied, while population growth trends may affect the demand for study or research in this area. Moreover, an understanding of employer expectations and the job market can help steer the research focus toward addressing societal needs. The COVID-19 epidemic has had a huge impact on both traditional learning methods and the way that people learn in the modern era, which in turn may have implications for how information literacy is taught and studied. Several scholars have also done considerable research on information literacy studies in higher education. It was based on decades of publications and research on information literacy from Western countries. However, comparatively fewer studies have been published in Asian countries. All these elements must be carefully considered to completely comprehend information literacy in higher education (ILHE) in Asian countries to fill this study gap.

1.1.1 Disruptive technology

Since the third industrial revolution in 1969, technology has drastically transformed people's lives (Schwab, 2016). The current fourth industrial revolution, known as “Disruptive Technology”, is reshaping society, the economy, and cultural adaptation. Technological advancements have revolutionized communication and behavior (Prensky, 2001), empowering individuals to create and share messages across various channels. In 2013, McKinsey's Global Institute identified twelve disruptive technologies that would impact the economy by 2025 (McKinsey's Global Institute, 2013). These technologies include mobile internet, automation of knowledge and work, the internet of things, cloud technology, advanced robotics, autonomous and near-autonomous vehicles, next-generation genomics, energy storage, 3D printing, advanced materials, advanced oil

and gas exploration and recovery, and renewable energy. These advancements have influenced learning and the skills demanded by the job market.

Technology has brought positive changes to education, enhancing interactivity and collaboration (Baran & Correia, 2014). It enables learning anytime, anywhere, supporting lifelong learning (Sun, 2002). However, technology can also weaken human relations and create dependency (Baran & Correia, 2014). It is important to recognize both the benefits and drawbacks of technology for its responsible use in society. In education, technology serves as a teacher's assistant, offering immersive experiences through augmented reality (AR) and virtual reality (VR) (García-Bermejo & Martinez-Abad, 2016; Marks & Thomas, 2022). Disruptive technology has influenced learning models, challenging traditional education approaches (Chen, 2023). Massive open online courses (MOOCs) and other online learning platforms are becoming more and more popular, which may put pre-existing models of higher education in the challenge of educational management. Alternative models of education administration have evolved to response to the increasing popularity of new learning platforms.

Disruptive technology has profoundly influenced knowledge development in the 21st century given rise to new communication platforms like social media, necessitating media and digital literacy skills (Meyer, 2010). It has transformed communication, emphasizing the need for digital literacy. Due to the extensive usage of computers, smartphones, and the internet, these technologies must be used and navigated effectively (Keshavarz, 2021). In higher education, online learning has harnessed disruptive properties but requires student-centered approaches, diverse options, and connections to real-life experiences (Meyer, 2010). Addressing challenges like plagiarism, cheating, and distraction is crucial for a productive online learning environment. The rapid advancement of information technology has impacted information literacy skills. While access to information has increased, assessing credibility has become more challenging. The relevance of information literacy abilities has been highlighted by the emergence of new formats and platforms, such as online courses and educational applications (Keshavarz, 2021). In summary, disruptive technology has reshaped knowledge development, communication, and information access. Developing digital and media literacy, along with information literacy skills, is essential in navigating today's information-rich world.

1.1.2 Population growth trends

Currently, many countries worldwide are facing the issue of declining birth rates. According to the latest report from The Population Division of the Department of Economic and Social Affairs of the United Nations (2022) titled "World Population Prospects 2022: Summary of Results," reported that all aspects of population change, including migration, death, and fertility, have been impacted by the COVID-19 pandemic. 61 countries or regions are predicted to experience a population loss of at least 1% between 2022 and 2050. The decline in life expectancy at birth worldwide in 2021, from 72.8 years in 2019 to 71.0 years. The next generation's shifting lifestyles are the primary cause of the low birthrate. They tend to have higher levels of education (Eriksson et al., 2013; Petersen et al., 2015; Maharaj & Shangase, 2020), marry later in life (An et al., 2022), place value on being single (Sirisamphan et al., 2019), cherish their freedom, socioeconomic status (Termpittayapaisith & Peek, 2013), and embrace gender diversity (Ajzen & Klobas, 2013; Arpino et al., 2015). Moreover, their desire to have children and the number of children they want has changed. Additionally, young adults' perspectives on having children are another factor in how parenting has changed over the past few decades.

Nowadays, parenting in high-income countries like the United States and many others takes more time and resources (Bianchi, 2011; Kornrich & Furstenberg, 2013; Doepke & Zilibotti, 2019). Furthermore, in "The Mystery of the Declining U.S. Birth Rate," by Kearney et al. (2022) mentioned that various factors may be accountable for the decrease. These factors encompass the increased utilization of highly efficient contraception methods, the financial burden of raising children, improved career prospects for women, and the substantial amount of student loan debt carried by young individuals. Additionally, economic, and social problems, it is difficult to identify any policy or economic factor that can statistically account for the continued decline. As well as the impact of COVID-19, have caused people to postpone having children, as modern parents may not feel financially prepared to start a family. Consequently, the decision to continue studying at the higher education level has decreased. Another possible impact of declining population growth is an aging population, with a greater proportion of elderly compared to younger individuals. his could lead to education and training being geared more towards the needs of an aging population, while the diverse needs of younger individuals may be overlooked.

Population changes also affect the development of educational institutions' structures, budgets, the development of life skills, and students' access to technology and the Internet to further their education (Lutz & KC, 2011; Taylay & Dalal, 2017; Nguyen & Tuamsuk, 2021) on how new knowledge is developed. It's critical for educators and policymakers to take these trends into account. New knowledge will be produced as the population grows to change the demand for education and training.

1.1.3 Expectations of employers and the job market

By empowering students with the knowledge and skills they need to succeed in their jobs, education plays a crucial role in addressing the demands of employers and the labor market. Employers consistently seek graduates who possess specific competencies and abilities. Therefore, education management should prioritize fostering relevant knowledge and skills that align with the demands of the job market, enabling employees to perform effectively and adapt to changes. This includes encouraging students to acquire and apply skills that are applicable to future job markets and staying updated with technological advancements and innovations. Updating the curriculum to reflect labor market demands and upcoming technological developments is crucial. Currently, there is a problem of skilled and competent workforce shortage in the field of information and digital technology that is ready to adapt to the changing times. The main cause of this issue is the unpreparedness of graduates to meet the demands of the business sector in terms of skills and qualifications. This negatively affects their ability to perform effectively in the workplace (Tuamsuk et al., 2023).

In the current era, it is imperative that the educational system focuses on fostering knowledge and skills that are relevant and applicable to the workforce, such as proficiency in technology and communication, or the learning of a foreign language. To successfully address the needs of the labor market, education management must place a significant emphasis on collaborations with companies and educational institutions. However, the curriculum and teaching strategies are not adjusted to meet the demands of the labor market or to help students be ready for ongoing change. These qualitative features of the educational system are not in line with these demands. Subjects and skills taught in schools are increasingly becoming outdated and insufficient for the demands of the labor market and individual careers (Chulalongkorn University Social Research Institute, 2019). In the rapidly changing labor market, most jobs require workers with both specialized knowledges such as

design and computer programming, as well as social and work skills like critical thinking, complex problem-solving, leadership, and emotional intelligence (World Economic Forum, 2020). The According to the World Economic Forum (2016), social and emotional skills will be vital in the 21st century, and there has been a rising demand for occupations requiring these abilities. Additionally, a total of 16 skills for the 21st century have been defined and divided into three categories that address life skills relevant to the context of today's world, skills for coping with life's challenges, and skills for adapting to the rapidly changing world. The processes required to build these skills cannot be achieved through traditional classroom processes alone.

With technology advancements and market conditions evolving rapidly, it is essential for the educational system to adapt to the changing expectations of employers and the labor market. Providing education that meets the needs of employers and equips individuals with current and future knowledge and skills is crucial for professional success. Educational management should focus on producing workers with creative skills to support long-term economic development, including the creation of new professional opportunities and adaptation to technological advancements. Understanding employer expectations and the job market can guide research efforts towards addressing societal needs, as research aligned with these expectations has a higher chance of implementation and making a meaningful impact. Overall, aligning research efforts with employer expectations and the job market can positively impact both individuals and society.

It is obvious that a university education is essential for preparing students for the workforce and for knowledge-based jobs. As a result, educational institutions need to concentrate on producing a new generation of digital workers who can meet the demands of the labor market as outlined by The Organisation for Economic Co-operation and Development (OECD). To create high-quality graduates for the labor market, the OECD strives to produce people with information literacy and digital skills. (Office of National Digital Economy and Social Commission, 2021)

In conclusion, education should emphasize developing digital skills, stimulating innovation, and addressing labor market demands. Collaboration, adapting curriculum, and addressing societal needs are vital for preparing graduates for the job market (Chulalongkorn University Social Research Institute, 2019).

1.1.4 The learning style of the learner in the digital age

Information literacy education and research may be impacted by the considerable changes in the learner's learning style that have occurred in the digital age. Traditional information literacy education strategies had an influence prior to the COVID-19 epidemic. These traits of the next generation of learners have an impact on how information literacy is taught and researched. For this age, traditional lecture-style teaching techniques may be less effective, and educators may need to adopt more tech-enhanced collaborative and interactive ways. Additionally, by facilitating knowledge sharing and exchange, the usage of social media and internet tools can improve the educational experience for this generation.

The significance of technology in the education industry has grown more obvious since the COVID-19 outbreak. It has made education more accessible and convenient, enabling people worldwide to adapt their behaviors and lifestyles by working and living from home for extended periods. The use of telecommunication services has surged, and people have embraced the digital age by participating in online meetings, working, studying, and shopping. However, in a digitally saturated society with vast amounts of information, several problems have emerged, including information spread and infodemics. The rapid evolution of technology has caused people to compete for leadership in information dissemination, often ignoring accuracy and leading to misinformation, disinformation, and the phenomenon of fake news (Silverman, 2015). It shows that people lack knowledge and understanding of information literacy skills. Therefore, information literacy is crucial to people to be well-informed and adopt ethical practices in digital citizenship and as becoming a central and survival skill of the digital age (Sacchanand, 2022).

Educational institutions worldwide have had to adapt to embracing technology for communication and learning purposes. Online learning has become the prevailing approach, facilitated through learning platforms or distance learning systems (Chen, 2023). Online learning has gained significant importance and may continue as a trend in future education. Managing time and learning effectively has become essential for students to maximize the efficiency of their education in this new environment. Communication technology, such as websites or applications with learning functions, enables interaction between teachers and students, offering video tutorials, exercises, quizzes, live discussions, and more. Popular online learning platforms like Google Classroom, Zoom, or Microsoft Teams provide flexibility and convenience. However, online learning may present

challenges for those with limited digital technology experience, internet connectivity issues, or inadequate equipment. It is crucial to consider the impact of online learning beyond academic aspects, such as the mental health of students, particularly those transitioning from traditional classrooms to online settings. Extended periods in front of a computer or mobile phone may lead to fatigue, lack of freshness, or feelings of depression among students.

Furthermore, the COVID-19 epidemic has not only forced educational institutions to adapt, but it has also created new chances for students to advance their information literacy skills in online teaching and learning settings. Learners must arm themselves with the skills essential to efficiently acquire, assess, and apply information given the ease with which a wide variety of information resources are available. This includes skills such as conducting relevant searches, critically assessing the credibility and relevance of information, and employing it appropriately to support their learning and decision-making processes. Online teaching methods also facilitate collaboration among students and encourage participation in interactive learning activities. However, the transition to online learning presents challenges in fostering and developing students' information literacy skills. Some students may encounter difficulties in accessing specific resources or face technical obstacles that hinder their completion of assignments.

In summary, the digital age has transformed the learning style of students, necessitating interactive and technology-driven approaches to teaching information literacy. The COVID-19 epidemic has emphasized the value of technology even more because it makes distance learning and information access possible at the present and in the future. However, the abundance of information in the digital era has also led to challenges such as misinformation and the need for information literacy skills. Online learning has become the norm, offering flexibility and communication tools, but it can pose challenges for students with limited technology access or mental health implications. Despite the difficulties, online learning offers students the chance to improve their efficient information literacy skills. Collaboration and interactive activities are also encouraged, but fostering information literacy skills in the online learning environment can be challenging for some students.

1.1.5 The continuity of research publications

The continuity of research publications is vital for fostering understanding and promoting development in various fields. It involves consistently disseminating research

findings over time, allowing researchers to build upon previous work and contribute to knowledge and technological advancements. Maintaining research continuity increases the likelihood of publishing in prestigious journals, gaining citations, and making significant contributions to the academic and wider community. It ensures that research remains relevant and addresses educators' and learners' current needs and challenges. Two approaches to achieving research continuity include focusing on original ideas and creating connections between studies. Researchers can conduct literature reviews or a series of research projects to establish a foundation and advance new concepts. Another approach involves studying and building upon existing information, using previous research as a foundation for further development, particularly in data analysis and retrieval.

Continuity in research publications offers several benefits. It enhances the credibility and stability of research results, particularly in complex studies that require extensive validation. By continuously publishing research and building upon previous findings, researchers can refine their results and improve outcomes in future studies. Research continuity also helps researchers develop expertise in their field, reducing duplication of efforts and increasing the likelihood of securing external funding. However, there are some drawbacks to consider. Changes in a researcher's work address or status can hinder the dissemination of new research or generate interest in existing research, potentially missing opportunities for knowledge development and innovation. Rapid dissemination without sufficient scrutiny can compromise the credibility of research results. Despite these drawbacks, the importance of continuity in research cannot be overstated. Research topics may evolve or fade (Griffiths & Steyvers, 2004; Upham & Small, 2010; Shi et al., 2010), but some areas are continuously explored, contributing to the overall body of knowledge, and allowing researchers to build upon the work of their predecessors. Continuity in research takes on various characteristics and may involve emerging topics (Li et al., 2010; Yan et al., 2012; Yan, 2014; Derman et al., 2018), enriching the understanding of the subject. By maintaining research continuity, researchers contribute to the advancement of their field and make meaningful contributions to the academic and wider community.

In higher education's information literacy domain, ongoing research is vital for knowledge advancement and addressing technological shifts. Research dissemination enriches our grasp of student and faculty progress in skill utilization, aiding improved teaching methods through technology integration. Evaluation of teaching efficacy via precise assessment tools equips students for the future. Notably, information literacy research

consistently bolsters global knowledge, especially in Western contexts. Conceptually, higher education's information literacy research spotlights technology integration, encompassing information management, search, tech-driven learning, communication, collaboration, and data analysis. Furthermore, it devises tools like online learning systems and communication tech to bolster these skills.

In conclusion, research continuity is vital for advancing knowledge, meeting educational needs, and making significant contributions to various fields. Research on information literacy abilities in higher education must be widely disseminated in order to advance knowledge, enhance teaching methods, and prepare students for the future in an era of rapidly changing technology. Continuity in this research area contributes to the overall body of knowledge and promotes social and economic development.

1.2 Problem statements

This section outlines the problem statement, which includes several factors related to disruptive technology, population growth trends, expectations of employers and the job market, the learning style of the learner in the digital age, and the continuity of research publications mentioned in the background and motivation section. These factors have resulted in the development of information technology, the emerging of new literacies, learner's lack of information literacy skills, and lack of bibliometric and content analysis of research in information literacy in higher education in Asian countries. Asian countries have diverse educational systems and cultural contexts and technological landscapes. Exploring information literacy education specifically in Asian countries allows a deeper understanding of regional variations, similarities, challenges, and best practices. To address this problem, a study will be conducted to analyze information literacy research publications in higher education in Asian countries.

1.2.1 The development of information technology

In the modern world, the advancement of information technology (IT) is crucial. IT can boost productivity in many different areas and help with a variety of challenges. IT development may be traced back to the time when people first began to store information in recorded form. Since then, data processing on computers has evolved. Information and communication technology (ICT) development spans a wide range of applications and

academic study across several disciplines, including computer science, data science, and ICT. These fields are created to meet the demands and goals of the users. IT is always evolving, and security is constantly being improved. Control and security systems must be established since IT is a crucial instrument for managing information and facilitating communication. All facets of growth, including social, economic, and environmental development, benefit greatly from information technology.

By improving the effectiveness of teaching and learning, information technology has completely transformed the educational system (Haleem et al., 2022). New, better-quality, and more efficient instructional resources that are readily available to students have been produced as a result of the use of digital information technology in education. IT has enabled the development of individualized learning management systems which cater to the specific needs of individual students. Learners can choose the mode of learning that best suits them, whether it be online or through mobile applications.

Additionally, the use of digital information technology in the classroom has improved students' access to instructional materials and data (Szymkowiak et al., 2021), enabling them to learn anytime, anywhere. Learners can also connect with their peers and teachers through online chat programs or online learning platforms. This has increased student interest and engagement in learning, as learners can also utilize specialized applications designed for further learning such as language learning, science learning, art learning, and more. These applications foster interest in learning and help learners acquire knowledge more effectively, thus making learning flexible. Furthermore, information technology allows for the quick and convenient tracking and assessment of learners' progress in learning. It provides immediate feedback on their performance and helps identify areas that require improvement. Thus, the use of information technology in education has improved the effectiveness, efficiency, and enjoyment of learning for students.

The evolution of information technology (IT) has had a big influence on how instructors educate and how they work. Teachers may now utilize IT to modify their lesson plans to better suit the demands and situations of their pupils in the digital age. IT is a potent instrument that can support efficient learning and improve online education. An online learning platform or learning management system (LMS) may be used by teachers to organize instructional materials, monitor student progress, evaluate learning, and compile learner statistics. This gives teachers the ability to enhance the educational process and

modify the curriculum to meet the requirements of each student (Dudar et al. , 2021; Kosaretsky et al. , 2022). By creating interesting learning activities, teachers can help students stay engaged and motivated. IT also enables teachers to create more interesting and effective teaching materials using computer programs suitable for teaching, video creation software, teaching management software, and online teaching websites. For instance, teachers can construct interactive classes that let students' study at their own speed using video editing tools. They can also use teaching management software to track student progress and provide feedback. Overall, IT has the potential to revolutionize teaching and learning.

Effective utilization of Information Technology (IT) empowers educators to craft immersive and tailored learning journeys for students. Techniques such as video tutorials and online quizzes offer flexible and efficient learning, amplifying instructional impact. IT facilitates swift student assessment and connectivity, fostering vibrant online learning communities. Yet, IT incorporation carries inherent caveats. Relying excessively on digital communication can erode face-to-face interactions, possibly breeding misunderstandings. Moreover, educators face amplified workloads as they curate content, evaluate progress, and provide feedback. Skill gaps among educators and students may hinder IT's seamless application, leading to inefficiencies. Additionally, technological inequalities may compromise equitable access, hindering some students' engagement (Haleem et al., 2022).

1.2.2 The emerging of new literacies

Learning in today's era is rapidly evolving due to the proliferation of media and new technologies. As a result, to gain new information that is applicable to the modern period, one must not only be literate in reading and writing but also have the capacity to use technology and media, such as websites, social media, and applications. This phenomenon is referred to as the "emergence of new literacies," which highlights the requirement for new capacities and skills in order to adapt to changes in communication and technology. Traditional literacy skills are no longer sufficient today (Crockett et al., 2011), where digital technology and multimedia are prevalent. Digital literacy, media literacy, visual literacy, and information literacy are just a few of the genres that are used to showcase various new literacies. These literacies are essential in today's society as they are the skills and abilities necessary to use technology and multimedia effectively and appropriately, according to the

learning situation and objectives of individuals and organizations. Therefore, the development of new literacies is necessary so that individuals and organizations can use technology and information effectively and appropriately for their intended situations and purposes.

The abilities needed to comprehend and use digital media successfully across a range of settings and users are included in new literacies, which are not just confined to reading and writing. This includes using digital technologies and other devices for communication, learning, and creation, such as playing games and engaging with social media. The emergence of new literacies has had a profound impact on learning and communication in society. In the digital age, students may more readily learn from professionals and have access to a broader range of information and content. Utilizing platforms like social media conversations and messaging apps has helped communication as well. In a culture where technology is crucial to communication and education across diverse cultural settings and languages, the creation of new literacies represents a significant advancement in learning (Sang, 2017).

The evolution of new literacies is influenced by various factors, including:

• Changes in technology: The development of new communication and digital technologies shapes the direction of the development of new literacies (Gentikow, 2015). These technologies impact the way people learn and communicate and require new skills and abilities to use them effectively.

• Changes in teaching and learning practices: As instructors and learners increasingly use technology and media for learning, teaching, and learning practices must also evolve to accommodate these changes. This includes providing learners with opportunities to develop the skills and abilities needed to use technology and media effectively.

• The use of new communication tools: New communication tools, such as social media, blogs, and podcasts, can be used to enhance learning by providing learners with opportunities to share knowledge, establish connections between content, and create a learning and discussion space (Khalil & Ebner, 2017).

New literacies are constantly being developed, and as technology advances, new literacies will continue to appear. To use technology and media successfully in their

work and learning, educators, students, and other stakeholders must remain current on the most recent developments in new literacies.

Information literacy, a crucial information skill for all users, particularly teachers who wish to access and use meaningful information in their teaching and profession, has been significantly impacted by the rise of new literacies. With the emergence of new literacies, users need to learn and apply different technologies and media to manage information, and these capabilities need to increase with the demands of new situations and technologies. New literacies differ from information literacy in several ways. Information literacy focuses on accessing and analyzing data for use, learning, or working, while new literacies focus on using technology and media to create valuable contributions and share knowledge. Information literacy also focuses on the selection and use of media appropriately, while new literacies emphasize media creation and content sharing. Furthermore, new literacies focus on the use of language and various forms of communication, such as website language and sign language, whereas information literacy emphasizes understanding and using language correctly and effectively. Finally, the role of the learner in new literacies is central, whereas information literacy focuses on learning and using information for work.

Despite the rise of new literacies, information literacy continues to be a critical ability needed to manage and understand information obtained in daily life. It allows us to accurately assess the quality and credibility of information and provides an underlying foundation. Therefore, both new literacies and information literacy are important and should be developed over time. In conclusion, the emergence of new literacies provides a new basis for the use of existing technologies and media. However, this does not make information literacy less important. Both new literacies and information literacy are necessary skills that users must develop to navigate the complexities of our digital age.

1.2.3 Lack of information literacy skills of learners

Higher education is characterized by specialized learning in a particular field. This requires gathering and analyzing insights to create an understanding of complex academic circles. These insights must be processed and analyzed to generate new ideas and to comprehend problems in the field. Communication is the most crucial aspect of learning in higher education as it enables students to share their knowledge and experience with others in the field, using technologies such as online chat or social media communication.

Learning at the higher education level often includes research to develop new ideas and to increase efficiency in the research area.

To prepare for the workplace and daily living in the information- and technology-rich world of today, information literacy skills are crucial for students in higher education. To provide students with knowledge and understanding in learning and applying technology and information to create and develop future creativity, the learning approach should emphasize the application of information knowledge and skills in various situations. However, students must also develop scientific skills such as data analysis and interpretation, creativity, seeking additional information, performances, and presentations. Additionally, it must focus on developing communication skills, teamwork, lifelong learning, and continuing education to prepare for future changes in technology and communications.

Previous studies have found that learners at the higher education level often lack information literacy skills in various areas (Erlinger, 2018; Mahmood, 2016; Anwar & Naveed, 2019), such as:

• Search and information selection skills: Learners may not be able to properly search for and select appropriate sources of information. They may also have difficulty in retaining relevant information. Additionally, they may lack the skills to analyze and select appropriate information to use, such as filtering out inappropriate or false information. This may have an impact on their work or lead to incorrect decisions. Learners may also lack skills in assessing the quality of the information they receive, such as verifying the source and checking for data accuracy.

• Information management skills: Learners may lack knowledge on how to organize information, such as storing files and folders, to make it easy and fast to access.

• Analytical and summarizing Skills: Learners may lack the skills to select and analyze critical information from various sources, appropriate to the task at hand. Additionally, they may struggle with processing the information obtained and summarizing the results efficiently.

• Presentation skills: Learners may lack the skills to create and present useful, high-quality information.

• Communication skills: Learners may lack proper communication skills to share information or communicate with others. They may lack the ability to interpret and communicate information effectively for others to understand and benefit from. This could be due to a lack of clear communication skills, whether in writing documents, online communication, or presentations. Additionally, learners may struggle to choose appropriate media or communication channels to convey their message effectively.

However, when developing information literacy skills for learners, emphasis should be placed on promoting skills that are appropriate to their individual level and learning style. This will ensure that learners have the necessary knowledge, skills, and abilities to effectively access, evaluate, and use information. Learners should also have knowledge of and compliance with laws related to information, such as copyright and privacy laws, to prevent any illegal or unethical activities related to information.

1.2.4 Lack of bibliometric and content analysis of research on information literacy in higher education in Asian countries

Recent years have seen a significant increase in interest in research on bibliometrics and content analysis of studies on information literacy, particularly in subjects connected to library and information science. Bibliometrics is a quantitative analysis of research by examining the number and quality of research published in various channels, such as journals, conferences, and websites. Analyzing data from this tool can help researchers identify the following: The researcher's network, The peak research publication period, and the network researcher's relationship network. By connecting the major publications, authors, institutions, themes, and other elements of the field under study, this information can help researchers map and expand their knowledge on a particular area of research (Gumpenberger et al., 2012; Vogel, 2013). Researchers can use this information to decide what direction their research should take. By using this method, researchers can efficiently collect data and study relevant research, know the differences in the evolution of the research that occurred during the desired period of study (Donthu et al., 2021). Thus, enabling them to find conclusions and important information that can be used in further research. The findings of this type of analysis may be used to encourage the development of information literacy skills among students by assisting researchers in understanding trends and research conditions on information literacy in higher education.

While content analysis is a qualitative analysis of research by examining the content of research articles which focuses on identifying themes and patterns in the research (Maguire & Delahunt, 2017), as well as the strengths and weaknesses of the research. Content analysis can help identify trends in research, as well as areas where further research is needed. The section on a content analysis of research on information literacy in higher education involves compiling and analyzing relevant articles using a systematic data retrieval tool and a thorough analysis of research findings to identify trends and problems related to information literacy in higher education and to summarize the research results. This analysis focuses on qualitative data analysis, collecting and analyzing quality research results published in journals from various academic databases. Researchers typically choose high-quality databases that are accepted in academic circles, such as Scopus, Web of Science (WoS), PubMed, and others, to summarize current research findings and identify research flaws to recommend further studies in the field.

In recent years, these techniques are widely used in various fields. For example in Medicine (Thompson & Walker, 2015; Liang et al., 2017; Faust et al., 2018; Tran et al., 2019), Engineering (Fahimnia et al., 2015; Strozzi et al., 2017; Muhuri et al., 2019), Social sciences (Bornmann & Mutz, 2015; Heradio et al., 2016; Koseoglu et al., 2016; Nobre & Tavares, 2017), Finance (Xu et al., 2018; Goyal & Kumar, 2020), Library and information sciences (Fan et al., 2015; Siddique et al., 2021), etc. Additionally, there has been a growing interest in bibliometrics and content analysis of research on information literacy (Pinto et al., 2014; Majid et al., 2015; Kolle, 2017; Bhardwaj, 2017; Stopar, & Bartol, 2018; Pinto et al., 2019; Pinto et al., 2020; Onyancha, 2020; Zimmerman & Ni, 2021; Ali et al., 2022). However, ILHE research in Asian countries is still limited and has not been extensively studied. Although this is an important and interesting topic in education, finding relevant research can be challenging due to the vast number of sources available. Therefore, using both bibliometrics and content analysis is crucial to obtain the necessary results. Some research can help educators and data analysts better understand the nature of research and trends in this field and promote the development of further research. Moreover, content analysis can help plan effective development across institutions and benchmark performance between them. It can lead to the continuous improvement of knowledge and skills among learners.

In this study, in addition to using bibliometrics and content analysis to determine the state of information literacy skills in higher education, researchers also employed

interviewing methods. This method can help researchers collect qualitative data that cannot be obtained through bibliometrics or content analysis. For example, interviews can be used to gather information about the challenges faced by instructors in teaching information literacy skills, the strategies that instructors find most effective, and the resources that instructors find most helpful. Researchers use bibliometrics, content analysis, and interview methods as well, giving a thorough picture of the field of study on ILHE research. With the aid of this knowledge, programs, and efforts for information literacy may be created that will help students acquire the abilities required for both academic and professional success in the future.

1.3 Objectives of the study

The aim of this study is to explore trends and situation of information literacy education across Asian countries using three methods: bibliometric, content analysis, and interview methods. This dissertation answers three main research questions regarding trends including the direction, characteristics and distribution of research articles and the situation of information literacy research and instruction in higher education. Specifically, the study aims to:

1) To identify trends including the direction of ILHE research across Asian countries.

2) To investigate the characteristics and distribution of ILHE research across Asian countries.

3) To examine the situation of information literacy instruction in higher education across Asian LIS educators.

By achieving the above objectives, this research provides the following results:

1) Provides a summary of the subject and identifies key topics for further study on information literacy in Asian countries' higher education.

2) Useful recommendations for courses, training, resources, and pedagogy to support and enhance students' information literacy abilities in the context of developing digital technology for administrators and instructors of higher education institutions.

1.4 Research questions

The research formulates three research questions according to the objectives:

RQ 1: What aspects of participants, sample sizes, research methods, research domains, information literacy standards, and education objectives are included in publications on ILHE in Asian countries?

RQ 2: What are the productive authors, collaboration patterns of journals and authors, and trends in, and frequently used keywords in the publications on ILHE in Asian countries?

RQ 3: What is the nature of the educational situation, as perceived by LIS educators, in different aspects of information literacy instruction at the higher education level in Asian countries?

1.5 Scope and limitations of the study

This study used bibliometric and content analysis to investigate trends including the direction of information literacy research, as well as the characteristics and distribution of research publications in Asian countries, with a focus on Eastern and Southeastern regions indexed in the Web of Science's SSCI database between 2000-2022. The objective of the research was to provide a comprehensive and in-depth understanding of the situation of information literacy instruction. To achieve this aim, interviews were conducted with instructors in LIS educators in Taiwan and Thailand as a case study, to compare the findings obtained through bibliometric and content analysis with the insights gained from the interview data. This research study is based solely on the Web of Science's SSCI database, which is limited to a single database and includes only articles published in English. This limitation may result in the study not encompassing all the research available in national-level databases, as well as publications in local languages in each country in Asian.

1.6 Definition of terms

1.6.1 Information literacy research

Information literacy research is an interdisciplinary field of study that investigates how individuals seek, evaluate, and use information effectively and efficiently. It includes a range of topics, such as information-seeking behavior, information evaluation, information use,

and information technology use. Information literacy research aims to identify effective teaching and learning strategies for information literacy, as well as to inform the development of policies and practices that promote information literacy across different contexts, including education, the workplace, and society. Research in this field is conducted using a variety of research methods, including quantitative, qualitative, and mixed methods research. It involves both theoretical and empirical research, and researchers may draw on theories from different fields, such as education, psychology, sociology, and library and information science. For this study, the researcher analyzes the content of information literacy research in higher education in terms of: Participants and sample size, Research methods, Application domains, Research themes, and Information literacy standards.

1.6.2 Asian countries

This study focuses on Eastern and Southeastern Asian countries. The cultural diversity and education systems in these regions exhibit some differences. However, both regions share a strong emphasis on education, particularly in basic education such as reading, writing, and mathematics. Education is organized and oriented toward lifelong learning promotion. Activities to encourage lifelong learning are available, and these can be beneficial to both individuals' personal and professional lives. These factors collectively justify the need and interest to investigate ILHE research in Asian countries.

1.6.3 Bibliometric mapping analysis

For this study, bibliometric mapping analysis was used to visualize bibliometric data in maps or networks. This allowed us to identify clusters of related research, collaborations among authors, and other patterns of scholarly communication. Bibliometric analysis and bibliometric mapping analysis are two distinct, but related methods used to analyze and visualize research output. The bibliometric analysis focuses on quantitative measurements of research impact and productivity. Bibliometric mapping analysis, on the other hand, is a more visual and exploratory approach that can help identify research trends and emerging areas of inquiry. Bibliometric mapping analysis involves the visualization of bibliometric data in maps or networks. This allows researchers to identify patterns of scholarly communication and explore research trends and emerging areas of inquiry. There are various visualization tools such as CitNetExplorer, VOSviewer, Pajek and CiteSpace which are available for bibliometric mapping analysis, each with its strengths and limitations.

1.6.4 Content analysis

Content analysis is a research method that involves the systematic analysis of qualitative data to draw meaningful conclusions. Content analysis involves identifying, coding, and categorizing patterns and themes within a set of data. This will help the reader understand the process of content analysis in more detail. Content analysis can be used to analyze various forms of textual, visual, or audio data, such as interviews, documents, videos, or social media posts. This will help the reader understand the wide range of applications of content analysis. Content analysis is often used to analyze the content of research articles or other scholarly documents. To determine the research issues being addressed, the methodologies being applied, and the conclusions being presented, content analysis can be employed. This will help the reader understand how content analysis can be used to gain research insights. For this study will focus on identifying specific content characteristics of ILHE research in Asian countries and transforming qualitative data into quantitative data through frequency analysis. This will help the reader understand the specific goals of this study.

1.6.5 Data visualization tools

For this study, data visualization tools were essential in analyzing and presenting data clearly and effectively. These tools provided researchers with the ability to transform large amounts of data into understandable and actionable insights, which could help to identify patterns, relationships, and trends that might not be apparent through other methods. There are various types of data visualization tools, including charts, graphs, heat maps, and interactive dashboards. Each of these tools has its strengths and can be used to present data in different ways, depending on the specific research questions being addressed. Overall, data visualization tools play a crucial role in modern research, enabling researchers to analyze and present complex data in a clear and meaningful way. Some popular ones include CitNetExplorer, VOSviewer, Pajek and CiteSpace. For this study, a data visualization of the research papers indexed in Web of Science's SSCI database based on citation, co-citation, and co-occurrence was produced using VOSviewer version 1.6.18.

Chapter 2. Literature Review

This chapter provides a comprehensive review of the literature related to information literacy education in higher education. It begins by examining the learning competencies in the 21st century for higher education. It then explores the evolution of information literacy theories, from standards to frameworks, and investigates the interrelationship between information literacy and other literacies. The current situation of information literacy education in both global and Asian countries is discussed. Additionally, this chapter highlights the use of bibliometric analysis in navigating scholarly terrain and presents a review of information literacy research publications in higher education. Finally, a summary is provided.

2.1 Learning competencies in the 21st century for higher education

2.1.1 Overview of the learning competencies in the 21st century

In the digital age, skills and knowledge development has shifted towards continuous adaptation to technology. Higher education has also transformed, emphasizing technology for efficient and flexible learning. Online platforms enable anytime, anywhere education (Carnevale & Smith, 2010), fostering competencies like problem-solving, communication, and interdisciplinary learning. These skills prepare students for a changing job market. Scholarly sources confirm the importance of critical thinking, creativity, and problem-solving for success in the 21st-century job market, the benefits of online learning, and effective practical learning approaches. The COVID-19 outbreak has globally impacted education, prompting widespread technology integration to ensure continuity and efficiency (Al Lily et al., 2020). This situation has led to the development of teaching methods suitable for the current conditions. Digital technology's role in teaching has been critical and is expected to become a permanent fixture.

The new generation of learners must embrace their roles as innovators and creators, replacing repetitive jobs handled by robots. 16 fundamental skills for success in the 21st century were recognized by the World Economic Forum (WEF) in 2016 (2016), and they were categorized into foundational literacies, competencies, and character qualities as illustrated in Figure 1. Foundational literacies like ICT and financial literacy are crucial for

interacting in diverse contexts. Competencies such as critical thinking and collaboration are necessary for complex problem-solving. Character qualities like empathy, integrity, and perseverance are vital for managing oneself in a changing social landscape. Possessing these skills is essential for adapting and thriving in a changing environment, enabling individuals to tackle increasingly complex and sensitive issues. Lifelong learning is crucial, and developing these skills early offers long-term advantages. Moreover, the WEF (2023) predicts the top 10 skills for workforce development between 2023-2027, including analytical and creative thinking, leadership, resilience, technological literacy, and empathy, with AI and big data gaining importance.

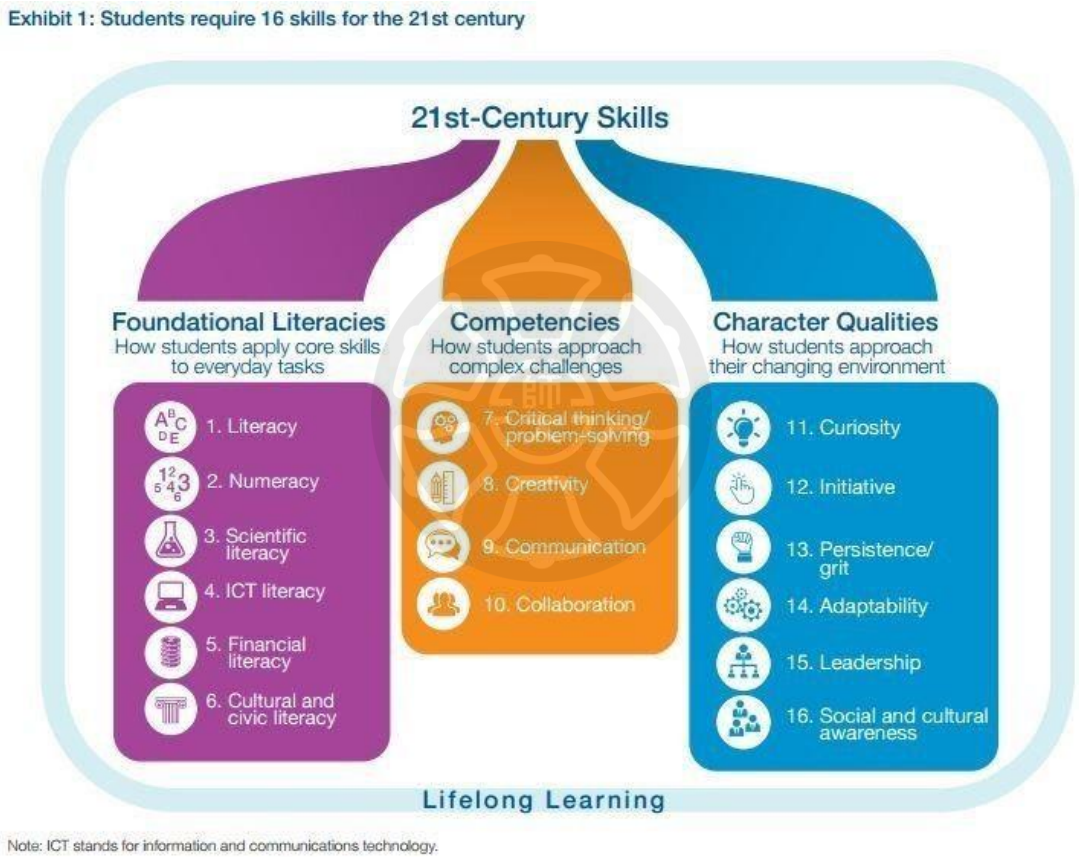


Figure 1. *16 essential skills for success in the 21st century*

Source: https://www.battelleforkids.org/networks/p21/frameworks-resources

Educational institutions are adapting to global changes by modifying their learning approaches, encompassing online learning, technology-enhanced learning, hybrid learning, and self-directed learning. During the COVID-19 pandemic, online learning and technology-enhanced learning have become more popular because they provide flexible learning opportunities. However, online learning poses challenges related to content quality, technology issues, and establishing teacher-learner relationships and communication.

Hybrid learning combines online and classroom-based learning, providing a comprehensive learning experience. Through the use of a variety of technology and information sources, self-directed learning allows students to take control of their objectives and workflows. While self-directed learning promotes leadership and self-development, it may limit opportunities for communication and idea exchange among learners. Hodges et al. (2020) emphasize the significance of online and distance learning during the pandemic.

2.1.2 Importance of learning competencies in higher education

As higher education adapts to the technological advances of the 21st century, various learning approaches have emerged. These approaches prioritize the development of learners' abilities in areas such as analysis and problem-solving, communication, teamwork, self-directed learning, and lifelong learning that reflects social and technological changes. Information technology and communication skills are now essential in higher education, with digital technology being integrated into teaching and learning through online learning platforms and virtual reality technology for skills training and knowledge application.

Learners have access to various resources and technologies that enhance their learning experiences, such as online learning platforms, educational apps, digital textbooks, and multimedia content (Hew & Cheung, 2013). Learners in the 21st century must possess creative thinking skills, diverse learning skills, and the ability to combine different skills to prepare themselves for society and work (Freeman et al., 2017). However, learners also face challenges in the 21st century, such as the abundance of information and resources, which make it difficult to assess the quality and credibility of the content they use. Learners must develop analytical skills and the ability to evaluate the reliability and accuracy of the information they encounter. Adaptability and flexibility are also critical, given the rapidly changing nature of technology and the job market. Learners may need to continuously upgrade their skills and knowledge, requiring a commitment to lifelong learning.

Teachers have a variety of complex and demanding duties as education changes to meet the demands of the twenty-first century. UNESCO (2015) highlights the importance of teachers' abilities to navigate a rapidly changing educational landscape while catering to diverse learning needs and styles. Using online platforms, educational applications, and multimedia material to produce engaging and relevant learning experiences for their students, teachers face a significant challenge and opportunity in integrating technology into

their teaching techniques. (Jenkins et al., 2016). Furthermore, teachers need to adapt their teaching methods to meet the diverse needs of their students, such as differentiating instruction to support learners with different abilities, interests, and backgrounds.

Establishing positive classroom environments that promote collaboration, teamwork, and strategies for managing stress and developing positive coping skills is crucial for supporting social and emotional development (Durlak et al., 2011). Teachers are also expected to participate in ongoing professional learning and collaborate with colleagues to share best practices and resources to support the learning and development of their students. In conclusion, teachers play an essential role in the 21st-century education system and require continuous professional learning to adapt to evolving education requirements and support the ongoing development of their students.

2.2 The evolution of information literacy theories: from standards to frameworks

The field of information literacy has experienced significant shifts in theories and orientations in recent years. Limberg and Sundin (2012) identified three theoretical orientations: the phenomenographic perspective, the sociocultural perspective, and the discourse analytic perspective. Each orientation focuses on different aspects of information literacy, resulting in diverse definitions, standards, and educational practices. Building on these orientations, according to Addison and Meyers (2013), can be categorized into three different ways: as the development of information-age-appropriate skills, as the cultivation of cognitive habits, and as active participation in information-rich social practices. During the ASIST seminar, interviewees proposed four additional orientations: the metacognition orientation, the ontological and epistemological dimensions of information literacy in practice, the sociocultural perspective, and the autonomous literacy.

The Association of College and Research Libraries (ACRL) updated its information literacy requirements in response to discussions and disagreements over theoretical ideas. The Information Literacy Competency Standards were replaced by the Framework for Information Literacy for Higher Education, which was presented by the ACRL in 2015. This approach is centered on the idea of metaliteracy, which motivates students to actively interact with information on the behavioral, emotional, cognitive, and metacognitive levels. It emphasizes how crucial critical self-reflection and metacognition are for promoting

autonomy in a world of knowledge that is always shifting. (Association of College and Research Libraries, 2016) which comprises six core 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. One notable feature of the Framework is its strong emphasis on metacognition, enabling learners to critically reflect on their information-seeking behaviors and adapt to the rapidly changing information ecosystem. By developing metacognitive skills, learners enhance their autonomy and become adept at navigating the complexities of the information landscape.

Information literacy is becoming more dynamic in an environment that is always changing, as seen by the shift from information literacy standards to frameworks. The difference between these two sets of criteria, according to Gross et al. (2022), is in how they conceptualize information literacy. The new Framework defines information literacy as the inclusion of threshold ideas that affect the comprehension, creation, and application of information, as opposed to the old "standards" which saw it as a collection of particular abilities. The ACRL Framework, according to Chen (2023), may be a novel conceptual framework, but it is not a novel idea. In the past, when students were taught about information literacy, this conceptual framework was not highlighted. A new conceptual framework for teaching can increase the efficacy of learning by giving students the knowledge they need to not only access, choose, and evaluate information but also to fully comprehend the academic ecosystem and environment of information. The ACRL Framework introduces essential concepts, fosters student engagement, and encourages collaboration among educators and librarians. Metacognition and critical self-reflection play a crucial role in empowering learners to become autonomous in the information ecosystem. This evolution has opened up new possibilities for information literacy education and underscores the significance of ongoing theoretical discussions to advance the field. Furthermore, this transition has led to an expansion of the framework's scope, increased complexity, and greater depth. It has switched the emphasis from only stressing skills to embracing a larger concept of information literacy as a social practice. These changes have had a profound impact on information literacy educators, presenting them with both opportunities and challenges in their instructional approaches. The framework also incorporates knowledge practices that assist learners in comprehending information literacy concepts and highlights the importance of cultivating positive dispositions towards the framework, including affective states, attitudes, and values.

2.3 The emerging family of literacy: the interrelationship between information literacy and other literacies

Understanding how to identify, locate, evaluate, and use information effectively is known as information literacy. It includes the knowledge and abilities required to move around in the digital age's information world. When Paul G. Zurkowski realized, a new strategy was required to comprehend the demands of the Information Age, he first developed the idea of information literacy in 1974. Information, in the opinion of Zurkowski, is more than simply knowledge; it is also a notion or idea that has the power to affect people's perceptions and behavior. Information's worth and relevancy are greatly influenced by the user's perspective. Information literacy, as defined by the American Library Association (ALA) in 1989, is the ability to identify the need for information, find pertinent sources, assess the reliability of those sources, and apply the knowledge in a useful way. This definition emphasizes how crucial it is to evaluate information and exercise critical thinking when looking for knowledge. The term "information literacy" was broadened by McClure in 1994 and was divided into four competencies: traditional literacy, media literacy, computer literacy, and network literacy. The terms reading, writing, and math are all used to describe traditional literacy. While computer literacy stresses skill with hardware and software, media literacy focuses on comprehending non-print media. The ability to browse and assess online resources is referred to as network literacy. The complexity of literacy in the information age is reflected in these abilities.

Lloyd (2003) states that the environment of social media and online communities serves as evidence that collaborative technology has become a new innovation today. The need to redefine information literacy (IL) as a branch of metaliteracy or metacompetency has arisen as a result of this. Since the release of the ACRL's framework in 2016, it has been increasingly clear that the focus has switched to metaliteracy. In addition to the understanding of critical thinking, data agility, and ethical participation in a data-rich society, metaliteracy includes the capacity to acquire, assess, and apply information from a variety of sources. It is clear that metaliteracy is defined as a broad and self-referential framework that incorporates new technologies and various forms of literacy, including information literacy (IL) and other related ideas like media literacy, digital literacy, visual literacy, cyberliteracy, and information fluency (Mackey & Jacobson, 2011).

The primary idea has changed to metaliteracy after the ACRL Framework was released in 2016. The capacity to find, analyze, and apply data from a range of sources is included in metaliteracy. In today's information-rich culture, it acknowledges the value of ethical participation, information fluency, and critical thinking. People require a broad range of abilities in order to function in the 21st century's complicated information environment. People require a broad range of abilities in order to function in the 21st century's complicated information environment. The New London Group, the United Nations Educational, Scientific and Cultural Organization (UNESCO), and Secker and Coonan (2013) described the information literacy landscape in which the literacies pertinent to information literacy each have their own features. The definitions of these literacies and how they relate to information literacy are given in detail below.

1) Information literacy: Information literacy is the ability to identify, locate, evaluate, and use information effectively. It is crucial for success in various aspects of life, including education and work.

2) Academic literacy: Academic literacy involves critical reading, writing, and thinking skills in academic contexts. It is essential for achieving success in higher education and beyond.

3) New literacy: New literacy refers to the ability to utilize new technologies for communication and creation. It is a necessary skill set in the rapidly advancing 21st century.

4) Digital literacy: Digital literacy is the competence to use computers and other digital devices to access, assess, and utilize information. It is vital in today's digital age.

5) Media literacy and Media and information literacy (MIL): Media literacy or MIL entails the capacity to analyze and interpret media messages critically from diverse sources. It is essential for making informed decisions in the era of mass media.

6) Multiliteracy: Multiliteracy involves proficiency in various forms of communication, including print, digital, and visual mediums. It is crucial for success in a globally interconnected world.

7) Metaliteracy: Metaliteracy focuses on the ability to learn and adapt to new information environments. It expands traditional information literacy by including visual, media, and digital literacies. Metaliteracy encourages a holistic approach to learning, promoting the production, sharing, and reuse of information in a participatory environment with four key areas—behavioral, cognitive, affective, and metacognitive to support meta literacy's learning goals (Chen, 2023).

The concept of new literacy has significantly influenced information literacy in the digital age, highlighting the need for individuals to possess a diverse range of skills beyond traditional literacy. New literacy encompasses the ability to effectively navigate and participate in the rapidly changing digital world, including the use of digital tools, critical assessment of online information, and technological proficiency (Hobbs, 2010). This understanding has shaped the teaching and comprehension of information literacy, expanding its scope to encompass digital literacy and other new literacies.

In today's information age, information literacy, media literacy, and digital literacy all play crucial roles. Although each term focuses on slightly different aspects, they are all vital for developing the skills necessary to access, evaluate, and utilize information and media responsibly and efficiently. Information literacy involves effective and ethical information searching, evaluation of sources, and appropriate use in academic settings. Media literacy entails understanding and analyzing media messages, including the cultural and technical contexts surrounding their creation and delivery. On the other hand, digital literacy covers the efficient and responsible use of digital technology, the internet, software, and online safety practices.

In conclusion, these literacies are interconnected and mutually reinforcing. For instance, information literacy is foundational to academic literacy, and academic literacy is necessary for new literacy. These literacies continue to evolve as new technologies and communication methods emerge. Developing these skills is crucial for becoming informed individuals, competent professionals, and engaged lifelong learners. However, the evolving dimension of information literacy carries substantial implications for optimizing research practices, reaching beyond academic contexts to encompass various aspects of daily life.

2.4 The current situation of information literacy education in Global and Asian countries

Due to its ability to help students access and process information quickly and accurately, information literacy is a critical skill for success in higher education. Information literacy, as defined by the Association of College and Research Libraries (ACRL) (2016), 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." "The ability to recognize the need for information, locate, evaluate, and effectively use the information," according to Badke (2009), is what is meant by information literacy. This definition emphasizes the importance of identifying information needs, evaluating sources for quality and relevance, and using information effectively in a given context. Moreover, information literacy involves understanding the social and ethical implications of using information, including issues related to intellectual property and copyright. Efficient information literacy skills are particularly important in academia, where students are expected to conduct research and analyze complex data as part of their coursework.

In today's digital age, information literacy has gained significant importance due to the abundance of information available through the internet and digital resources. With the development of information technology, information literacy has increased steadily. Information literacy skills empower individuals to navigate, process, analyze, and utilize the vast amount of data for personal and professional growth. This skill is a vital component of personal development and career advancement, as individuals need the knowledge and abilities to access and effectively use information in their future endeavors. Additionally, information literacy ensures that individuals can actively participate as informed and responsible members of their communities and as conscientious digital citizens. Furthermore, information literacy is essential for keeping pace with the ever-changing world. As technology and new media forms evolve, individuals must possess the skills to navigate and adapt to these advancements. This entails understanding new tools, platforms, and technologies and employing them ethically and efficiently. With the rapid rate of change, information literacy skills are crucial for maintaining competitiveness in the workforce and making well-informed decisions in personal lives. Hence, information literacy is an

indispensable aspect of 21st-century education, serving as a foundation for personal and professional success.

In order for students to become independent learners who can effectively search for and use information, rather than only depending on instructors to give all necessary information, the development of information literacy skills is an essential component of higher education (Bruce, 1997). This promotes a more effective understanding of the content learned and systematically encourages learning and creativity. Additionally, it teaches students to be more critical information consumers, which is important in a society with a lot of internet data (Association of College and Research Libraries, 2016). Students take ownership of their own learning and personal growth in areas connected to the use of technology and the exchange of information as they acquire information literacy skills. Moreover, it helps students understand and effectively present information, as well as analyze and solve problems related to the content learned. For example, skills such as finding useful sources of information, analyzing and summarizing data, and presenting research findings or projects are important skills for higher education (AASL, 2018).

In conclusion, the ability to use knowledge effectively is crucial for success in higher education and beyond (Bruce, 1997). It makes it possible for people to successfully and morally search, evaluate, and use information—skills essential for academic achievement, personal development, and professional growth. For remaining current with the newest media and technology, as well as for navigating the large quantity of information available in the digital age, information literacy skills are crucial. Information literacy abilities are therefore an essential part of education in the twenty-first century and are essential for people to continue to be informed and competitive members of their communities (Association of College and Research Libraries, 2016).

2.4.1 The importance of information literacy in higher education

The rapid advancement of information and communications technology (ICT) has resulted in a wealth of information, posing a challenge for students to discern between reliable and false sources (Kusumarani & Zo, 2018). Despite students' proficiency in using digital devices, there remains a deficiency in information literacy skills (Shuhidan et al., 2019). Higher education encompasses post-secondary education, including undergraduate, graduate, doctoral, and professional courses. While similarities exist between K-12

education and higher education, notable distinctions also arise. The main goal of higher education is to prepare students for a wide range of jobs, including teaching, research, and professional employment in a variety of sectors. The development of problem-solving skills, critical thinking skills, and the capacity to evaluate and resolve complex problems using suitable techniques and procedures must be prioritized in order to achieve these goals. Learning experiences should be customized to meet individual needs and abilities, with active learner engagement facilitating the construction of a personal understanding of concepts. Moreover, effective integration of technology is essential to facilitate knowledge creation and support lifelong learning endeavors (AAC&U, 2013). Additionally, UNESCO (2020) emphasizes the importance of keeping students informed about media and information within their curriculum. This serves to safeguard and guide them by providing appropriate methods for acquiring information for academic purposes and fostering a more civilized society indirectly.

Information literacy is a vital skill that holds significant importance for learners at all levels in the 21st century. In the context of higher education, possessing information literacy skills is not only a fundamental requirement for effective learning but also a means of fostering self-development in a rapidly evolving society. These skills play a pivotal role in cultivating leadership qualities that enhance decision-making and problem-solving abilities in everyday life. For higher education students, several key characteristics of information literacy skills are particularly suitable. These include effective information retrieval, skill in data analysis and summarization, the capacity to confirm the accuracy of the information, proficiency in presenting and communicating information clearly, and the ability to assess information to make informed decisions (Association of College and Research Libraries, 2016). In 2021, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) placed a strong emphasis on the need for improved media and information literacy instruction for both children and adults globally. Universities are essential for teaching information literacy and are also important for professional development. Additionally, the International Federation of Library Associations and Institutions (IFLA) prepared the Trend Report 2021, which gathered 20 significant trends, and placed a strong emphasis on the importance of information literacy in the perceptual aspect. As stated in Trend 18, "information literacy is recognized," with governments and other organizations fully appreciating its significance (International Federation of Library Associations and Institutions, 2022).

To promote the development of information literacy skills among higher education students, it is essential to employ standardized and appropriate techniques for searching and selecting information. Regardless of whether students are using online search tools or conducting research in libraries or online databases, efficient access and utilization of information are paramount. Analyzing and accurately summarizing information obtained from various sources can be achieved through the application of diverse techniques, such as examining relationships and presenting data in different formats. Additionally, the integration of technology and software can greatly support students' learning, especially in subjects related to data analysis and visualization. Examples include using graphing software to present data in a comprehensible format or utilizing database software for effective data collection and organization (Association of College and Research Libraries, 2016). Furthermore, according to a study by Tang and Tseng (2013), students who are proficient in information literacy show confidence when navigating online learning environments and actively participate in information-related problem-solving tasks, which increases their awareness of problem-solving. According to Tamnanchit et al. (2019), it is clear that those with information literacy have greater professional chances.

It's crucial to understand that various educational levels require different approaches to acquiring and using information literacy abilities according to the nature and complexity of the activities involved. At the higher education level, students are often encouraged to cultivate analytical and problem-solving skills within complex contexts, such as conducting academic research and analyzing data to make informed decisions in their professional endeavors. Additionally, they may be encouraged to delve into areas like e-business and programming to foster innovation in the future. Conversely, in secondary education, the emphasis typically lies in promoting information searching and analysis skills, aiding students in setting learning goals, and applying their knowledge to solve everyday problems. Collaborative learning is also encouraged through the use of communication technology and online teamwork.

To conclude, information literacy skills are essential across all levels of education, with varying focuses and complexities. Higher education demands the development of advanced analytical and problem-solving skills, while secondary education emphasizes information searching and analysis. The development and application of information literacy skills also differ between levels, with higher education involving tasks such as analyzing extensive data sets and accessing scientific databases. In contrast, other educational levels

concentrate on using electronic communication tools and online collaboration. By putting an emphasis on effective information access, a range of analytical methodologies, and the use of technology and software, higher education institutions may support the development of information literacy skills. By doing so, they can create effective learning environments that prepare learners for the demands of future society and the workforce.

2.4.2 The current situation of information literacy education in Western and Asian countries

The current state of information literacy education exhibits significant variations among countries. While some nations have well-established initiatives in place, others have yet to fully integrate information literacy programs into their education systems. The availability of technology and the internet, the readiness of students who have received information literacy training, and cultural and societal effects on successful data use are only a few of the elements affecting the present condition of information literacy education (Koltay, 2016).

It is difficult to provide a thorough review of information literacy education at the higher level across Western and Asian countries due to the diversity of each region's educational and cultural systems. There is a rising understanding of the significance of these abilities in the digital age, even if the current quality of information literacy education varies among nations. However, issues still exist, such as ensuring that all students have equal access to technology and resources, removing social and cultural obstacles, and promoting a mentality that places a high priority on students' acquisition of information literacy abilities. Growing interest in creating and executing information literacy programs throughout the globe is a result of the increased understanding of the value of information literacy skills in recent years.

2.4.2.1 Global perspectives on information literacy education

The creation of the ACRL Framework in 2016 is an illustration of information literacy instruction during this time. It places a strong emphasis on the value of critical thinking and evaluative abilities in the pursuit of knowledge and the ethical use of information. The framework also underlines how important it is for faculty members and librarians to work together to include information literacy into their curricula. The concept has been

extensively embraced by universities and colleges all throughout the US and has had an impact on information literacy instruction in other Western nations as well as beyond.

2.4.2.2 Information literacy education in Asian

Information literacy has gained significant traction across Asian countries, emerging as a critical area of focus within the library field. However, difficulties were noted when the phrase was translated into each ASEAN nation's official language. The development of information literacy programs was further hampered by the tendency to conflate the word "information literacy" with other literacy concepts like media literacy and digital literacy (Sacchanand, 2022). Despite a rise in information literacy research and teaching throughout ASEAN nations, according to Sacchanand (2022), there are still significant regional differences in the methodologies taken. Additionally, there isn't already a model or standard for information literacy that is explicitly designed for this area.

China

Since 2001, the Chinese State Department has determined to "deepen education reform and promote information literacy" in schools, colleges, and universities. And during the year 2002, it was found that research on information literacy was increase published. (Sun, 2002). Academic libraries in Macao began using the phrase "information literacy" in library training roughly six years ago (Xie2020). According to a research by Guo and Huang published in 2021b, the Chinese Ministry of Education published two significant papers in March 2020. The "Key Points of Education Informatization and Cybersecurity Work in 2020" underlines the significance of improving information literacy, particularly for academic libraries. Following that, the Ministry of Education released "Guidelines on COVID-19 Prevention and Control in Higher Education Institutes," which emphasizes the necessity for college students to rely on trustworthy sources and deliberately examine material. Information literacy (IL) is a required subject for students majoring in library and information science (LIS) and an elective course for those majoring in social sciences and the natural sciences at Chinese colleges and universities. The information retrieval methods and techniques covered by the IL curriculum are varied, with a particular emphasis on the use of information technologies including computers, the Internet, and cellphones. Students are also taught how to use search engines, digital platforms, databases, and library catalogs to efficiently obtain

information. Nevertheless, a sizable proportion of IL instructors continue to use conventional face-to-face teaching techniques, despite technological developments (Huang et al., 2016).

Singapore

The introduction of IL education in Singapore began in the late 1990s, when the Ministry of Education in Singapore (1997) created a set of guidelines and supplementary resources to support IL instruction from primary to postsecondary levels. A renewed interest in IL education should result from the Ministry of Education including "Information and Communication Skills" as one of the twenty-first-century skills for students. When it comes to tertiary IL education, Nanyang Technological University's Wee Kim Wee School of Communication and Information started offering a required course called "Information Literacy and Interpretation" in 2008 to help its own undergraduates' abilities for identifying, searching for, and locating information (Foo et al., 2013). Information Literacy Guidelines (ILG) and Information Literacy Supplementary Materials (ILSM) were created and published more than ten years ago by the School Libraries Unit of the MOE's Curriculum Planning and Development Division (CPDD) for use in Singapore schools from elementary to preuniversity level (Mokhtar et al., 2009). To assist in the creation of IL standards for Singapore schools, a group of academics from Nanyang Technological University presented a 6+3 model using the standards as a reference (Foo et al., 2013).

As the only nation in the area with comprehensive national policies, strategic plans, guidelines, models, and frameworks especially targeting information literacy, Singapore has a prominent position as the most productive nation in ASEAN. This came about as a result of the nation's social, economic, educational, and technical progress as well as LIS education and library development. According to study by Basili et al. (2022), Singapore is the only ASEAN nation to have government policies, strategic plans, guidelines, models, or frameworks for information literacy. Both the Ministry of Communications and Information and the Ministry of Education are instrumental in developing policies that support comprehensive, integrated methods as well as cooperative relationships amongst stakeholders. The National Library Board is crucial to Singapore's excellent progress in promoting information literacy. Surprisingly, Singapore has put in place a variety of initiatives for teaching media literacy and information literacy to the general people, with the National Library's S.U.R.E. (Source, Understand, Research, Evaluate) program garnering particular attention.

Malaysia

To improve users' information literacy abilities, the National Library of Malaysia created the e-LMM Portal, an online media and information literacy module (International Federation of Library Associations and Institutions, 2023). This innovative platform aims to support lifelong learning, empower users in their academics and careers, and foster an information society. The e-LMM Portal serves as a comprehensive guide and platform for individuals in Malaysia to become information literate. It offers a self-learning system accessible 24/7, enabling users to access the Media and Information Literacy Program online. The portal is designed with three learning levels, including Basic, Intermediate, and Advanced, targeting different user groups based on their education or career. The modules cover a range of skills and are tailored to various audiences, such as primary school students, professionals, and university students. Notably, the e-LMM Portal is free of charge and compatible with any internet-connected electronic device.

Malaysia stands out among the ASEAN nations as the sole publisher of the prestigious, Scopus-indexed Malaysian publication of Library and Information Science (MJLIS), a recognized worldwide publication in the area of Library and Information Science (LIS). Information literacy is only one of several subjects covered by the highly valued and well recognized MJLIS. A prominent peer-reviewed publication published by the Library Association of Singapore, the Singapore publication of Library and Information Management (SJLIM), also contributes significantly to the advancement of the ASEAN region's conversation on information literacy by offering insightful analysis and knowledge.

Taiwan

In general education courses, several Taiwanese institutions started offering information literacy courses around 2000 (Wang et al., 2023). Information literacy courses in Taiwan began offering online instruction and digital learning around 2010. (Wang, 2017) There are several effective teaching approaches for teaching information literacy to undergraduate students. Information literacy classes may be made more effective with the use of effective teaching techniques, which can also foster students' competitiveness. Pre-test, post-test, formative assessment, and summative evaluation are just a few of the assessments that are used to look at student learning outcomes, according to Wang et al. (2023). in order to support information literacy courses' diversity and flexibility.

This study also notes that using a variety of evaluation methods enables students to exhibit their skills in more interesting and varied ways.

Thailand

As a student-centered reform, Thailand's drive for IL competences in higher education started with the establishment of policy in compliance with the National Education Act 1999 (Office of National Education Commission, 1999). The Thai Qualifications Framework for Higher Education 2022 has been established by the Ministry of Higher Education, Science, Research and Innovation (MHESRI) of Thailand. It will be used to determine the qualifications of higher education students based on the standards for higher education curriculum set by each level of education and the requirements for learners' learning outcomes resulting from the educational system. In total, diplomas, undergraduate degrees, and doctoral degrees have been covered. Graduates at all levels must exhibit a minimum of four competencies: personality, ethics, knowledge, and skills (MHESRI, 2022). Higher education institutions in Thailand have emphasized the need of motivating students to develop their IL abilities. Tuamsuk (2013) and Tuamsuk and Surabraniam (2017) reported 66.28% of Thai universities need information and digital literacy for a bachelor's degree and that 79.07% of Thai institutions have IL teaching incorporated into their curricula for both general education and elective courses.

In Thailand, information literacy learning and teaching approaches encompass problem-based, project-based, inquiry-based, and active learning methods. These approaches are integrated into various courses, allowing students to develop their information literacy skills (Tuamsuk et al., 2023). Promoting information literacy can be achieved through various means, which vary depending on the policies implemented by each organization (Maitaouthong, 2015). In Thailand, the teaching and learning approaches for information literacy encompass three main methods: IL courses, course integration, and training. These approaches aim to enhance individuals' information literacy skills by providing dedicated courses, integrating information literacy concepts into existing courses, and offering training opportunities. By adopting these approaches, Thailand endeavors to cultivate a society that is well-equipped to effectively navigate and utilize information in diverse contexts.

2.4.3 The educational situation of information literacy instruction

In order to comprehend the viewpoints of faculty on information literacy education across Asian countries, it is crucial to understand the educational context of information literacy instruction in higher education.

2.4.3.1 Enhancing information literacy through library-university partnerships

Each university has its policies to promote information literacy among students, which can vary based on the university's structure and organization, originating from the central administration, faculty, or program level, the strategies and policies related to education, curriculum design, teaching methods, and integration of soft skills into the curriculum are discussed in the study by Tuamsuk et al. (2023). In Thailand, some universities have implemented institutional-level policies, such as mandatory information literacy courses, while others delegate responsibility to faculties or programs. Universities employ various strategies to support and foster students' information literacy skills. They offer training and resources, including workshops, tutorials, and online guides, often provided by libraries or academic support units. Across all academic areas, information literacy skills are included in the curriculum. In addition to working with libraries to provide and market resources and services like research assistance, instruction sessions, and online tutorials, universities also make it easier for people to access a broad variety of information resources, such as online journals and library databases. Professors serve as role models for information literacy practices, demonstrating proper citation and resource utilization.

Nevertheless, libraries are essential for teaching information literacy in higher education (Chisita, 2020). They provide users access to a variety of technology and information sources, including databases, e-books, and online tutorials. By collaborating closely with teachers to create pertinent learning objectives and teaching resources, librarians actively contribute to the design and delivery of information literacy courses. In addition to librarians, it is also found that reference librarians play a primary role in teaching, as identified by Aharony et al. (2020). Additionally, libraries support information literacy throughout the whole institution by working with teachers to include it into the curriculum and foster an information literacy culture on campus. They ensure their staff possesses the necessary information literacy skills through ongoing training and professional

development opportunities. However, as noted by Jabeen et al. (2016) and Humbhi and Jabeen (2019), the collaboration between librarians and faculty instructors plays a crucial role in the curriculum of information literacy training.

However, according to the research by Tuamsuk et al. (2023), information literacy (IL) is not explicitly mentioned in university policies and is not specified as a criterion for expected learning outcomes. However, the content of the curriculum is often used and emphasized within the framework of competency-based curriculum design. It is evident that although information literacy skills are important at the higher education level, educational institutions may not give explicit importance in shaping policies for promoting information literacy skills. In conclusion, developing information literacy among students is greatly influenced by universities and libraries. Universities provide students the tools they need to thrive academically and professionally by providing training, incorporating information literacy into the curriculum, facilitating access to information resources, working with libraries, and encouraging faculty members to use effective information literacy practices.

2.4.3.2 The diversity of models, standards, and frameworks for information literacy in higher education

In the context of information literacy in higher education worldwide, models, standards, and frameworks play crucial roles in guiding and shaping information literacy instruction. First, information literacy models refer to specific approaches or conceptual frameworks that outline a particular aspect or component of information literacy instruction. These models provide a structured framework for understanding and teaching specific skills or concepts related to information literacy. Examples of information literacy models include the Big 6, SCONUL Seven Pillars, and the PLUS model. These models offer step-by-step processes or guidelines for conducting research, evaluating sources, or developing critical thinking skills in information seeking and use.

Next, Information literacy standards establish the expectations or requirements for information literacy proficiency at the institutional or national level. In order to be deemed information literate, people must have certain knowledge, skills, and abilities, which they define. Standards offer a framework for evaluating and analyzing information literacy programs and are frequently created by professional groups or governing bodies in education. The Information Literacy Competency Standards for Higher Education published

by the Association of College and Research Libraries (ACRL) since 2000 is a well-known example of information literacy standards. Curricula, resources, and tools have been developed by a number of academic libraries to help students enhance their information literacy abilities.

Information literacy frameworks offer a thorough and all-encompassing picture of information literacy in higher education. They provide a wide range of content by incorporating several information literacy standards, ideas, or areas. The creation of curricula, instructional methods, and evaluation techniques are all influenced by frameworks, which act as guiding structures. In addition to encouraging critical thinking, scientific inquiry, and ethical information usage, they stress how linked information literacy abilities are. One well-known example of a thorough framework that highlights threshold ideas and frameworks for comprehending information literacy is the ACRL Framework for Information Literacy for Higher Education. In general, models, standards, and frameworks in information literacy in higher education provide educators, librarians, and institutions organized techniques, benchmarks, and recommendations for building information literacy abilities in students. International models, standards, or frameworks can guide universities in aligning their information literacy initiatives with best practices and facilitate comparisons with other institutions (Kong, 2016), while also providing a common language and set of goals for information literacy education. However, it is important to note that universities should adapt these frameworks and models to fit their specific needs and contexts, consulting with experts in the field or studying specific information literacy practices and policies (Bruce & Edwards, 2020).

The Association of College and Research Libraries Framework for Information Literacy for Higher Education (ACRL Framework) is a well-known standard curriculum used in the United States for teaching information literacy skills at the university level (Association of College and Research Libraries, 2016). Developed in 2016, the ACRL Framework focuses on building understanding and skills in finding information, analyzing it, using technology tools, and presenting data appropriately. It consists of six interrelated concepts that form the foundation of information literacy education:

- Authority is Constructed and Contextual: Emphasizes the examination of information sources and data management in relation to the power structures involved in creating knowledge. It involves considering various aspects such

as the expertise of experts in different fields and the contextual factors that influence the reliability and importance of data.

- Information Creation as a Process: Highlights the importance of understanding the process of creating information and selecting data sources in research. It emphasizes the steps involved in creating different types of data and articles, as well as the use of communication resources in generating data. It stresses that data creation is an ongoing process and that analyzing and presenting data should consider the sources and process of its creation.

- Information Has Value: Focuses on the significance of valuable data and the analysis of its value in various formats. It underscores the importance of maintaining the confidentiality and security of data and evaluating its worth for use.

- Research as Inquiry: Emphasizes the role of questioning in understanding problems and developing knowledge. It uses the research process to develop research and problem-solving skills, encouraging students to assess the quality of data sources through inquiry and critical evaluation.

- Scholarship as Conversation: Highlights the importance of communication and the exchange of opinions in academia. It involves evaluating the dissemination of information, including the review process and academic discussions related to data. It encourages students to engage in meaningful conversations with researchers and peers to enhance their knowledge and skills.

- Information Literacy as a Metaliteracy: Recognizes the importance of understanding and using data beyond its limited usage. It emphasizes comprehensive data usage, utilizing current and accurate information, and taking responsibility for proper citation and referencing. It aims to ensure that students understand the benefits of using data and possess the skills to use it effectively and ethically.

Higher education institutions have their own policies, frameworks, or best practices regarding information and digital literacy for their institutions (Basili et al., 2022). Identifying a single country as a model for studying information literacy in Asian is not feasible, as each country has developed its approach and format according to its unique needs

and specific context. The educational systems and cultures of each country are distinct, and the practices and standards of information literacy may significantly differ within and between countries. It is essential to acknowledge that there is no one-size-fits-all approach to studying information literacy in education, and what may work well in one country may not work in another. However, universities should also consider their specific needs and contexts to ensure that their information literacy initiatives are effective and meaningful for their students and faculty.

The implementation of information literacy standards in the classroom has had an effect on teaching and learning, notably in the growth of students' information literacy abilities. The notion of information literacy is better understood as a result, which has an impact on librarians and educators as well (Sangchantr, 2022). It also helps them comprehend their roles in promoting and developing information literacy abilities. The Framework for Information Literacy for Higher Education, however, was not used for information literacy training by about 27% of respondents, according to research by Gross et al. (2022). The notion that the Framework is neither applicable nor useful to community college students preparing for the job was one of the reasons given for this. Some respondents believed that the Framework's terminology was unclear to pupils and overly complicated the task of teaching information literacy. The decision to reject the Framework was partly impacted by workload issues and what was viewed as library administration's lack of enthusiasm. The impact of the pandemic and the absence of participation in professional organizations like the ACRL and/or the ACRL Community and Junior College Libraries Section (CJCLS) were also noted as contributing causes to the non-use of the framework.

2.4.3.3 Responsibility for instruction of information literacy

Responsibility for instruction in information literacy at the higher level is shared among various stakeholders, including libraries, academic support units, librarians, faculty members, administrators and policymakers, employers, and students. These stakeholders play a significant role in promoting and enhancing information literacy skills among students in higher education institutions. Responsibility for promoting information literacy skills at the higher education level is shared by various organizations and individuals. These include:

- Libraries: Libraries play a critical role in information literacy instruction. They provide resources and services to support students in developing information literacy skills. This includes granting access to information resources, conducting workshops on research skills, and offering online practice exercises. Reference service librarians were indicated the primary responsibility for instruction (Aharony et al., 2020)

- Academic support units: Academic support units, such as writing centers or tutoring services, can contribute to the development and promotion of information literacy skills. They can offer workshops or one-on-one support to students, focusing on research methodologies, information evaluation, and proper citation practices.

- Librarians: Librarians, as trained experts in information literacy, offer guidance and resources to students, professors, and staff on searching for and evaluating information sources. They also educate on ethical and responsible information use.

- Faculty members: Faculty members play a significant role in integrating information literacy into courses and assignments. They provide guidance and support to students in developing effective information searching and usage skills. Faculty members serve as models by demonstrating how to identify credible sources and use information responsibly.

- Administrators and policymakers: Administrators and policymakers create policies and allocate resources to support information literacy skill development. This includes funding for library resources, technology, and training programs. They collaborate with other institutions and organizations to share best practices and establish standards.

- Employers: Employers recognize the importance of information literacy skills in the workforce. They may expect graduates to possess these skills and can provide training and resources to support information literacy development among their employees.

- Students: Students have a responsibility to actively seek opportunities to learn and practice information literacy skills. They can engage in internships, research projects, and independent study to enhance their skills. Students also have a role in promoting information literacy among their peers.

Overall, the responsibility for instruction for information literacy in higher education is a collective effort that involves a range of stakeholders. These stakeholders can ensure that students have the abilities and knowledge required to succeed in their academic and professional endeavors as well as to navigate the ever-expanding universe of information and use it effectively by cooperating, with each stakeholder playing a specific role in promoting and enhancing these crucial skills and recognizing the importance of information literacy include IL in the curriculum of all programs (Mahmood, 2013). They may foster a culture of information literacy that enables kids to learn for the rest of their lives and utilize information wisely in a world that is always changing. Undoubtedly, one of the most important factors in making sure that students acquire the abilities to access and use information successfully in higher education is the need to teach information literacy. It's critical to understand that various stakeholders share responsibility for education rather than any one person or organization (Alexandersson & Limberg, 2003; Lundh & Limberg, 2008; Pawley, 2003).

2.4.3.4 Characteristics of teaching of Information Literacy

The capacity to locate, evaluate, and use information effectively has evolved into crucial skills for higher education in the twenty-first century. Information literacy is a competency that is crucial for achievement in both academic and professional contexts. It is now essential to teach information literacy in higher education, and there are specific traits of good teaching strategies that foster information literacy abilities. Different ways are used to teach ILHE features (Maitaouthong et al., 2011).

In accordance with Peacock, Eisenberg, Lowe, and Spitzer, as cited in the study of Wang (2011), the pedagogical landscape of information literacy instruction within higher education encompasses four primary paradigms. These encompass:

- Intra-curricular approach: This strategy entails seamlessly incorporating information literacy concepts into the structure of academic courses or teaching initiatives. Such integration takes the shape of objectives, learning activities,

or evaluation evaluations for information literacy that are in line with the major learning objectives of the academic curriculum. Collaborations developed between academic academics and library staff members frequently help to enable this integration.

- Inter-curricular approach: Within this paradigm, information literacy is proffered as supplementary sessions, embedded within the contours of academic courses or programs. These sessions are typically introduced by the library in consultation with individual academic staff or in response to their specific requisites. Participation in these sessions is commonly stipulated as a mandatory component of the corresponding course or program.

- Extra-curricular approach: Information literacy is disseminated through library-driven initiatives existing beyond the boundaries of formal academic curricula. Attendance in these sessions remains discretionary, catering to students' voluntary engagement with the subject matter.

- Stand-alone approach: The stand-alone facet encompasses the delineation of information literacy as a distinct and autonomous curricular course, expressly devoted to the cultivation of information literacy proficiencies. This mode of instruction assumes two distinctive variants: firstly, as an elective course that may carry academic credit or non-credit status, and secondly, as a compulsory element integrated within the general education framework offered at the faculty or university level.

Higher education can promote information literacy skills in a variety of ways (Humbhi & Jabeen, 2019; Aharony et al., 2020), such as one-on-one instruction, group instruction courses/subjects in the library, lectures and demonstrations in subject classes, hands-on instruction in computer labs, self-paced library tours, group library tours, and credit courses for instruction. According to Munazza et al. (2016), face-to-face education combined with library orientations, tours, and face-to-face instruction is the most effective way to conduct information literacy instruction in China. Tuamsuk et al. (2023) argue that traditional assessment methods used to evaluate student learning, such as tests, oral examinations, and essay writing, limit students' knowledge and understanding. These methods restrict the development of learning capabilities, creativity, and critical thinking skills.

In conclusion, various teaching methods and activities can be employed to teach information literacy skills. Lectures and discussions serve as effective tools for introducing concepts and theories, while hands-on practice and online activities facilitate the development of practical skills. Employing a combination of these methods is crucial to accommodate different learning styles and provide students with a comprehensive education. Different curriculum models exist for integrating information literacy into higher education courses. Some universities adopt a standalone approach, where information literacy is taught as a separate course or workshop. Others embrace an embedded approach, incorporating information literacy skills into the curriculum of various disciplines. Each model has its advantages and disadvantages, and universities should select the approach that aligns best with their goals and available resources. Assessing students' information literacy skills is vital to ensure their growth and success in higher education and beyond. Universities employ diverse assessment methods, including exams, assignments, presentations, and projects. Rubrics are valuable tools for providing clear expectations and assessment criteria. By employing these assessment methods, universities can gauge students' progress in acquiring information literacy skills. To effectively teach information literacy in the 21st century, universities should consider a combination of teaching methods and activities, as well as employ a variety of assessment methods. Careful consideration should be given to selecting a curriculum model that aligns with institutional goals and resources. Additionally, ongoing support and training should be provided to faculty and staff to equip them with the necessary skills and knowledge for effective information literacy instruction.

2.4.3.5 Factors related to the development of information literacy skills

Due to the information technology's rapid growth, which has fundamentally changed how individuals’ access, find, and use information, information literacy skills are essential in the twenty-first century. In this section, researchers present what influences the growth of information literacy skills.

- Access to technology and the internet: The availability of technology and internet access plays a significant role in individuals' ability to efficiently search for and utilize information. While technology has increased the quantity and diversity of available data, it has also made evaluating the credibility and reliability of information more challenging.

- Education and training: Formal education, such as information literacy courses and workshops, plays a critical role in developing individuals' skills in finding and using information effectively.

- Socioeconomic status: Socioeconomic status can influence access to technology and education, potentially hindering the development of information literacy skills. Individuals from lower socioeconomic backgrounds may have limited exposure to information and may be less likely to engage with it critically.

- Personal motivation and self-leadership: Motivation and self-driven learning are crucial factors in developing information literacy skills. Individuals who actively seek out opportunities to learn and develop these skills are more likely to succeed.

- Curriculum and specialized programs: The curriculum and specialized programs offered at universities can impact the development of information literacy skills. Universities that place a high priority on research and critical thinking provide students with greater opportunity to acquire these skills.

- Resources and support: The availability of resources and support at universities, including libraries, academic support units, and online databases, can significantly influence the development of information literacy skills (Aharony et al., 2020)

- Faculty expertise and teaching practices: Faculty members who possess knowledge of research and information literacy and serve as role models in teaching contribute to the development of these skills. Student engagement with the content and opportunities to develop information literacy skills also play a vital role.

- Student's prior knowledge and experience: A student's prior knowledge and experience with information literacy skills affect their ability to develop these skills. Students with prior exposure to research and critical analysis may have an advantage, while those lacking experience may require additional support.

- Culture and institutional expectations: Universities with a culture that emphasizes research, critical thinking, and the development of information literacy skills are more likely to have students with strong information literacy skills.

- Promoting information literacy: Recognizing and addressing these factors is crucial to ensure equal access to tools and resources necessary for developing information literacy skills. Promoting critical thinking and responsible use of information is essential in navigating the vast amount of information available today.

- Impact of the COVID-19 pandemic on information literacy skills development: The COVID-19 pandemic has affected higher education, including the development of information literacy skills. Online education offers new opportunities, such as easy access to diverse information resources and collaborative learning. However, challenges such as limited resource access and technical difficulties may hinder skill development in some learners.

Using document research techniques and academic data sources, such as libraries and online databases, Bhornchareon et al. (2019) claim to have found factors impacting information literacy (IL) among undergraduate students in Thailand. They combined three important aspects through content analysis: individual traits, the learning environment, and self-directed learning. The following personal attributes were listed: gender, academic year, GPA, and subject of study. The learning environment included the use of the library, ICT resources, and faculty members. Self-monitoring, self-modification, and self-motivation were the hallmarks of self-directed learning.

In conclusion, the development of information literacy skills in the 21st century is influenced by factors such as access to technology, education and training, socioeconomic status, personal motivation, curriculum, resources and support, faculty expertise, students' prior knowledge, culture, and institutional expectations. Recognizing and addressing these factors is crucial for equal access and skill development. Universities should integrate information literacy into their curriculum, provide resources and support, engage faculty expertise, and promote critical thinking. Additionally, the COVID-19 pandemic has impacted information literacy skill development, presenting both opportunities and challenges in the online learning environment.

2.4.3.6 Challenges and difficulties in promoting information literacy skills in higher education

Promoting information literacy skills in higher education presents various challenges and difficulties that universities must address. These challenges can hinder the effective development of students' information literacy skills and require careful consideration and proactive measures. Here are some of the key challenges universities face in promoting information literacy:

- Limited access to resources and support: Ensuring equal access to resources and support is a significant challenge. Universities need to provide assistance to students who have limited access to technology or face other barriers to learning, enabling them to develop their information literacy skills effectively.

- Keeping up with evolving data landscape: The constant evolution of the data landscape introduces new technologies and data sources, making it challenging for universities to stay updated and ensure that their information literacy practices remain relevant and current.

- Lack of collaboration and communication: The development of information literacy abilities may be hampered by a lack of collaboration and communication among librarians, information workers, and faculty members. To effectively incorporate information literacy into their instruction, faculty members may need training and resources.

- Lack of standardization: The absence of a standard definition and framework for information literacy creates difficulties in developing effective initiatives and comparing their effectiveness. It also hampers the measurement of success and comparison of outcomes across institutions.

- Integration across disciplines: Ensuring that information literacy skills are integrated into courses and assignments across all disciplines can be challenging. Collaboration and shared understanding among faculty members and librarians are crucial. Different disciplines may prioritize different skills, making it essential to find a balance that addresses information literacy needs in each field.

- Balancing priorities: Universities need to strike a balance between promoting information literacy skills and other priorities, such as research and academic achievement. Integrating information literacy into all aspects of university life requires careful planning and collaboration to avoid neglecting these vital skills.

- Lack of a national information literacy (IL) policy to promote information literacy (Jabeen et al.,2016): Several countries in Asian have yet to identify comprehensive IL policies. This absence of a national IL policy poses challenges for the endorsement and advancement of IL programs in the region. It is crucial for Asian countries to recognize the importance of information literacy and develop national policies that prioritize IL education.

Universities may successfully include information literacy skills into the curriculum by working with faculty and stakeholders to address these issues. Faculty members can receive training on incorporating information literacy assignments and activities, and workshops can be offered alongside specific courses or programs. By addressing these challenges head-on, universities can ensure that information literacy skills are given the attention they deserve without compromising other important priorities.

2.4.3.7 Expectations of instructors in promoting information literacy skills in higher education

Promoting information literacy skills in higher education needs careful planning and collaboration amongst universities. The advancement of critical thinking and problem-solving skills, as well as academic performance, depend on placing a high priority on information literacy capabilities. With explicit expectations for fostering information literacy skills, instructors play a crucial role in this process. To promote information literacy in higher education, instructors are expected to:

- Incorporating information literacy instruction: It is required of instructors to incorporate information literacy lessons into their course material. This entails developing students' critical thinking and research abilities as well as teaching them how to locate, assess, and apply information efficiently.

- Modeling the research process: Instructors should serve as models by demonstrating the research process and critical thinking skills. By showcasing effective information-seeking behaviors and critical evaluation, they help students understand the importance of these skills in their academic and professional lives.

- Providing practice opportunities: The ability to exercise information literacy skills must be offered by instructors to their pupils. This can be achieved through research-based assignments, group projects, and interactive activities that require students to engage with information sources and apply critical thinking skills.

- Offering constructive feedback: Instructors are responsible for providing constructive feedback on students' information literacy skills. This feedback helps students understand their strengths and areas for improvement, enabling them to refine their research and information evaluation abilities over time.

- Collaborating with librarians: In order to include information literacy into the curriculum and give students access to pertinent resources, instructors should work with librarians. This collaboration may involve designing assignments that require the use of library resources, conducting library instruction sessions, or embedding librarians within courses to provide targeted support.

- Staying updated on trends and technologies: Instructors need to be aware of the changing landscape of data and technology and incorporate these developments into their teaching. This includes staying informed about new information resources, digital tools, and research methodologies relevant to information literacy.

In conclusion, instructors in higher education have important responsibilities in promoting information literacy skills. To incorporate information literacy instruction, model the research process, provide practice opportunities, offer constructive feedback, collaborate with librarians, and stay updated on trends and technologies. Instructors empower students to navigate information effectively, think critically, and make informed decisions. Through collaboration and support, instructors play a vital role in preparing students for academic and professional success.

2.5 Navigating scholarly terrain with bibliometric analysis

This section highlights the benefits of bibliometric analysis in the world of research. It draws on the metaphor of maps and navigation, suggesting that bibliometric analysis can help researchers navigate scholarly literature's complex and ever-changing landscape. Researchers can map out the scholarly terrain of their field of study, providing them with a bird's-eye view of the literature and allowing them to see the big views (Donthu et al., 2021). Researchers may also find gaps in the literature, uncover new trends and subjects, and track down influential people and organizations that are moving the area ahead with the use of bibliometric analysis. Moreover, researchers can save time and effort, avoid duplicating existing research, and ensure that their work is relevant and impactful.

Bibliometric analysis is a quantitative method for assessing academic publications in a given subject area or discipline. It entails using mathematical and statistical methods to analyze and describe publications, bibliographic databases, and citation networks. This method can identify patterns of publication, research trends, and the impact of authors or institutions on a field. Bibliometric analysis provides researchers and policymakers with insights into the structure and dynamics of research fields and helps to identify areas for future research. It can be used to evaluate the impact of research and to identify highly cited publications or researchers. The procedure entails gathering information from scholarly works and bibliographic databases and then evaluating it using bibliometric metrics including citation counts, h-indexes, and co-citation analyses.

The bibliometric analysis provides objective and quantitative data on research output and impact, making it a valuable tool for identifying emerging research areas, assessing productivity and impact, and informing strategic decisions about research funding and resource allocation. However, it is important to consider limitations such as disciplinary differences in citation practices and the potential for citation biases (Waltman & Van Eck, 2012). Despite these drawbacks, bibliometric analysis is becoming more and more common in academic research, especially in science and technology, and may offer insightful information about research trends and the influence of authors or institutions on a topic. (Rafols et al., 2012). It can also be used to evaluate the quality of scholarly publications based on citation metrics. The development of scientific databases as Scopus and Web of Science, however, has greatly aided in the collecting of substantial bibliometric data. Additionally, the accessibility and usefulness of the analysis of such data has been increased

by the development of user-friendly bibliometric tools, like Gephi, Leximancer, and VOSviewer, among others. As a result, bibliometric analysis has recently seen a considerable increase in scholarly attention. Researchers are increasingly recognizing the value and convenience of utilizing these tools to examine and interpret bibliometric data, leading to a growing trend in the application of bibliometric analysis in various fields of research (Donthu et al., 2021).

The fields of informatics, bibliometrics, scientometrics, cybermetrics, and webometrics all fall under the umbrella of library and information science (LIS). These terms were difficult to distinguish from one another even in the late 1980s. Pritchard (1969) defines bibliometric as “the application of mathematics and statistical methods to book and other media of communication”. According to Wormell (1998), terminology is in a state of chaos, and the term "informetrics" has gained acceptability. These terms, as mentioned above, are related, and overlapping branches of study, demonstrating that Bibliometrics, Scientometrics, Infometrics, Webometrics or Cybermetrics, and Altmetrics are fields that analyze literature and information using quantitative methods. They are often used interchangeably and have similar meanings. Figure 2 shows the relationship among many subfields and the size of the overlapping between these terms.

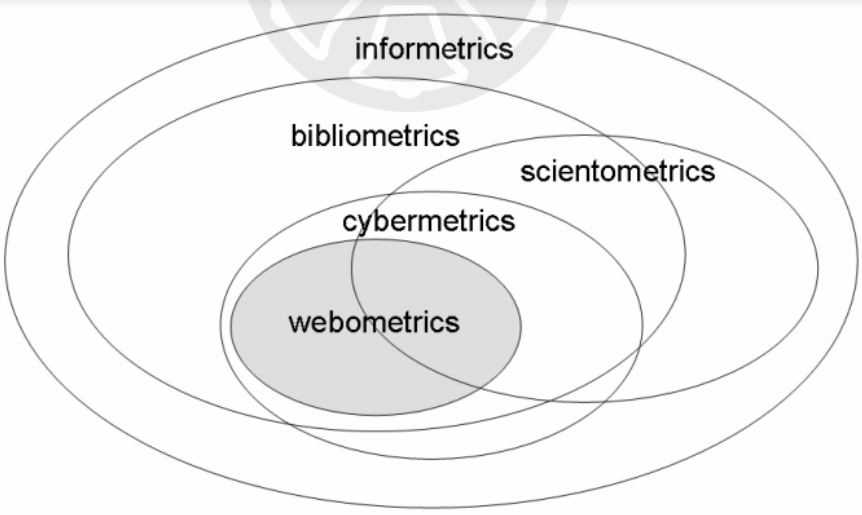


Figure 2. *The sizes of the overlapping between informetrics, bibliometrics, scientometrics, cybermetrics and webometrics (Björneborn & Ingwersen, 2004)*

2.5.1 Scope of bibliometric studies

The extensive body of knowledge we have today is primarily derived from research publications such as journal articles, conference proceedings, and books. According to

Ravichandra Rao (1983), bibliometric techniques are widely employed to identify trends in various subjects, including the identification of core journals and patterns of library use. These techniques are also utilized to develop models for the study of scientific communication. In bibliometric studies, authors and documents (journal articles, conference proceedings, and books) are considered the fundamental units of analysis. By analyzing aggregated data from these sources quantitatively and qualitatively, it becomes possible to detect trends and patterns in scientific communication. At the local level, these models are predominantly tested and applied to accomplish various objectives (Eom, 2009), including: 1) Assessing scientific productivity; 2) Analyzing publication growth trends; 3) Identifying core journals; 4) Filtering out irrelevant documents; and 5) Understanding patterns of library usage. Additionally, Bibliometric studies focus on two fundamental units: authors and documents, including journal articles, conference proceedings, and books. By analyzing aggregated periodical data through quantitative and qualitative methods, trends and patterns in scientific communication can be identified (Eom, 2009).

In the literature review, it can be observed that there are related terms such as Bibliometric analysis, meta-analysis, and systematic literature reviews. These three methods were analyzed and discussed in the research conducted by Donthu et al. (2021).

- Meta-analysis is a quantitative method that aims to estimate the overall strength and direction of effects in a particular field, while also explaining the variance observed across different studies. This approach involves a manual process carried out by scholars to analyze and synthesize existing literature. However, it is important to note that meta-analysis may be influenced by study heterogeneity and publication bias, and the literature considered in this method tends to be less diverse.

- Systematic literature reviews, on the other hand, employ systematic procedures to acquire, organize, and evaluate existing literature. Like meta-analysis, this review process is typically conducted manually by scholars. However, systematic literature reviews have a narrower focus and generally include a smaller number of papers. They are particularly suitable for examining specific research areas or niche topics. Unlike meta-analysis, systematic literature reviews often rely on qualitative techniques for data analysis.

- Bibliometric analysis summarize the bibliometric and intellectual structure of an area. It entails examining connections between diverse research elements, including authors,

nations, institutions, and themes. Like meta-analysis, bibliometric analysis employs quantitative techniques and is capable of handling large volumes of literature.

However, the application of the mentioned review methods in research depends on the objectives of the review and the size and nature of the literature being reviewed. Due to the complementary nature of these review methods, the choice of appropriate review method can be seen in Figure 3, which compares bibliometric analysis, meta-analysis, and systematic literature reviews in a systematic manner to assist authors in making informed decisions based on relevant decision-making data regarding the selection of appropriate review methods.

Review type	Goal	When to use	When not to use	Scope	Dataset	Analysis
Bibliometric analysis	• Summarizes large quantities of bibliometric data to present the state of the intellectual structure and emerging trends of a research topic or field.	• When the scope of review is broad. • When the dataset is too large for manual review.	• When the scope of review is specific. • When the dataset is small and manageable enough that its content can be manually reviewed.	• Broad	• Large	• Quantitative (evaluation and interpretation) • Qualitative (interpretation only)
Meta-analysis	• Summarizes the empirical evidence of relationship between variables while uncovering relationships not studied in existing studies.	• When the focus of review is to summarize results rather than to engage with content, which may be broad or specific. • When studies in the field are homogenous. • When the number of homogeneous studies available is sufficiently high. • When the number of homogeneous studies remaining after removing low quality studies is sufficiently high.	• When studies in the field are heterogeneous. • When the number of homogenous studies is relatively low. • When the number of high-quality homogeneous studies is relatively low.	• Broad • Specific	• Large • Small but adequate	• Quantitative (evaluation and interpretation)
Systematic literature review	• Summarizes and synthesizes the findings of existing literature on a research topic or field.	• When the scope of review is specific. • When the dataset is small and manageable enough that its content can be manually reviewed.	• When the scope of review is broad. • When the dataset is too large for manual review.	• Specific	• Small	• Qualitative (evaluation and interpretation)

Figure 3. *The comparison of three major review methods; bibliometric analysis, meta-analysis, and systematic literature reviews (Donthu et al., 2021)*

2.5.2 Bibliometric analysis techniques; Science mapping analysis

In bibliometric analysis, there are two main categories: performance analysis and science mapping (Cobo et al., 2011a; Donthu et al., 2021). Performance analysis focuses on examining the contributions of research constituents. It is descriptive in nature and is a common practice in bibliometric studies. It involves presenting the performance of different research constituents such as authors, institutions, countries, and journals in each field. This

provides background information and analytical insights like the profiles of participants in empirical research. While science mapping, a subfield of bibliometric analysis, is concerned with analyzing the connections between research components. It entails examining the logical relationships and interactions between these elements. Science mapping employs a number of methods, such as co-citation analysis, bibliographic coupling, co-word analysis, and co-authorship analysis. These methods enable the display of the bibliometric structure and intellectual structure of the study area when paired with network analysis. The various bibliometric analysis methodologies are summarized in Figure 4. Science mapping analysis was used in this study to explore the topic. As a result, the researchers would want to provide more details in this area.

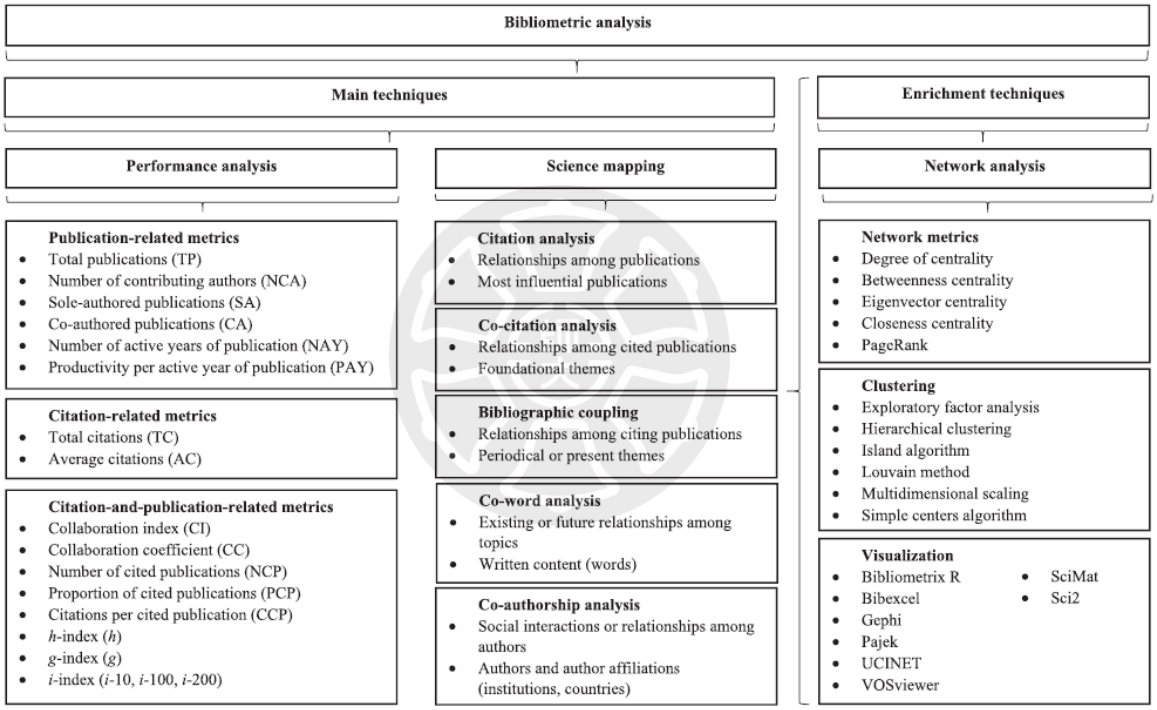


Figure 4. *The bibliometric analysis techniques (Donthu et al., 2021)*

The different types of analysis methods in bibliometrics provide insights into the relationships, impact, collaboration, and content within the field of research. Various techniques can be used in science mapping to analyze the intellectual landscape of a research field. Bibliometric analysis can be categorized into five methods (Donthu et al.,2021);

1) Citation analysis involves assessing the impact and influence of publications based on the number of citations they receive. It helps identify influential

publications and provides insights into the intellectual dynamics of a research field.

2) Co-citation analysis identifies thematic similarities between publications by examining their co-occurrence in the reference lists of other publications. This technique reveals the intellectual structure and underlying themes within a research field.

3) Bibliographic coupling focuses on publications that share common references. By clustering publications based on shared references, it uncovers thematic clusters and the latest developments in a research field.

4) Co-word analysis/ Co-occurrence analysis examines the content of publications by analyzing the frequency of words that appear together. It assumes that words that are often used together have a common theme. Co-word analysis provides more in-depth understanding of the substance of theme clusters than co-citation analysis or bibliographic coupling.

5) Co-authorship analysis explores collaborations among scholars in the research field. It examines relationships and interactions between researchers based on their co-authored publications. Co-authorship analysis helps identify collaboration patterns, highlight research clusters among scholars from specific regions, and track the trajectory of intellectual development over time.

These techniques offer valuable tools for researchers to understand the impact, thematic structure, content, and collaboration dynamics within a research field. They provide insights into influential publications, thematic clusters, emerging trends, and collaborative networks. Citation analysis, co-citation analysis, bibliographic coupling, co-word analysis, and co-authorship analysis complement each other and can be used together to gain a comprehensive understanding of the intellectual landscape of a research field.

The analyses of citations, co-citations, and co-words (co-occurrences) are the main points of this study. To understand the evolution of the fundamental themes in a research area, it is important to understand the linkages between cited articles and the publications they are related to. This analysis may be done by identifying the most productive publications in a field of study. Moreover, by concentrating on the publication's textual

content, one may investigate past, present, and future connections between various themes in the field of study.

2.5.3 VOSviewer; Science mapping analysis tools

A key bibliometrics research technique is science mapping, also known as bibliographic mapping (Pritchard, 1969). Finding the intellectual links within a scientific knowledge system that is always growing is the goal of bibliographic mapping (Small, 1999). When working with a huge amount of text data, researchers can save time and money by using bibliographic mapping tools. Researchers may effectively sift through the massive quantity of information by selecting the most pertinent articles and organizing them in accordance with predetermined criteria. There have been numerous developments in bibliographic mapping tools since the early 2000s. Examples of these tools include In-spire (Wise, 1999), Bibexcel (Persson et al., 2009), CiteSpace II (Chen, 2006; Chen, 2019), The Network Workbench Tool (Börner et al., 2010), VOSviewer (van Eck & Waltman, 2010, 2013, 2017), Biblioshiny (Aria & Cuccurullo, 2017), BiblioMaps (Grauwin & Jensen, 2011), CitNetExplorer (Garfield et al., 2003), SciMAT (Cobo et al., 2012), and Sci2Tool (Sci2 Team, 2009). These tools have contributed to the advancement of bibliographic mapping techniques and have provided researchers with valuable resources for analyzing and visualizing bibliographic data.

A software program called VOSviewer makes it possible to create maps from network data and makes it easier to see and explore those maps. While the main emphasis of VOSviewer is the study of bibliometric networks, it may also be used to construct, analyze, and explore maps based on many kinds of network data. Its main characteristics may be summed up as follows:

1) Network Data Mapping: VOSviewer enables the creation of maps using a variety of network data types, including scholarly articles, journals, researchers, research institutions, nations, keywords, or phrases. Co-authorship, co-occurrence, citation, bibliographic coupling, and co-citation are a few examples of relationships that may be used to connect the elements in these networks.

2) Map Visualization and Exploration: VOSviewer offers three visualization modes; network visualization, overlay visualization, and density visualization. Users can zoom in

and navigate the maps, enabling a detailed exploration of large-scale maps that encompass thousands of items.

Based on citation, co-citation, and co-occurrence data, a data visualization of the research papers included in Web of Science's SSCI (Social Sciences Citation Index) was produced for this study using VOSviewer version 1.6.18. A software program for creating and viewing bibliometric networks is called VOSviewer. According to Van Eck and Waltman (2010), bibliometric analysis frequently uses it and can be used to analyze bibliographic data from a variety of sources, including Web of Science, Scopus, and PubMed. VOSviewer provides a wide range of visualization options to identify patterns, trends, and relationships among authors, publications, and keywords in a research field. VOSviewer can also be used to perform clustering and network analysis, which allows for the identification of research areas and the mapping of intellectual structures in a field (Van Eck & Waltman, 2014).

In conclusion, bibliometric analysis has become a widely used method for evaluating scholarly research. It offers the advantage of quantitatively measuring the impact and influence of publications, identifying emerging research areas, and informing strategic decisions about research funding and resource allocation. However, bibliometric analysis is also limited to quantitative data, unable to provide insights into the quality or content of individual publications (Bornmann & Leydesdorff, 2014). Moreover, the use of citation-based indicators may favor certain disciplines or research areas, potentially leading to imbalances in funding and recognition. Despite these limitations, bibliometric analysis remains a valuable tool for understanding the structure and dynamics of scholarly research, and for informing policy and decision-making in academia and beyond.

2.6 Review of information literacy research publications in higher education

Recent years have seen a considerable increase in the amount of research on information literacy that addresses particular possibilities and difficulties. Program planning and assessment, information literacy's place in higher education, and the effects of technology are just a few of the subjects covered. This study offers insightful analysis and suggestions for improving information literacy instruction and practice in Asia. Depending on the study question and design, different research methodologies have different benefits

and weaknesses. The efficacy of information literacy teaching programs in higher education is one subject that has drawn attention recently. The effects of these programs on students' learning outcomes and information literacy abilities have been the subject of several studies.

Another issue that has been explored in research on information literacy in higher education is the impact of technology on information literacy. Many studies have examined the role of technology in information literacy instruction, particularly in the context of online learning. With the increasing use of technology in higher education, researchers have explored how technology can be used to support and enhance information literacy skills. In addition, there have been efforts to develop and evaluate information literacy programs in specific contexts, such as health information literacy, science information literacy, and business information literacy. These endeavors aim to enhance individuals' abilities to access, evaluate, and use information effectively and ethically within the respective fields.

There has been a growing interest in recent years in using biometric studies to research information literacy. Numerous bibliometric studies have been published, particularly in international journals and literature focusing on information literacy. The growing interest in using bibliometric studies to research information literacy stems from its ability to provide a systematic, quantitative, and comprehensive approach to understanding research trends, interdisciplinary connections, key contributors, and impact within the field. It offers valuable insights for researchers, practitioners, and policymakers to advance knowledge, collaboration, and evidence-based practice in information literacy. Each study has a specific research focus within the broader field of information literacy. These studies exhibit variations in aspects such as scope, specific objectives, time frames, and databases employed for article retrieval (Sacchanand, 2022).

For instance, the research by Aharony (2010) used the Web of Science database to perform a thorough analysis of articles pertaining to information literacy and emerging trends between 1999 and 2009. The primary conclusions of the study showed that information literacy had distinctive traits in an exciting setting: health and medicine. This finding highlights the significance of information literacy in this particular profession by pointing to a developing relationship between information literacy and the health and medical fields.

Pinto et al. (2013) investigate the impact of information literacy on global scientific production from 1974 to late 2011. With a focus on the social sciences (SoS) and health

sciences (HeS), they conducted a bibliometric study utilizing research papers from the Web of Science and Scopus databases. The study examined the output, distribution, and co-authorship of writers' publications, as well as their associations and most-read journals. Utilizing statistical, mathematical, and content analysis, the research used both quantitative and qualitative methodology.

In their study of information literacy theses and dissertations from Taiwan and the United States between 1988 and 2010, Hsieh et al. (2013) examined the features of each. The study focuses on a number of topics, such as the publishing universities, paper growth, author/advisor productivity, forms of literacy, and research methodologies. In order to determine trends in research between the two nations, a bibliometric study of 767 theses and dissertations in the topic of information literacy is carried out. The analysis comprises a sample of 265 overseas doctorate dissertations, mostly from North America, and 502 Taiwanese theses. Information literacy-related keyword searches were used to choose the dissertations. The results show that Taiwan has more theses and dissertations published on information literacy than the United States.

Research trends in information literacy were examined by Majid et al. (2015). They looked at 1989 documents published between 2003 and 2012 using the Scopus database. The study looked at the rise of information literacy literature, favored journals, famous writers, top nations, subject distribution, and language usage. Information literacy conference papers and publications have continuously risen over the past ten years. Numerous publications were produced by prolific authors including Badke, W. (15 publications), Pinto, M. (17 publications), and Julian, H. (18 publications).

Information literacy (IL) practices' adoption in Chinese university and research libraries was studied by Jabeen et al. in 2016. A questionnaire and professional interviews were used to gather data from 10 Beijing libraries. The results showed that, in terms of IL implementation, university libraries were in a better position than research libraries, but that there was still room for improvement. Both types of libraries frequently employed library orientations, basic information skills, and IL programs incorporated within topic units. In both university and research libraries, in-person instruction was the primary delivery option. Exercises were used the most frequently among the various evaluation techniques. While research libraries employed a mix of training activities and lesson plans, academic libraries preferred training activities for providing instructional IL content.

Kim & Lee (2017) conducted a study analyzing trends in information literacy (IL) studies in higher education. They selected 1,711 articles published between January 1988 and May 2017 for analysis, focusing on publication year, themes, published journals, and authorship. The number of articles on IL in higher education has steadily increased over time. Instruction and skill were prominent themes, with evolving terms related to courses, learning, programs, experiences, and needs.

While Kolle (2017) examined the information literacy (IL) literature that was published from 2005 to 2014. The study looked for patterns in IL articles in the Web of Science database. The results revealed a large rise in IL literature over the research period, with notable yearly increases in 2007, 2008, and 2011. The Journal of Academic Librarianship was the most active journal, and the most productive author was connected to the University of Granada in Spain. The majority of the material on IL came from the United States. The digital divide, media literacy, pedagogy, higher education, and critical thinking were among the major study subjects. The study sheds light on IL publication patterns, identifies successful writers, companies, and nations, and highlights well-liked IL keywords.

International students and information literacy were the subject of a comprehensive review of library and information science research by Houlihan et al. (2017) that covered the years 1990 through 2014. 23 publications, mostly from the USA, Australia, and Canada, were found in the review, comprising journal articles, conference papers, and book chapters. Surveys, interviews, and mixed-approaches studies were all used as study methods. "Library experience" and "information seeking" were the most popular study subjects. The resources available in and outside of libraries, library education, language barriers, and research challenges experienced by foreign students were emphasized as important results. recommendations centered on cross-campus cooperation, staff development, evaluation, cultural sensitivity, and library education.

Singh & Singh (2018) evaluated the topics of information literacy (IL) publications and the patterns of their co-occurrence. In order to examine IL research papers published between 2001 and 2016, the study used network visualization tools and data from the Scopus database. The findings showed that IL publications increased linearly during the course of the research period. With a research shortage found in immunology and microbiology, IL articles covered 26 of the 27 topic categories in the Scopus database. Social science has

become the primary field of study, with substantial contributions from computer science, the arts and humanities, engineering, and medicine.

Verma and Shukla (2019) examined the growth rate of the literature on information literacy from 2008 to 2017. According to the survey, 2016 had the most publications (1,234, or 12.99%). With 65 publications, Wolf, M.S., and Pinto, M., were the most active reserachers. The year 2010 had the most citations (14,298), followed by 2011 (13,594). The United States made the most publications (5,770), followed by the United Kingdom (1,028). The study finds that the United States and the United Kingdom significantly advanced the area of information literacy research and that it grew noticeably over the study period.

Singh and Yumnam's (2020) bibliometric analysis focuses on Information Literacy (IL) research that was carried out between 1989 and 2020. For data analysis and visualization, the researchers used the Web of Science (WoS) database, the Biblioshiny R-package, and VOSviewer. 35,558 references to a total of 1,764 publications from 357 sources were found. According to the survey, 2016 had the greatest increase in IL-related papers. M. Pinto provided the most papers, while the United States emerged as the most productive and highly referenced nation. The "Journal of Academic Librarianship" has the most articles among the top 20 scholarly publications. The terms "Information literacy," "media literacy," "internet literacy," and "electronic information resource literacy" were used in this analysis to find related literature.

Bapte (2020) provided a thorough bibliometric analysis with the goal of assessing the global research output on information literacy (IL) using information gathered from the SCOPUS database. There are a total of 7,070 records and 50,584 citations in the research, which spans the years 1975 to 2019. The survey highlights the best journals and books for IL research, with Communication in Computer and Information Science ranking first with 380 papers. The highest h-index, 32, and most citations (6.75%) are both held by The Journal of Academic Librarianship. Universidad de Granada's Pinto, M., who has 48 publications, is the most prolific author, while Lloyed, A., who has 1,062 citations and an h-index of 17, has the most citations overall. According to the survey, the Social Sciences, with an h-index of 170, offer the largest quantitative return in terms of IL research. "Article" is the most favored type of document. The study also shows that Purdue University (United States) and Queensland University of Technology (Australia) are the most notable institutions in terms of institutional production, with the United States accounting for 46.94% of the research

output. The analysis also highlights the prevalence of the term "information literacy" among the 22,353 keywords produced by the 7,070 documents. Since 2001, IL research has expanded, which suggests that it is becoming more important in many areas of human life, including higher education. The study offers insightful information on important source names, prolific writers, national contributions, and significant organizations that support IL research. Such a study is essential for analyzing and comprehending the most recent developments in IL research throughout the world.

Onyancha (2020) examined the evolution of information literacy from 1975 to 2018 cataloged within the Scopus database. The evolution engendered its evolution into a dynamic and interdisciplinary sphere, encompassing a diverse spectrum of 27 disciplines. This evolution further gave rise to new literacies, including digital literacy, media literacy, health literacy, business information literacy, and an array of other emergent facets. The study highlights the dynamic nature of information literacy, emphasizing the need for interdisciplinary and collaborative approaches to effectively deliver it in diverse and complex information and learning environments. The study analyzes the author-supplied keywords in information literacy literature for four time periods: 1975-1990, 1991-2000, 2001-2010, and 2011-2018. In the earlier periods, the focus was on computer education and literacy due to the emergence of new information technologies. The 1990s marked a growth phase, with a systemic and document-based focus on information literacy. The 2000s saw information literacy being integrated into various contexts, with a focus on academic institutions and distance education. From 2011 to 2018, information literacy expanded into diverse contexts such as high schools, teaching methods, research skills, and health information. The distribution of information literacy literature across subject areas indicates that it is multidisciplinary, with a prominent presence in social sciences and computer science. Other significant contributing disciplines include medicine, engineering, arts and humanities, mathematics, and business. The number of subject areas in which information literacy research took place increased over time, reflecting a growing interest in the field. The study emphasizes the need for interdisciplinary collaboration to effectively address information literacy in different subject areas.

The study of Karisiddappa et al. (2020) examined global publications on information literacy research, utilizing data from the Scopus database spanning the years 2000 to 2019. The most productive authors were M. Pinto and A. Lloyd, with A. Lloyd and R. Hobbs are the most cited authors in the field. The study found that information literacy research

extended to 118 countries. The United States led the ranking, followed by the United Kingdom, Australia, Spain, Canada, China, Germany, Brazil, India, and Turkey. Spain, China, India, Germany, Brazil, and Turkey experienced an increase in their global publication share, while the UK, Canada, Australia, and the USA saw a decrease. The study also analyzed collaborative links among the top 10 countries, with the USA registering the highest number of links. In terms of subject-wise distribution, social sciences emerged as the most important subject in global literacy research, followed by computer science, arts and humanities, and other contributing subjects. In addition, the study identified 45 important keywords that reflected the research trends in information literacy. The keyword "Information Literacy" had the highest number of hits in the Scopus database, followed by "Digital Literacy" and "Students," indicating the areas of focus within the field.

Haq et al. (2021) conducted a bibliometric analysis of scholarly literature on Information Literacy using the Web of Science database. The dataset was extracted on January 4, 2021, and included 4,943 items. The analysis focused on publications in the field of Information Science Library Science, resulting in a refined dataset of 2,945 items. The publication data, citations, and growth rate were analyzed by year, document types, top countries, institutions, and authors. A total of 2,251 records published from 1983 to 2020 were selected for further analysis, accumulating 22,107 citations with an average of 8.66 citations per document. The United States and the California State University System were identified as the most contributing country and institution, respectively. The Spanish author, Maria Pinto, emerged as the most prolific author. It should be noted that this study focused solely on the Web of Science database and did not include other databases for browsing the same terms.

Baber et al. (2022) conducted an analysis of the digital literacy literature using a bibliometric approach, encompassing works published between 2017 and 2021. The review encompassed a comprehensive review of 2,307 publications, scrutinizing various bibliometric indicators such as yearly publication, field category productivity, citation structure, most cited resources, documents, authors, and countries. The findings reveal a consistent and incremental rate of publication over time, with a discernible concentration of scholarly endeavors within the domains of education and library sciences. Notably, the United States emerges as a prominent leader in research output within this realm. Moreover, the emergent trends in digital literacy encompass multifarious themes, including but not limited to fake news, competencies, pedagogical technology, health literacy, self-efficacy,

and the reverberations of the COVID-19 pandemic. Information literacy emerges as the dominant keyword, followed sequentially by digital literacy and media literacy. Intriguingly, the analysis underscores the discernible interrelation between COVID-19 and themes like information literacy, higher education, social media, and fake news, underscoring the palpable influence of the pandemic on shaping the landscape of digital literacy research.

A study of Fu (2022) analyzed of information literacy education in universities using bibliometric methods. A sample of 1,296 papers from the Web of Science database was analyzed using CiteSpace, a visualization tool. The study aims to identify hotspots and trends in information literacy education and provide insights for future research. The results show an increasing trend in the number of papers from 2011 to 2021, with significant growth in 2015 and 2018. The research trends in recent years include media literacy, student ability cultivation, and the evolving keywords of university, higher education, digital literacy, and ICT. Some keywords have disappeared over time, indicating a shift in research focus. Additionally, the emergence of keywords related to COVID-2019 and graduate students suggests potential research directions in postgraduate information literacy education within the context of the pandemic. The research emphasizes the importance of information literacy education for different groups within universities, such as college students, graduate students, teachers, library staff, and adult education. It highlights the integration of information literacy into education and the significance of online education in enhancing students' information abilities. The discussion also addresses the shift towards media literacy and digital literacy, emphasizing their importance in higher education and professional development. It underscores the need to combine information literacy education with professional education and cultivate well-rounded individuals.

Ali et al. (2022) conducted a bibliometric analysis titled "Information literacy and research support services in academic libraries: A bibliometric analysis from 2001 to 2020." The study utilized the Web of Science (WoS) database and identified 4,079 published documents. The analysis revealed that the topic of 'information literacy and library' had the highest number of publications, with 2,168 articles. English was the predominant language among the published documents. The study identified the top author, organization, country, and funding agency in the field. The researchers concluded that bibliometric analysis provided valuable insights into research-on-research support services in academic libraries, and it helped identify variables used in such studies. The study emphasized the increasing importance of publishing metrics in hiring and promotion decisions and recommended

conducting further bibliometric studies using different databases. It also suggested exploring the relationship between students' academic performance and higher education-related topics.

Hicks et al. (2022) explored how the concept of information literacy was incorporated into non-Library and Information Science disciplines, focusing on five disciplinary landscapes: Higher Education, Management and Business, Public Health, Nursing, and Psychology. The study employed searches in key databases within each field and selected highly cited papers for qualitative mapping analysis. The analysis examined how information literacy was represented, terminology used, definitions provided, involvement of libraries and librarians, and connections with other concepts. The study found diverse approaches to defining and discussing information literacy in higher education, with varying levels of engagement with librarians. The findings highlighted the contexts of information literacy as an aspect of evidence-based practice in nursing and allied health professions and the use of Wikipedia as an information source. The study emphasized the importance of understanding how information literacy travels across disciplinary boundaries and contributed to the impact of information literacy activities in Library and Information Science.

Kulkarni et al. (2022) conducted an evaluation of the field of information literacy within the context of Library and Information Science (LIS) using bibliometrics and scientific visualization techniques. They retrieved 2,288 articles indexed under the topic of information literacy from the Web of Science database. The study aimed to reveal pioneers and interdisciplinary aspects of the field, as well as to assess the effectiveness of current campaigns. The evaluation encompassed publications, citation counts, their distribution to journals, documents, and countries. The findings contribute to understanding the complexity of information literacy and provide insights into the field's development and interdisciplinary nature.

Islam et al. (2022) conducted a study to examine the literature published on information literacy (IL) between 2017 and 2021 and identify important trends in IL publications. They utilized the Scopus database to analyze publishing trends by looking at the literature indexed during that period. The study found a significant increase in citations to IL-related literature in 2017, with prolific authors like Janes-Jang SM and sources like College and Research Libraries. The Journal of Academic Librarianship published the most

articles (97) during this period, and the United States was the leading contributor. Key research topics in the IL field included information literacy, academic libraries, library instruction, and assessment. The study provides a bibliometric analysis of publications on information literacy indexed in Scopus from 2017 to 2021, revealing an increasing trend in literature and highlighting influential authors, sources, and keywords.

The study by Kappi and Biradar (2022) examined the growth and characteristics of research publications on information literacy and higher education. From 1991 to 2020, a total of 9,400 publications were identified in the Web of Science database. The growth rate of publications was significant at 16.84% per year, with an average of 470 papers produced annually. The research output was published in over 1,256 journals, with a focus on educational research and Library and Information Science. Associated terms included health literacy, education, and higher education. Prominent academic contributors were based in Germany, USA, Australia, India, and Canada, with notable institutions such as the University of California and the University of London. Collaboration among G20 countries accounted for 90% of the research output. The study utilized scientometric visualization to analyze the influence and linkages of global research in this field.

From the literature review, a study by Yang et al. (2022) examined research on information literacy from national databases. The study presented a bibliometric analysis of 422 core journals on college students' information literacy published in China National Knowledge Infrastructure database from 2000 to 2021. The analysis explores the current research trends and future directions for information literacy among college students in China. The analysis utilizes visual software tools, CiteSpace and Vosviewer, to examine the co-occurrence of keywords and identify research hotspots. The research on college students' information literacy in China shows a generally increasing trend until 2006, with intermittent increases in 2010 and 2015. High-frequency keywords in this research topic include "university student," "information literacy," "information quality," and "higher education." The study concludes that research on college students' information literacy in China has been expanding and deepening, emphasizing library information science. However, further development of information literacy systems and the exploration of new instructional models are recommended to address the evolving information society.

Some studies focus on information literacy assessment in higher education. For example, a study by Pinto (2015) focuses on information literacy assessment in higher

education. The study conducted a bibliographic analysis of scientific literature on the subject from 2000 to 2011. It identified research topics through co-words analysis and found five main clusters: evaluation-education, assessment, student efficacy, learning-research, and library. The study revealed the growth of publications in this area over the analyzed period. It also examined collaboration among authors and identified the most productive journals. The study suggests two complementary future research topics: Students-Efficacy-Assessment and Evaluation-Education-Learning-Research-Library. Additionally, emerging fields of study such as authentic assessment and the influence of information and communication technology (ICT) were identified within the information literacy assessment field. The study provides insights into the current research landscape and trends in information literacy assessment in higher education.

Some are specific to a particular aspect of the study, for example based on the researcher. For instance, Pinto et al. (2015) focuses on making a current diagnosis of the scientific production of Ibero-American researchers on information literacy and information competences between 1985-2013. The study employs bibliometric analysis and information visualization techniques to examine the literature output on information literacy. The analyzed literature includes articles from sources such as Web of Science, Scopus, Library and Information Science Abstracts, and Library, Information Science and Technology Abstracts. The visualization map generated by VOSviewer highlights the centrality of "Information literacy" strongly related to "Information Science," while terms like "Digital literacy" and "School library" appear at the edge of the map, indicating their lack of strong relationships with other terms. Descriptors such as "Education," "Knowledge management," "Universities & colleges," and "University libraries" show close links to the main IL theme.

Sheikh et al. (2023) conducted a bibliometric analysis on COVID-19-related literature in Library and Information Science (LIS) journals. The analysis revealed a significant increase in LIS publications on COVID-19 in 2020. The study identifies five major research themes and eleven sub-themes. Under the theme "Libraries and education," the sub-theme "Information Literacy" encompasses key terms such as information literacy, information behavior, instructional design, learning strategies, information sources, e-resources, information dissemination, online instruction, students, and teachers. The author's keyword analysis reveals prominent keywords such as COVID-19, coronavirus, pandemic, social media, online learning, fake news, academic libraries, higher education, information literacy, and knowledge management.

Information literacy research in higher education has not been extensively studied using other research techniques, such as content analysis. For instance, Chen et al. (2021) performed a bibliometric study to look at research trends on information literacy in higher education from 2011 to 2020. The top 100 most-cited papers were chosen for content analysis after data from the WOS SSCI database were evaluated. The results emphasized the most popular search terms, including "information literacy," "college students," "higher education," and "academic libraries." Media literacy and digital literacy were also frequently emphasized. According to the study, undergraduate and graduate students served as the primary research subjects, and a quantitative research methodology was mostly applied. Language, mixed domains, and library and information science were the top research areas.

Chen et al. (2022) undertook research trends and potential research themes within the domain of information literacy in higher education. Employing a systematic review coupled with bibliometric analysis, the authors meticulously scrutinized the 100 most frequently cited articles on information literacy in higher education published between 2011 and 2020. This study provides significance for practical applications and policy considerations. It underscores the necessity of comprehending the challenges posed by emerging digital technologies. The study also discusses the participants, research methods, information literacy standards, and research topics covered in the selected articles.

Research by Tu et al. (2023) on SSCI papers from 2011 to 2020 was examined in an ILHE research project. The study contrasted ILHE studies conducted in Asian and non-Asian nations, demonstrating variations in the topics and phrases employed. The majority of research employed sizable sample sizes and was mostly focused on college students. The quantitative approach was frequently used to investigate the emotive and cognitive components of learning success. Except for the ACRL Framework for nations outside of Asia, there were no reference standards for course design. A lot of research has been done on the emotional dimension, which includes attitudes and motivation. Future studies might examine cognition-related issues as well as less-discussed subjects like posterior cognition and threshold ideas.

In summary, information literacy research above that have mentioned share some similarities and differences. Their provide a valuable resource for researchers, educators, and librarians. They can help us to understand the field of information literacy, its trends, and its importance. The studies all use bibliometric methods to analyze the literature on information

literacy. This is a valuable approach because it allows us to track trends in research and identify the most influential authors and publications. The studies all found that the field of information literacy is growing rapidly. This is a positive development because it shows that the importance of information literacy is being recognized. The studies all identified the United States as the leading contributor to the field of information literacy. This is not surprising given the size and resources of the American library and information science community. However, there is limited bibliometric research on information literacy in Asian. The researcher believes that an in-depth study using a specific group will produce in-depth research results, and that additional research methods will improve the quality of the work. This qualitative study aims to explore trends and insights of information literacy education in higher education across Asian countries using three methods: bibliometric, content analysis, and interview methods.

2.7 Summary

In summary, the 21st century demands a new set of learning competencies that go beyond traditional academic knowledge and skills. These competencies include critical thinking, creativity, collaboration, communication, and digital literacy, which are necessary for success in the workforce and life. Information literacy education plays a crucial role in developing these competencies, and there is a growing need for it in higher education globally and in Asian countries specifically. Learning competencies in the 21st century have become a critical topic for higher education institutions around the world. With the rise of technology and the rapid pace of change in various industries, students require a new set of competencies to succeed in the workforce. Information literacy is one such competency that has gained significant attention in recent years, especially in the context of higher education.

In the 21st century, higher education institutions are facing challenges to prepare their students for the rapidly changing world. To address these challenges, learning competencies such as critical thinking, problem-solving, and information literacy are increasingly emphasized in higher education curricula. Information literacy education has become a global concern, and many countries, particularly in Asian, have implemented policies and initiatives to improve information literacy education in higher education. The current situation of information literacy education in global and Asian countries has been a topic of research in various studies. While there is a growing awareness of the importance of information literacy, many institutions still struggle with integrating it effectively into their

curricula. Studies have highlighted various factors that contribute to this, such as a lack of faculty buy-in and insufficient resources.

Bibliometric analysis of information literacy research has been conducted to provide insights into the trends and patterns of research in this area. Studies have analyzed publication output, author productivity, and citation impact of information literacy research in different countries and regions. These analyses have revealed the growth of information literacy research, especially in Asian countries. The review of information literacy research publications in higher education with bibliometric analysis, content analysis, and interviews has been conducted to gain a comprehensive understanding of the research landscape in this field. Studies have used various methodologies to analyze the content of research publications and the perceptions of faculty and students toward information literacy education. To understand the state of information literacy education, various research methods have been employed, including bibliometric analysis, content analysis, and interviews. The bibliometric analysis allows researchers to quantify and analyze the output and impact of information literacy research publications. Content analysis, on the other hand, examines the content and themes of information literacy research publications to identify trends, gaps, and areas for future research. Interviews with stakeholders, such as faculty members and librarians, provide valuable insights into their perceptions and experiences of information literacy education.

Overall, these studies have provided valuable insights into the current state of information literacy education in higher education and the challenges that institutions face in integrating it into their curricula. They have also highlighted the importance of continuous research and evaluation to improve the effectiveness of information literacy education in preparing students for the 21st-century workforce. However, there is still a need for more research to address the gaps and limitations identified in these studies, as well as to explore the effectiveness of different information literacy education approaches and interventions.

Chapter 3. Research Design

Research publications on information literacy from the past decade are crucial for providing an overview of the field and identifying areas for future research. However, there has been limited research conducted on information literacy in higher education in Asian countries. This research aims to explore trends and insights of information literacy education in higher education across Asian countries using three methods: bibliometric, content analysis, and interview methods. This study has three main objectives: to identify trends including the direction of research publications related to information literacy in higher education across Asian countries, to investigate characteristics and distribution of research publications related to information literacy in higher education across Asian countries, and to examine the situation of information literacy instruction in higher education across Asian countries. This study conducted bibliometric and content analysis on research publications related to information literacy in higher education, which were indexed in the WoS database from 2000 to 2022. The study also interviews LIS educators to the education situation of information literacy instruction in higher education in some Asian countries, Taiwan and Thailand as case study.

3.1 Research methodology

3.1.1 Research conceptual framework

In this study, bibliometric analysis and content analysis were conducted based on the theoretical model and coding approach outlined in previous works, including Chen et al. (2021), Lai (2020), and Tu and Hwang (2020). The research conceptual framework of this study is shown in Figure 5.

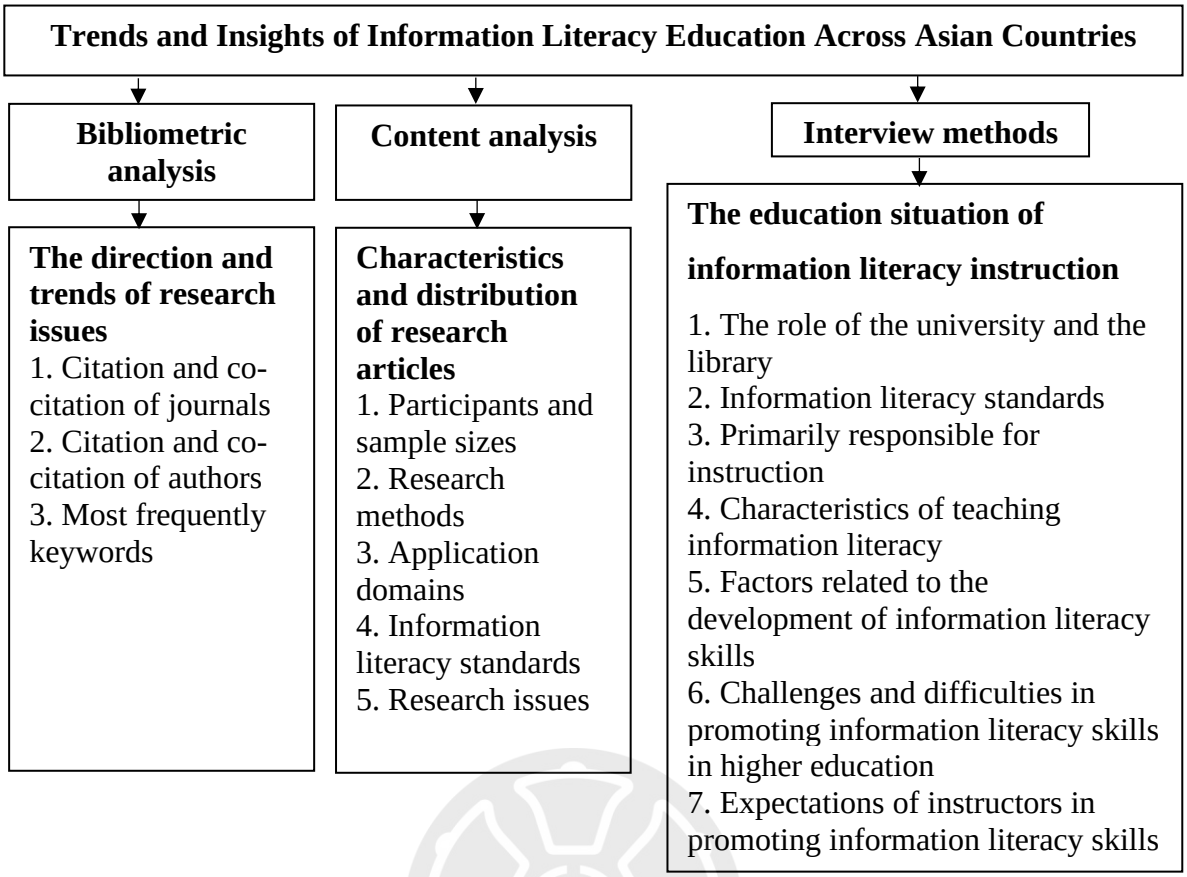


Figure *5. Research conceptual framework of this study*

3.1.2 Research method

3.1.2.1 Bibliometric analysis

In this study, the researcher created a data visualization of ILHE research using VOSviewer software (version 1.6.18) to identify and understand trends including the direction of research themes related to information literacy in higher education across Asian countries with citation, co-citation, and co-occurrence analysis. It provides a wide range of visualization options to identify patterns, trends, and relationships among authors, publications, and keywords in a research field. Additionally, it can also be used to perform clustering and network analysis, which allows for the identification of research areas and the mapping of intellectual structures in a field (Van Eck & Waltman, 2014).

The main data source for this phase of the research was scholarly publications related to ILHE research in Asian countries. These publications were selected based on inclusion and exclusion criteria and searched within the WoS database from 2000 to 2022. The research selection process involved two researchers who examined the titles, abstracts,

and full-text articles of relevant studies. The researchers followed predefined inclusion criteria to select the studies for this review. The research tools used in this phase include coding records. The data were collected through a systematic review of relevant journal articles. The researchers recorded and synthesized topics of interest in the articles.

For data visualization, the full data was downloaded in a .txt file from the WoS database. The data were then analyzed and presented using VOSviewer software. VOSviewer is a software program that can be used to present data in graphical formats such as mind maps or mapping charts. The software was also used to visualize the author's keywords in the articles. The study further analyzed the citation and co-citation of the journal and author, and frequent keywords in the articles.

3.1.2.2 Content analysis

The researcher adopted a systematic review of the theoretical model and coding approaches used in the literature by Chen et al. (2021), Tu and Hwang (2020), and Lai (2020). The dimensional analysis consisted of five dimensions: participants and sample sizes, research methods, research domains, information literacy standards, and education objectives. To gain a deeper understanding, content analysis was used to examine the characteristics and distribution of information literacy research in higher education in Asian countries. The collected data were analyzed using qualitative methods, including content analysis, synthesis, grouping, and summarization.

Overall, content analysis is a rigorous and time-consuming process that requires careful planning, attention to detail, and a clear understanding of the research question and objectives. It is a valuable research method that can provide insights into complex research questions and help to guide future research in the field. The coding record form was developed based on coding schemes from literature reviews related to systematic reviews and the information obtained from the study, as shown in Table 1.

Table 1

Coding scheme for studies on information literacy in higher education

Dimensions	Coding Items
Participants	Undergraduate students, graduate students, teachers, librarians, others, mixed, and no participants.
Sample sizes	small (<30), medium (30-150), large (>150), and unspecified.
Research methods	Quantitative methods, qualitative methods, and mixed methods.
Research domains	Science (Physics, Chemistry, Biology), Arts, Language, Social studies (including History), Engineering (including Computer courses), Health, Medical, and Physical education, Business and Management, Library and Information science, mixed disciplines, and unspecified.
Information literacy standards	Information Literacy Competency Standards for Higher Education, Framework for Information Literacy for Higher Education, courses with other reference standards, mixed, and no reference standards.
Education objectives	Cognition (including learning achievement, higher-order thinking skills, and collaboration or communication), affection (including technology acceptance, attitudes or effort, self-efficacy or beliefs, satisfaction or interest, and learners' opinions or learning experiences), learning (skill) performance, learning behavior, correlation or causal analysis, information literacy assessment, and others.

Table 1 presents the coding scheme used in this study. Two researchers independently coded all the articles for content analysis and categorized them according to the scheme. The remaining inconsistent coding results were reviewed and discussed between the two coders to resolve any discrepancies. A systematic review method was used to identify papers based on pre-specified eligibility criteria. The intercoder reliability was found to be 86%, indicating a high level of consistency between the coders. In this study, descriptive statistics were used to analyze the findings, while content analysis was used to examine the distribution of information literacy research and presented in graph and table formats. The findings were also classified according to subtypes in different contexts and analyzed in depth for information and presentation.

3.1.2.3 Interview method

In this study, semi-structured interviews were conducted with key informants using purposive sampling to investigate the education situation of information literacy instruction in higher education in selected Asian countries, Taiwan and Thailand as case study which both are Asian country that have diverse educational systems and cultural contexts and technological landscapes. The aim was to gain a deeper understanding of the perspectives of faculty on information literacy instruction in higher education across Asian countries, with a focus on seven dimensions: the role of the university and the library, information literacy standards, responsibility for instruction, characteristics of teaching IL, factors related to the development of IL skills, challenges and difficulties, and expectations of instructors in promoting IL skills in higher education. Table 2 shows the interviewee's profiles in terms of their position, and institutions, all of which offer LIS programs. The researchers agreed that information literacy skills are essential to the library and information science disciplines, and therefore, the best informants would be instructors from the LIS program (Tuamsuk, 2013; Polkinghorne et al., 2018; Latham et al., 2019). A comparison of the interview method with bibliometric and content analysis was also made. Each interview lasted approximately 30-50 minutes. The research tools used in this phase included an interview form, which was improved based on expert recommendations. The questionnaire includes seven dimensions and ten questions, as shown in Appendixes 1.

Table 2

Interviewee profiles

Position	Institution	ID
Associate Professor	Faculty of Arts, Chulalongkorn University, Thailand	A
Lecturer	Faculty of Arts, Chulalongkorn University, Thailand	B
Professor	Faculty of Humanities and Social Sciences, Khon Kaen University, Thailand	C
Assistant Professor	Faculty of Humanities and Social Sciences, Khon Kaen University, Thailand	D
Associate Professor	Faculty of Informatics, Mahasarakham University, Thailand	E
Associate Professor	Department of Library and Information Science, National Taiwan University, Taiwan	F
Professor	Graduate Institute of Library and Information Studies, National Taiwan Normal University, Taiwan	G
Associate Professor	Graduate Institute of Library and Information Science, National Chung-Hsing University, Taiwan	H
Professor	Graduate Institude of Library, Information and Archival Studies, National Chengchi University, Taiwan	I

3.1.3 Data searching and collection

According to Pinto et al. (2020) and Chen et al. (2021), the researcher searched for research articles in the Web of Science's SSCI database on Two day, November 27, 2021, and January 1, 2023, to avoid any daily updating bias that could arise from the ongoing data collection in the database. The search was performed using a combination of two keyword lists: "information literacy" and "higher education," forming the initial search string used to locate relevant topics in all fields. The search was limited to all SSCI articles published from 2000 to 2022 that related to ILHE researech, as presented in Table 3.

Table 3

Initial search string

Keywords	Search terms	References
Information literacy	"information literac*" OR “information skill*" OR “library literac*" OR "media literac*" OR "digital literac*" OR “technology literac*" OR “ICT literac*" OR “IT literac*" OR “transliterac*" OR "internet literac*" OR “media and information literac*" OR “metaliterac*" OR “traditional literac*" OR “computer literac*" OR “network literac*" OR "new literac*" OR "multiliterac*"	McClure (1994), Cope and Kalantzis, (2009), Pinto et al. (2013), Pinto (2014), Mackey & Jacobson, (2014), Majid et al. (2015), Bhardwaj (2017), Weightman et al. (2017), Kolle (2017), Phillips et al. (2018), Singh & Singh (2018), Cope & Kalantzis, (2020), Pinto et al. (2020), Morris (2020), Martínez-Bravo et al. (2020), Chen et al. (2021), Chen et al. (2022), Sacchanand (2022).
Higher education	"university" OR "college" OR "higher education" OR "graduate" OR "undergraduate" OR "postgraduate"	Pinto (2015), Weightman et al. (2017), Morris (2020), Pinto et al. (2020), Chen et al. (2021), Chen et al. (2022)

A total of 2,075 articles were initially identified in fields related to ILHE studies. After excluding 1,816 articles which non-article types (non-English articles, editorial material, proceedings papers, review articles, early access, and book reviews), 259 articles were manually reviewed based on their content. Articles that were not related to ILHE, duplicates, and non-English articles were excluded. Additionally, articles that were not related to countries in Asian were excluded. After reviewing the full text of the articles, 109 articles that were not related to ILHE were excluded. Finally, 150 articles are reserved at this stage for bibliometric analysis and content analysis.

To gain insight into the current state of information literacy studies in Asian countries, and to compare the results of bibliometric analysis and content analysis, the researchers used the first author's affiliation as a measure to determine the country of origin at the time of

publication. This approach was based on previous review studies (Hwang & Tsai, 2001), which indicated that the first author typically plays the primary role in research collaborations, a well-accepted practice in scientific publications. The publication was labeled as research literature from Asian countries if the first author was a citizen of an Eastern or Southeastern Asian nation. If not, it was categorized as research literature from non-Asian nations. This technique was utilized to correctly pinpoint the research's place of origin and offer insights into the variations in information literacy research across Eastern and Southeastern Asian nations.

In order to facilitate a comparative analysis delineating shifts in information literacy education preceding and subsequent to the dissemination of the ACRL framework, the pivotal juncture of 2016 was adopted as the principal demarcation point. The ACRL standard were initially approved in 2000, and the period between 2000 and 2007 was considered the first stage. The second stage comprised the period between 2008 and 2015, following the implementation of these standards in teaching and learning in higher education. The third stage was from 2016 to 2022, following the release of the ACRL Framework in 2016. These stages were used to compare the keywords and other dimensions in information literacy education.

In this study, the researcher referred to the study of Chen et al. (2021), Cheng et al. (2020), and Lai (2020), in conjunction with the stipulated criteria delineated within Table 4, with the intent of substantiating the reliability and validity of the results. The researcher manually reviewed and selected evidence-based research, which resulted in 150 articles for Asian countries. The selected papers from Asian countries were subjected to bibliometric and content analysis. The manual screening process involved a careful reading of each title, abstract, and full paper to determine whether to include or exclude the articles. Relevant literature was identified through a systematic review, and careful reading and synthesis of the information literacy research in higher education were conducted to provide key findings that addressed the research questions.

Table 4

Inclusion and exclusion criteria

Inclusion	Exclusion
- Must involve information literacy in higher education as a primary research topic. - Must have been published in English. - Must have been published between 2000 and 2022. - Must be a publicly available or archived periodical article.	- Not involving information literacy in higher education as a primary research topic. - Being an editorial material, proceedings paper, review article, early access, book review

Two researchers coded the papers using the coding scheme. They sorted the papers into several categories. The article selection process for the bibliometric and content analyses followed a systematic review approach that employed pre-specified eligibility criteria, as shown in Figure 6. By using an explicit and systematic review, the researchers were able to reduce bias. The systematic review and analysis of this study were based on the principles and guidelines outlined in previous studies, such as Hsu et al. (2012), Tu and Hwang (2020), Hwang and Tu (2021), and Xia and Zhong (2018).

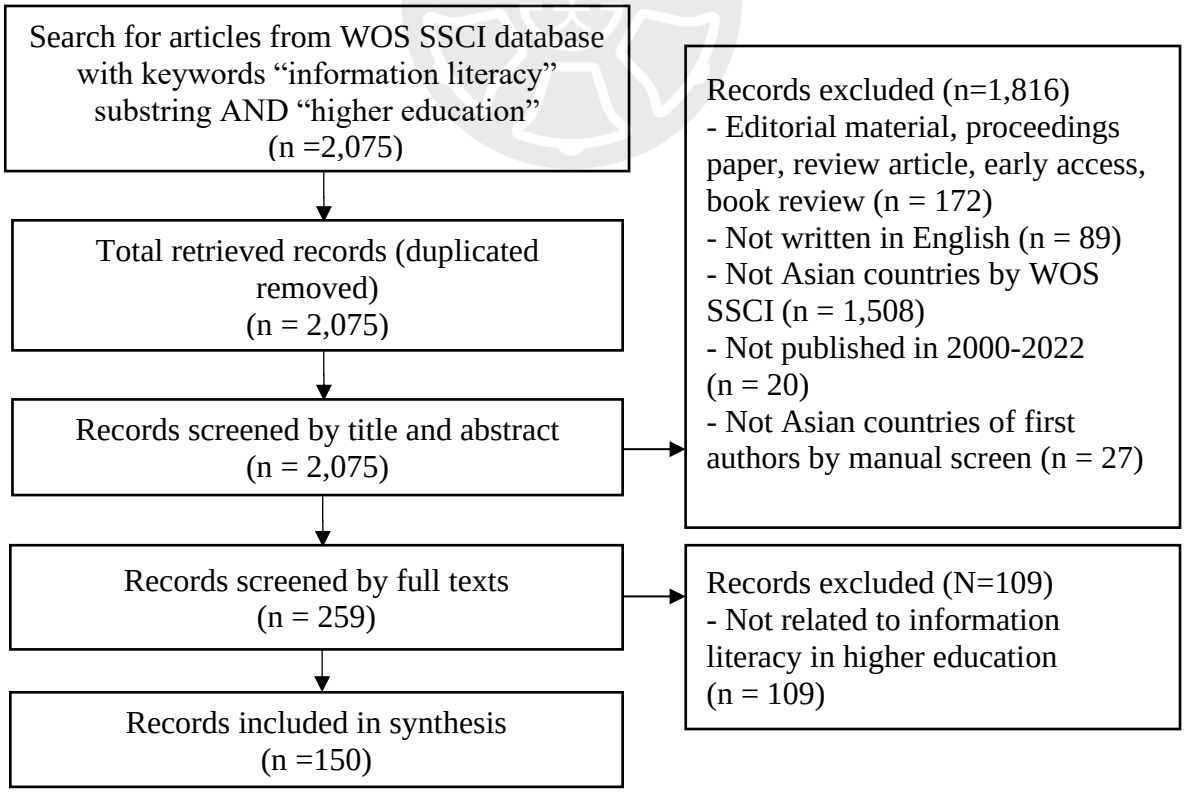


Figure 6. *Process and methods of data searching and collection*

3.1.4 Data distribution

The distribution of ILHE studies in Asian countries from January 2000 to December 2022 is presented. This study follows the approach of Tu and Hwang (2020) and Zheng et al. (2016) by examining ILHE studies in three stages: 2000 to 2007 (2 articles), 2008 to 2015 (35 articles), and 2016 to 2022 (113 articles). The results illustrate the continuous growth of ILHE research, with a growing number of literature reviews available on the topic.

3.2 Research procedures

The detailed procedures of this study is shown in Figure 7.

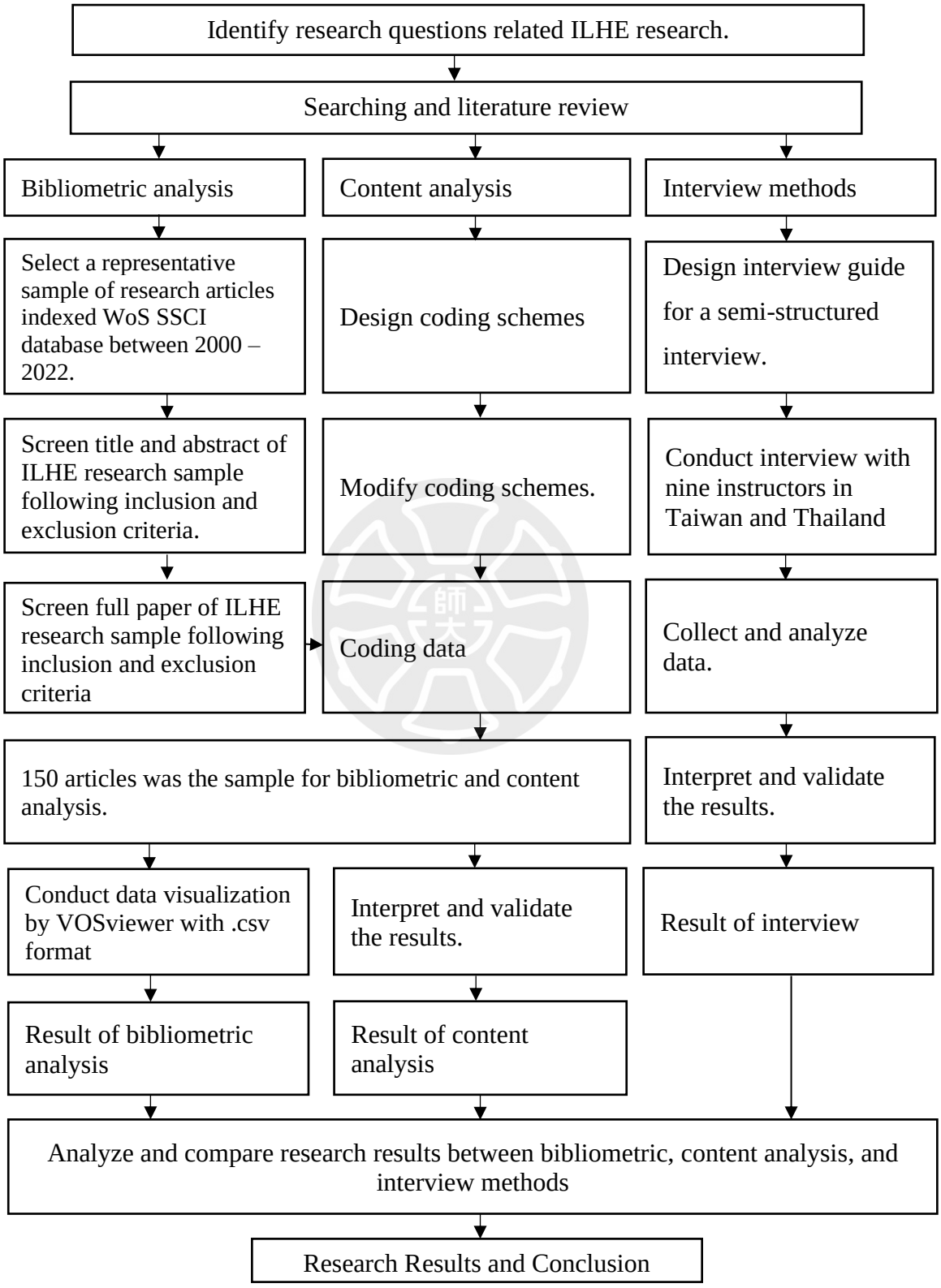


Figure 7. *Process and methods of data collection and analysis of this study*

In this study, the process of conducting the research is outlined in Figure 5, which includes several steps. The first step involves identifying research questions related to ILHE. A comprehensive literature review is conducted, focusing on ILHE research. A representative sample of research articles from the WoS SSCI database between 2000 and 2022 is selected using appropriate search terms related to "information literacy" and "higher education." The titles and abstracts of the selected ILHE research articles are screened following predefined inclusion and exclusion criteria. Subsequently, the full papers of the identified ILHE research sample are screened using the same criteria for content analysis. The bibliometric analysis is performed using VOSviewer software with the data in .csv format, resulting in visualizations and insights.

For content analysis, coding schemes are designed based on the relevant literature review and modified as necessary. The data is then coded, and a total of 150 articles are selected as the sample for bibliometric and content analysis. The results were coded follow coding schemes. Additionally, semi-structured interviews are conducted to gain a deeper understanding of ILHE in Asian countries. A questionnaire is designed for the interviews based on the literature review, and nine instructors from Taiwan and Thailand are interviewed. The collected data from the interviews is analyzed, interpreted, and validated. After obtaining the research results from bibliometric analysis, content analysis, and interviews, the researcher proceeds to analyze and compare the findings. This comparative analysis allows for a comprehensive understanding of ILHE. Finally, the research concludes with the presentation of the research results and a summary of the findings.

3.3 Limitations of the study

This study employs analysis, content analysis, and interview methods to explore the trends including the direction, characteristics and distribution of research, and the situation of information literacy research and instruction in higher education in Asian countries, as indexed in the Web of Science's SSCI databases from 2000-2022. It is worth noting that this research primarily focuses on English language research articles, which may pose limitations in terms of granularity derived from the systematic review. Nonetheless, the researcher has strived to analyze the data according to the pre-specified eligibility criteria. Further, to gain an in-depth understanding, the researcher conducted semi-structured interviews with key informants who are instructors in LIS programs in Taiwan and Thailand. Additionally, time

is an essential consideration when designing a sample or data source. Retrieving and accessing information from a source takes time to collect, verify, and interpret the data.

3.4 Validity and reliability

Validity and reliability are essential aspects of research that ensure the accuracy and consistency of the findings. This is true for all types of research, including bibliometric, content analysis, and interviews method. Determining the sample size for bibliometric and content analysis studies can be challenging. It depends on several factors, such as the research objectives, research questions, study design, and available resources. However, previous studies have suggested that a sample size of at least 50-100 papers can be sufficient for bibliometric analysis (Glänzel, 2003; Lee & Bozeman, 2005; Cobo et al., 2011b; Borgman et al., 2018; Zhang et al., 2019; Chen et al., 2019), while a sample size of at least 30-50 papers can be sufficient for content analysis (Krippendorff, 2004; Krippendorff, 2013; Neuendorf, 2016). While there is no set number of articles that are universally accepted as sufficient for bibliometric and content analysis, a sample size of at least 50 articles for bibliometric analysis and a sample size of at least 30 documents for content analysis is generally recommended. In this study, the SSCI index of the Web of Science was utilized. Search terms and date ranges were clearly defined to ensure the validity of the bibliometric and content analyses. It is crucial to use reliable data sources and establish clear inclusion and exclusion criteria to ensure validity.

For content analysis, a clear and consistent coding scheme based on established theoretical frameworks was employed. Two researchers conducted the coding process by reading and classifying the papers as systematic reviews according to the coding scheme. The intercoder reliability was found to be 86%, indicating a high level of consistency between the coders. The remaining inconsistency in the coding results was examined, and any inconsistencies were addressed between the two coders until an agreement was reached. By using this strategy, the data analysis and coding processes are more accurately guaranteed to be reliable and accurate. Interviews are a qualitative research method used to gather data about key informants' experiences, opinions, and beliefs. Well-designed questions that encourage detailed and informative responses are essential for ensuring data validity. Additionally, to ensure reliability, interviews can be conducted in various languages, and transcripts can be checked for accuracy and consistency.

Chapter 4. Findings

To address research questions related to information literacy research and instruction in higher education in Asian, this study utilized bibliometric, content analysis, and interview methods to explore three main aspects: trend including the direction, characteristics and distribution of research publications related to ILHE across Asian countries, and the situation of information literacy instruction in higher education. The research findings are presented in three sections. The first section showcases trend including the direction of research publications in ILHE in Asian, based on an analysis of research publications indexed in the Web of Science SSCI database. The second section presents the results of the content analysis, which explored characteristics and distribution of research themes related to ILHE across Asian countries. Finally, the last section describes the results of the interviews conducted to investigate the situation of information literacy instruction in higher education in Asian countries.

4.1 Bibliometric analysis trends including the direction of information literacy research publications in higher education in Asian countries

A literature search identified 2,075 relevant research studies from the Web of Science SSCI database. After removing duplicate studies, research studies were reviewed based on their titles and abstracts. Of these, 259 studies met the inclusion criteria. After a full-text review, only 150 studies were included in the final analysis. The criteria values for each analysis as presented in Table 5 were designed by the researchers.

Table 5

Criteria for each analysis in VOSviewer

Analyses	**Unit of Analysis**	**Threshold**	**Selected Terms**
Citation	Sources	Minimum number of documents of a source = 1	72
	Authors	Minimum number of authors = 1	406
Co-citation	Cited sources	Minimum number of documents of a cited source = 1	870
	Cited authors	Minimum number of documents of a cited authors = 2	892
Co-occurrence	Author Keywords	Minimum number of documents of keyword = 1 (2000-2007)	4
		Minimum number of documents of keyword = 2 (2008-2015)	122
		Minimum number of documents of keyword = 3 (2016-2022)	407
		Minimum number of documents of keyword = 3 (2000-2022)	506

4.1.1 Citation analysis and co-citation of journals

The 150 articles came from 72 different journals to create a map for the citation of journals, sources were selected. The minimum number of documents of a source was adjusted as 1. The number of sources to be selected was automatically stated as 72. The largest set of connected items consists of 22 items connected. It shows that the most cited journals are Computer assisted language learning (citations = 235, documents = 5), followed by Computers & education (citations = 173, documents = 6), and Journal of academic librarianship (citations = 168, documents = 10) as shown in Table 6.

In addition, co-citation analysis and cited sources were selected. The minimum number of citations of a source was set at 2 and the number of sources to be selected was automatically stated to be 870. Figure 10 shows the resulting map. It shows that Journal of computer education (Citations = 251), Computer human behavior (Citations =163), and Journal of academic librarianship (Citations = 80) were the most co-cited journals in this field of this study.

Table 6

Most productive journals in ILHE research of Asian countries indexed in the Web of Science's SSCI databases from 2000 – 2022

Rank	Source	Documents	Citations
1	Computer assisted language learning	5	235
2	Computers & Education	6	173
3	Journal of academic librarianship	10	168
4	Education and information technologies	3	139
5	TESOL quarterly	2	124
6	Frontiers in psychology	12	118
6	Internet and higher education	3	114
7	Social Science computer review	1	100
8	Language learning & technology	3	80
9	Malaysian journal of library & information science	8	61
10	Sustainability	9	55

Figure 8. *Journals with citation analysis*

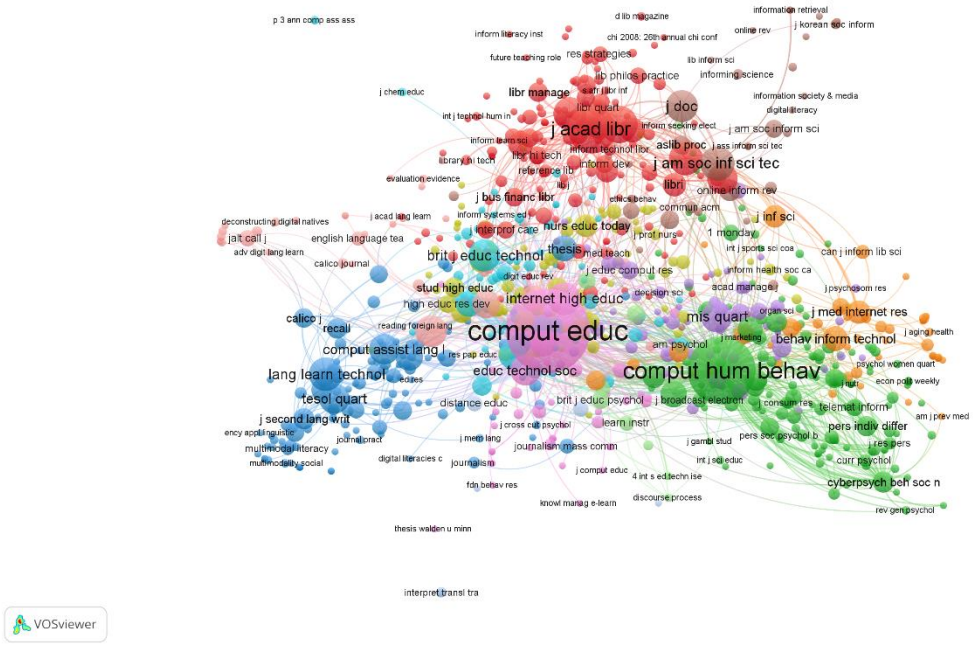


Figure 9. *Journals with co-citation analysis*

4.1.2 Citation analysis and co-citation of authors

To create a map for the most cited authors, citation analysis and authors were selected. The minimum number of documents of a source was adjusted as 1. The number of authors to be selected was automatically stated as 406. The largest set of connected items consists of 43 items. The map created shows that Lai, Chun was the most cited author (Citations = 284, Documents = 2) as shown in Table 3, followed by Gu, Ming-Yue (Citations = 154, Documents = 1), and Sin, Sei-Ching Joanna (Citations = 149, Documents = 3) as show in Table 7. A study by Lai, C., & Gu, M. published in 2011 under the title “Self-regulated out-of-class language learning with technology” is the most cited with 154 citations as shown in Table 8.

For co-citation analysis, the minimum number of citations of a source was set at 2 and the number of sources to be selected was automatically stated as 892. The largest set of connected items consists of 891 items. It shows that the most co-cited authors are Tsai, MJ, and Bandura, A. with co-citation analysis (Citations=22) in this field. follow by Hafner, Christoph A. (Citations =17), and Prensky, M. (Citations = 15). Figure 10 and Figure 11 show the resulting map.

Table 7

Most productive authors published highly cited ILHE research of Asian countries indexed in the Web of Science's SSCI databases from 2000 – 2022

Rank	Authors	Publications, n	Citations, n
1	Lai, Chun	2	284
2	Gu, Ming-Yue	1	154
3	Sin, Sei-Ching Joanna	3	149
4	Lei, Jing	1	130
4	Wang, Qiu	1	130
5	Hafner, Christoph A.	1	118
6	Theng, Yin-Leng	3	113
7	Gao, Lori Xingzhen	1	106
7	Zhang, Lawrance Jun	1	106
8	Chen, Xinren	1	101
8	Lee, Chei-Sian	1	101
9	Lee, Paul S. N.	1	100
9	Leung, Louis	1	100
10	Adarkwah, Michael Agyemang	1	93

Table *8*

Top five most authors and articles published with high citations

Rank	Authors and articles	Total of citations
1	Lai, C., & Gu, M. (2011). Self-regulated out-of-class language learning with technology. Computer Assisted Language Learning, 24(4), 317–335. doi:10.1080/09588221.2011.568417	154
2	Lai, C., Wang, Q., & Lei, J. (2012). What factors predict undergraduate students' use of technology for learning? A case from Hong Kong. Computers & Education, 59(2), 579–586. doi:10.1016/j.compedu.2012.03.006	130
3	Hafner, C. A. (2014). Embedding Digital Literacies in English Language Teaching: Students' Digital Video Projects as Multimodal Ensembles. TESOL Quarterly, 48(4), 655–685. doi:10.1002/tesq.138	118
4	Gao, L. X., & Zhang, L. J. (2020). Teacher Learning in Difficult Times: Examining Foreign Language Teachers' Cognitions About Online Teaching to Tide Over COVID-19. Frontiers in Psychology, 11, 549653. doi:10.3389/fpsyg.2020.549653	106
5	Chen, X., Sin, S. C. J., Theng, Y. L., & Lee, C. S. (2015). Why Students Share Misinformation on Social Media: Motivation, Gender, and Study-level Differences. The Journal of Academic Librarianship, 41(5), 583–592. doi:10.1016/j.acalib.2015.07.003	101

Figure 10. *Authors with citation analysis*

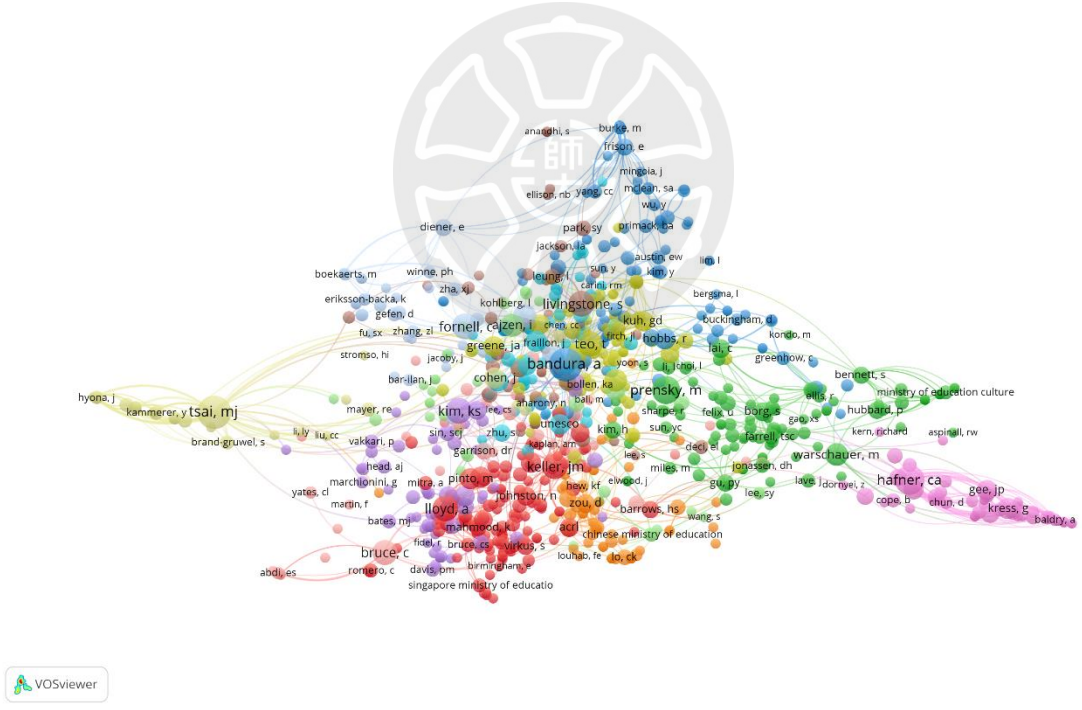


Figure 11. *Authors with co-citation analysis*

4.1.3 The frequently used keywords in information literacy research

In order to construct a textual representation depicting the frequently used keywords, a co-occurrence analysis technique was employed, utilizing author-designated keywords. The minimum number of occurrences of a keyword was set as 3 and the number of keywords to be selected was automatically given as 23. The encompassed domain of ILHE studies spanning the period from 2000 to 2022 encompasses a corpus of 506 keywords. The map created is illustrated in Figure 12. Table 9 shows frequently used keywords in ILHE research by year. The frequently used keywords for ILHE studies in Asian countries by authors are information literacy (f=35), digital literacy (f=11), higher education (f=6), undergraduate student (f=6), academic libraries (f=6), and college students (f=6). This aligns with the research conducted by Baber et al. (2022), where the term "information literacy" is frequently used in research studies. In the study undertaken by Tu et al. (2023), a discerning observation emerged regarding the prevailing terminological choices within the ambit of researching information literacy within higher education across diverse Asian countries. Notably recurrent keywords encompassed e-health literacy, digital literacy, lifelong learning, quantitative analysis, critical thinking, flipped classroom, higher education, medical students, and library instructions.

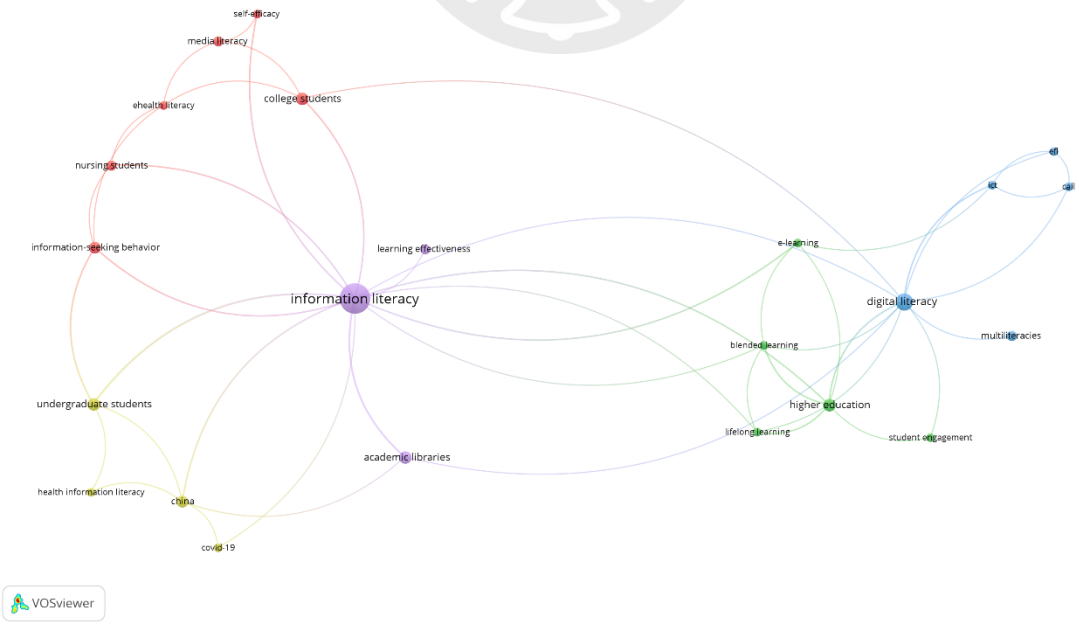


Figure 12. *Most frequently used keywords in ILHE research of Asian countries from 2000 to 2022 by authors*

Table 9

Frequency of keywords in ILHE research by year

Keyword	**Frequency, n**			
	2000-2007	**2008-2015**	**2016-2022**	**Total**
Information literacy*	1	9	25	35
Digital literacy*	-	1	10	11
Higher education*	-	1	5	6
Undergraduate students*	-	1	5	6
Academic libraries	-	2	4	6
College students*	-	2	4	6
China	-	2	3	5
Information seeking behavior	-	1	4	5
CALL	-	2	3	5
EFL	-	1	3	4
Media literacy*	-	-	4	4
Nursing students	-	2	2	4
Learning effectiveness	-	-	4	4
Multiliteracies*	-	2	2	4
Blended learning	-	1	3	4
Lifelong learning	-	1	3	4
ICT literacy	-	2	2	4
Computer literacy*	-	2	2	4
e-learning	-	2	1	3
ICT	-	-	3	3
e-health literacy	-	-	3	3
Self-efficacy	-	-	3	3
COVID-19	-	-	3	3
Health information literacy	-	-	3	3
Student engagement	-	-	3	3
citation analysis	1	-	2	3
final year project reports	1	-	-	1
performance indicators	1	-	-	1

Note. Only keywords used > 3 times are included. *Initial search terms in this study

In 2000-2007, the map created is illustrated in Figure 13. The frequently used keywords for ILHE studies in Asian countries are citation analysis (f=1), final year project reports (f=1), information literacy (f=1), and performance indicators (f=1).

In 2008-2015, the map created is illustrated in Figure 14. The frequently used keywords for ILHE studies in Asian countries are information literacy (f=9), followed by academic libraries (f=2), college students (f=2), China (f=2), CALL (f=2), nursing students (f=2), multiliteracies (f=2). ICT literacy (f=2), computer literacy (f=2), and e-learning (f=2).

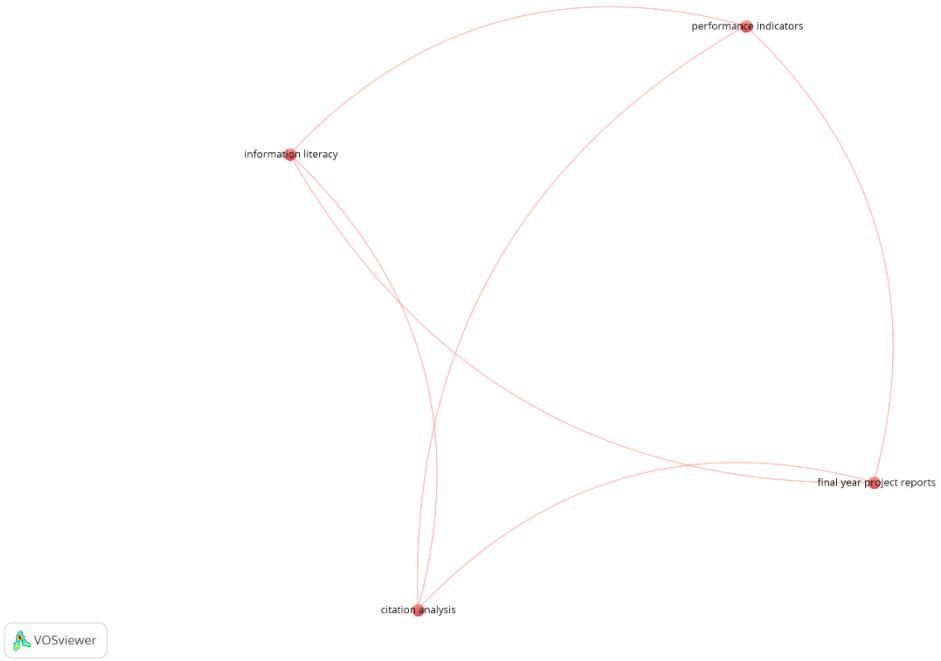


Figure 13. *Most frequently used keywords in ILHE research of Asian countries from 2000-2007 by authors*

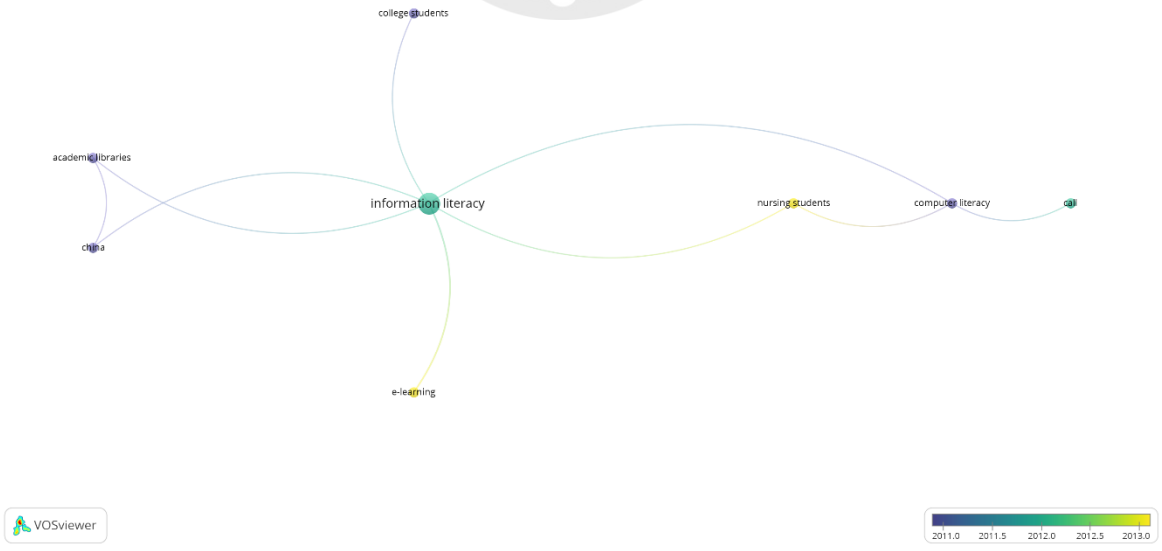


Figure 14. *Most frequently used keywords in ILHE research of Asian countries from 2008-2015 by authors*

In 2016-2022, the map created is illustrated in Figure 15. The frequently used keywords for ILHE studies in Asian countries are information literacy (f=25), followed by digital literacy (f=10), higher education (f=5), undergraduate student (f=5), academic libraries (f=4), college students (f=4), information seeking behavior (f=4), media literacy (f=4), and learning effectiveness (f=4).

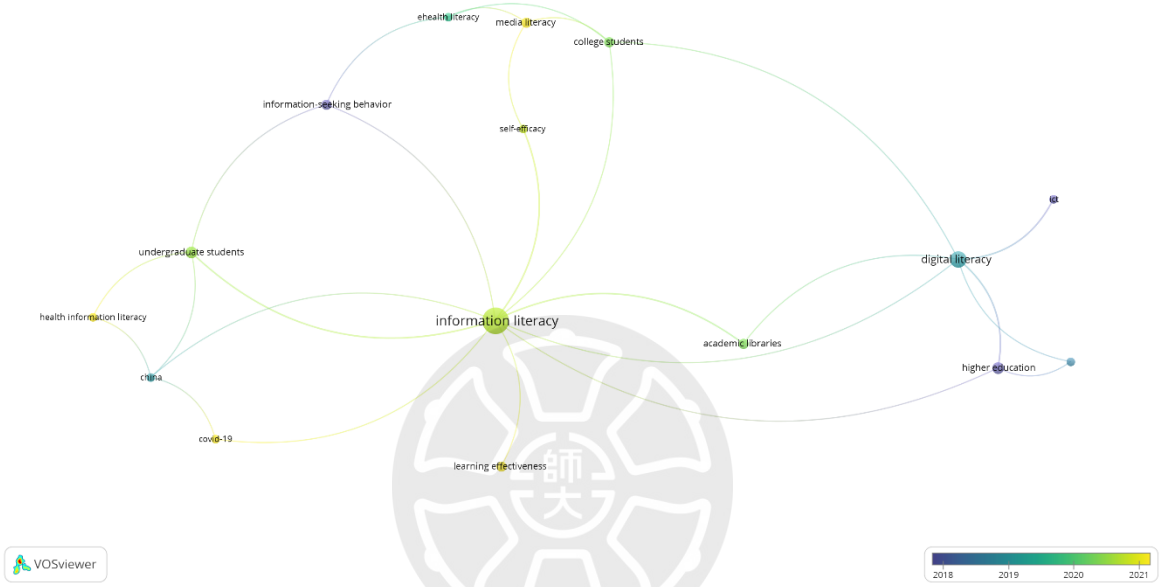


Figure 15. *Most frequently used keywords in ILHE research of Asian countries from 2016-2022 by authors*

Based on bibliometric mapping analysis using VOSviewer program, the keywords were divided into five groups, which are presented by different colors as shown in Figure 16. Each group represents the words and periods that appear in each research period with different colors. The study identified five topic clusters of scholarly discussion in information literacy research in higher education in Asian countries between 2000-2022 as shown in Figure 16. These clusters highlight the prominent themes and areas of interest within information literacy research in higher education, providing insights into the specific keywords and their relationships within the research landscape. They reflect the diverse range of concerns and challenges associated with information literacy development and practice in educational settings.

These groupings are visually presented through five colors: red, green, blue, yellow, and purple. The clusters of maximal magnitude are shaded in deep dark red for the most

extensive assembly, green for the second most substantial, dark blue for the third largest, yellow for the fourth largest, and purple for the fifth largest cluster. The chromatic allocation of each concept was predicated upon its alignment with a particular cluster. Furthermore, the dimensions of both the label and the circular representation of a given concept were contingent upon the weight it held within the network visualization. Notably, a higher weight corresponded to larger label and circle proportions. Additionally, the interconnections between concepts were depicted by lines, while the proximity between concepts conveyed the degree of interrelatedness in terms of co-occurrence. A closer spatial alignment between two concepts signified a heightened level of interconnectedness.

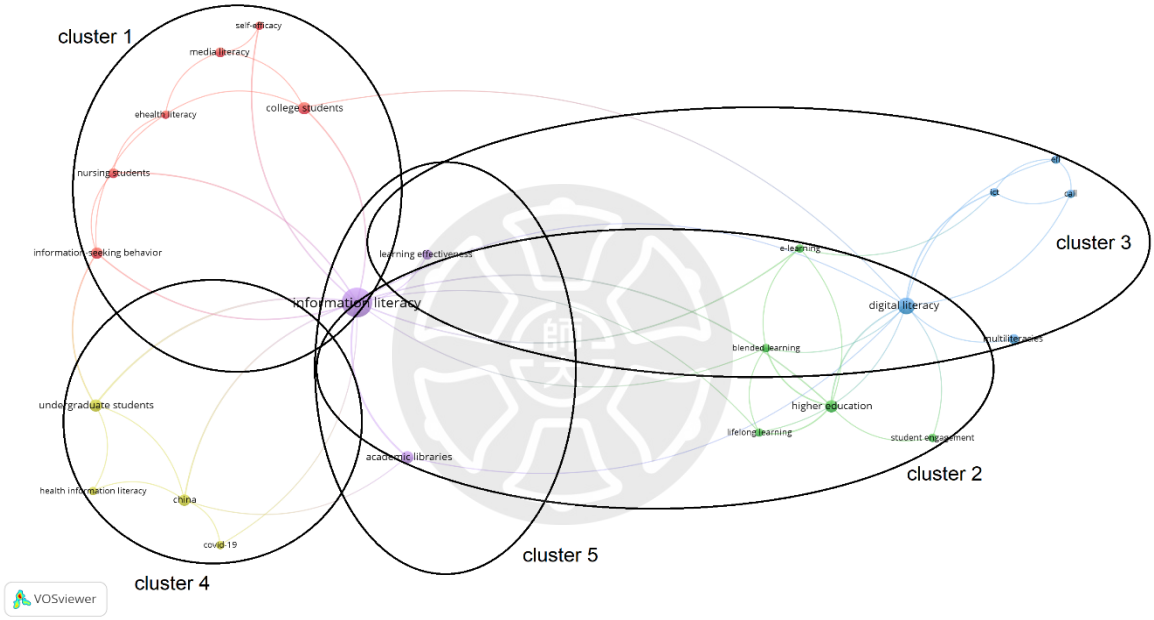


Figure 16. *Mapping of keywords used in ILHE research of Asian countries from 2000 to 2022*

From 2000 – 2022, the primary keyword was information literacy; during the 2016-2020 period, digital literacy, higher education, and undergraduate students appeared more often than in the previous seven years. There is also a significant correlation between the keywords in each cluster as shown in Table 10.

Table 10

Descriptors grouped into five clusters

Clusters	**Keywords**
Cluster 1 Red color	college students, e-health literacy, information-seeking behavior, media literacy, nursing students, and self-efficacy
Cluster 2 Green color	blended learning, e-learning, higher education, lifelong learning, and student engagement.
Cluster 3 Blue color	CALL (Computer-Assisted Language Learning), digital literacy, EFL (English as a Foreign Language), ICT (Information and Communication Technology), and multiliteracies.
Cluster 4 Yellow color	China, COVID-19, health information literacy, and undergraduate students
Cluster 5 Purple color	academic libraries, information literacy, and learning effectiveness.

Cluster 1 Red color consists of six keywords: college students, e-health literacy, information-seeking behavior, media literacy, nursing students, and self-efficacy. The issues related to this cluster include understanding the information literacy needs and challenges faced by college students, exploring e-health literacy and its impact on accessing and evaluating health-related information, examining information-seeking behavior and strategies among students, investigating media literacy skills in the context of information literacy, exploring the specific information literacy requirements of nursing students, and understanding the role of self-efficacy in information literacy development For example, Zhong et al. (2018) investigated the association between nursing students' information-seeking behavior and their inventive conduct.

Cluster 2 Green color comprises five keywords: blended learning, e-learning, higher education, lifelong learning, and student engagement. The issues related to this cluster focus on the integration of information literacy in blended and e-learning environments, exploring the significance of information literacy in higher education curricula and programs, understanding information literacy as a lifelong learning skill, and investigating how information literacy enhances student engagement in the learning process. For example, Kim et al. (2018) investigated the role of prior digital experiences on college students' family ties, perceived digital competence and attitude, and learning agility in long-term student involvement in higher education. Hong and Kim (2020) investigated the development and validation of a survey that assesses undergraduate students' digital preparedness for

academic engagement in terms of their perceived digital skills for academic work at a Korean institution.

Cluster 3 Blue color includes five keywords: CALL (Computer-Assisted Language Learning), digital literacy, EFL (English as a Foreign Language), ICT (Information and Communication Technology), and multiliteracies. The issues related to this cluster involve exploring the use of technology, such as CALL and ICT, to enhance information literacy skills, investigating the development of digital literacy competencies and their relationship with information literacy, examining the specific information literacy needs and challenges in English as a Foreign Language (EFL) contexts, and exploring the concept of multiliteracies within information literacy research. For example, Atoy et al. (2020) investigated the influence of mindfulness in regulating digital literacy and online information searching techniques in a sample of university students in the Philippines.

Cluster 4 Yellow color consists of four keywords: China, COVID-19, health information literacy, and undergraduate students. The issues related to this cluster include understanding the information literacy landscape in China and its unique challenges and opportunities, examining the impact of the COVID-19 pandemic on information literacy practices in higher education, exploring health information literacy and its relevance for undergraduate students, and investigating the role of information literacy in supporting the academic success of undergraduate students. For example, Zhang et al. (2021) investigated college students' online health information and skills in Guangdong, China. This study demonstrates that Chinese college students rely heavily on online health information-seeking activities to manage their own and others' health, despite a lack of knowledge/skills to distinguish between misinformation and disinformation.

Cluster 5 Purple color includes three keywords: academic libraries, information literacy, and learning effectiveness. The issues related to this cluster involve exploring the role of academic libraries in promoting information literacy skills among higher education students, understanding the conceptual foundations and frameworks of information literacy, and investigating the relationship between information literacy and learning effectiveness in higher education settings. For example, Zhu et al. (2021) conducted an inquiry encompassing 1843 university students, wherein they examined the nexus between information literacy and social media competence (SMC) to equip university students with the requisites to emerge as information-literate citizens proficient in navigating social media landscapes.

4.2 Characteristics and distribution of research themes related to information literacy in higher education across Asian countries

Literature can be effectively categorized into three distinct periods for a better understanding of the developmental trajectory in this field.

Period 1 2000-2007 was marked by the announcement and approval of the Information Literacy Competency Standards for Higher Education in 2000.

Period 2 2008-2015) saw the practical implementation of these competency standards in teaching and learning practices within higher education institutions.

Period 3 2016-2022 followed the introduction of the Framework for Information Literacy for Higher Education by the ACRL Board of Directors in 2016, alongside the continued utilization of the original standard - Information Literacy Competency Standards for Higher Education.

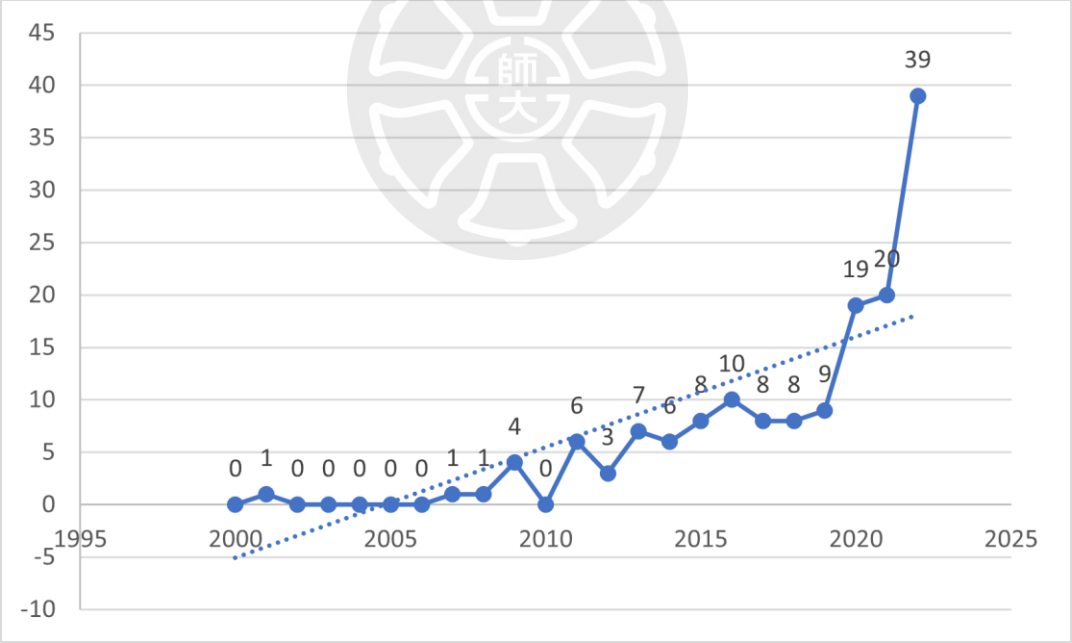


Figure 17. *Evolution of ILHE research in 2000 – 2022*

The analysis of published papers on information literacy in higher education across Asian countries from 2000 to 2022 reveals a comprehensive collection of 150 articles. These articles were distributed across different time periods, with 2 articles published during the period of 2000-2007, 35 articles published from 2008-2015, and a significant increase to

113 articles from 2016 to 2022, as depicted in Figure 17. It's possible that the research received more attention after the announcement of the Framework for Information Literacy for Higher Education of ACRL was published in 2016. Figure 17 and Table 11 clearly show a sharp increase in research activity up until 2000, followed by a constant increase up to 2022.

Table 11

Publications in information literacy in higher education in 2000 – 2022

Year	Number of publications (%)	Year	Number of publications (%)	Year	Number of publications (%)
2000	0	2008	1 (0.67)	2016	10 (6.67)
2001	1 (0.67)	2009	4 (2.67)	2017	8 (5.33)
2002	0	2010	0	2018	8 (5.33)
2003	0	2011	6 (4)	2019	9 (6)
2004	0	2012	3 (2)	2020	19 (12.67)
2005	0	2013	7 (4.67)	2021	20 (13.33)
2006	0	2014	6 (4)	2022	39 (26)
2007	1 (0.67)	2015	8 (5.33)		

These findings reflect the sustained growth and unwavering research interest in the domain of information literacy within higher education. They underscore the commitment of scholars and researchers to advancing this field of study. Notably, the top five countries contributing to the body of information literacy research in higher education across Asian countries are as follows: People's Republic of China with 73 publications, followed by Taiwan (n=26), South Korea (n=17), Malaysia (n=12), and Japan (n=9), as presented in Table 12. According to this remark, scholars are paying close attention to information literacy in higher education and increasing it (Chen et al., 2022). Furthermore, the research by Tu et al. (2023) revealed a significant increase in highly cited literature in the Asian region during the years 2020-2021. Additionally, it was found that there was a notable increase in the number of publications from Asian surpassing non-Asian countries.

During the period from 2000 to 2022, the top five journals in which information literacy research was published are as follows: Frontiers in Psychology (n=12), Journal of Academic Librarianship (n=10), Sustainability (n=9), Malaysian Journal of Library & Information Science (n=8), and Computers & Education (n=6).In the earlier period from 2000 to 2007, the prominent journals for ILHE in Asian countries were predominantly Innovations in Education and Training International and Malaysian Journal of Library &

Information Science (n=1). Moving to the period of 2008-2015, the main journal was Malaysian Journal of Library & Information Science (n=4). In the more recent period from 2016 to 2022, the primary journal was Frontiers in Psychology (n=12), followed by Sustainability (n=9) and Journal of Academic Librarianship (n=8).

Table 12

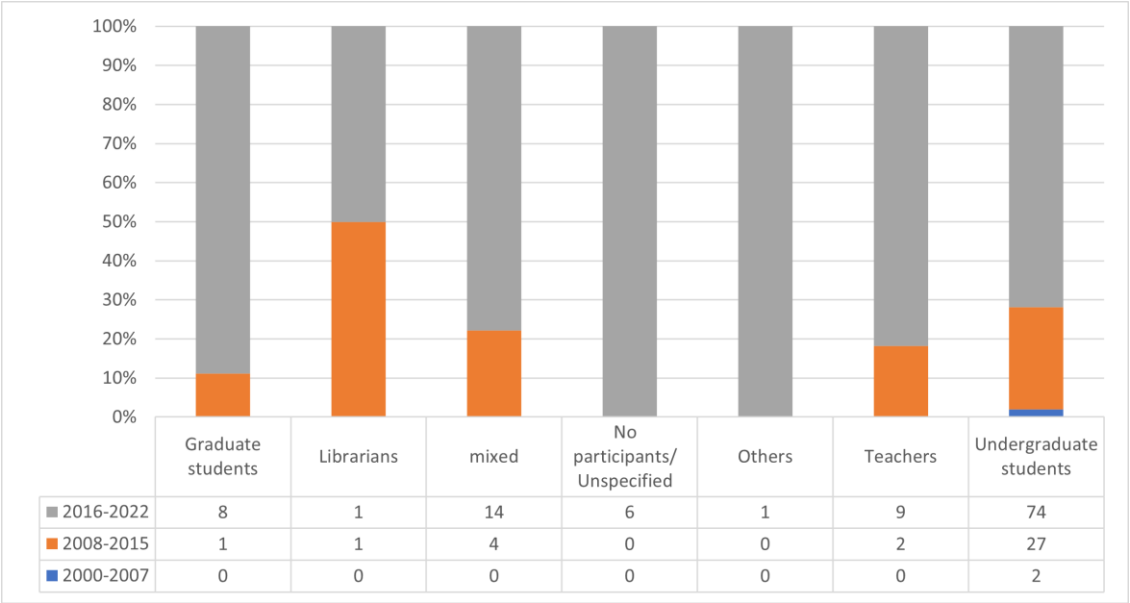
Number of ILHE research of Asian countries indexed in the Web of Science's SSCI databases since 2000 - 2022 (n=150)

Rank	Country	Region	Total, n	Articles by year, n		
				2000-2007	2008-2015	2016-2022
1	People R China*	Eastern Asian	73	1	9	63
2	Taiwan	Eastern Asian	26	0	9	17
3	South Korea	Eastern Asian	17	0	5	12
4	Malaysia	South-eastern Asian	12	1	4	7
5	Japan	Eastern Asian	9	0	3	6
6	Singapore	South-eastern Asian	7	0	4	3
7	Thailand	South-eastern Asian	3	0	1	2
8	Indonesia	South-eastern Asian	2	0	0	2
9	Philippines	South-eastern Asian	1	0	0	1

Note: * People R China include Hong Kong, Macao

4.2.1 Participants and sample sizes

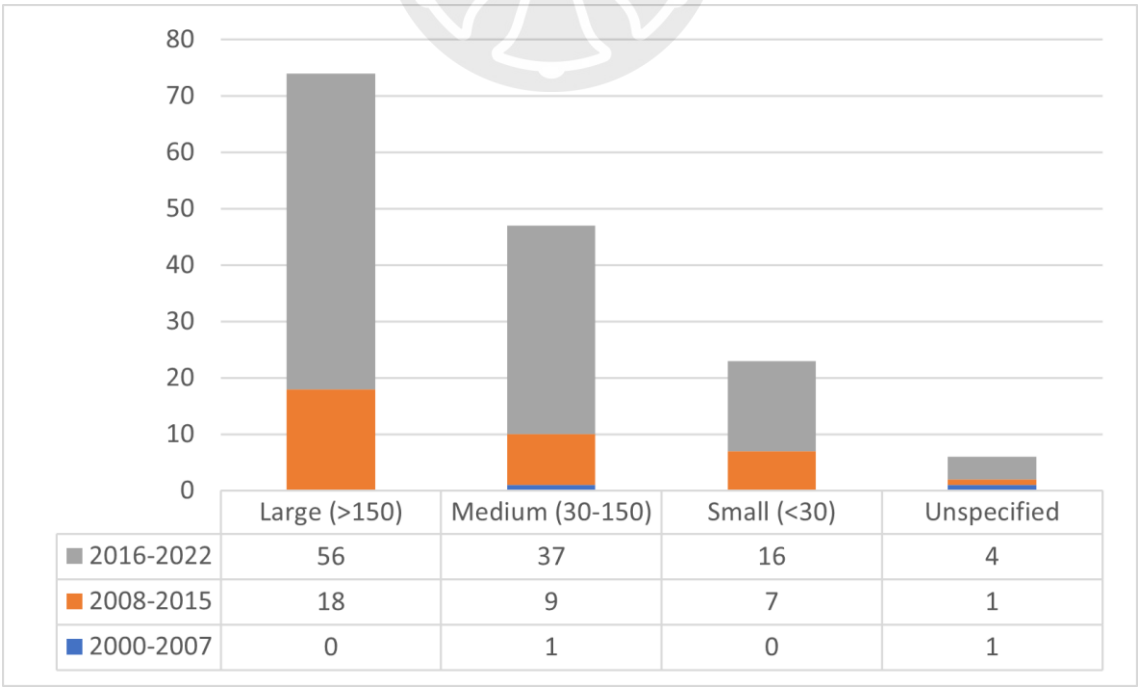
According to Figure 18, the most common research participants in studies on ILHE in Asian countries from 2000 to 2022 were undergraduate students, aligned with the research conducted by Tu et al. (2023), with a total of 103 articles focusing on this group. This was followed by studies involving mixed participant groups (n=18) and teachers (n=11). To considering three different time periods, namely 2000-2007, 2008-2015, and 2016-2022, the articles focused on undergraduate students.



	Graduate students	Librarians	mixed	No participants/ Unspecified	Others	Teachers	Undergraduate students
2016-2022	8	1	14	6	1	9	74
2008-2015	1	1	4	0	0	2	27
2000-2007	0	0	0	0	0	0	2

Figure 18. *Participants in ILHE research*

In terms of sample sizes used in ILHE of Asian countries during the same period as shown in Figure 19, large sample sizes (>150) were the most preferred, aligned with the research conducted by Tu et al. (2023), with 74 articles employing this size. Medium-sized samples (30-150) were utilized in 47 articles, while small sample sizes (<30) were used in 23 articles. Additionally, a few studies (6 articles) did not specify the sample size.

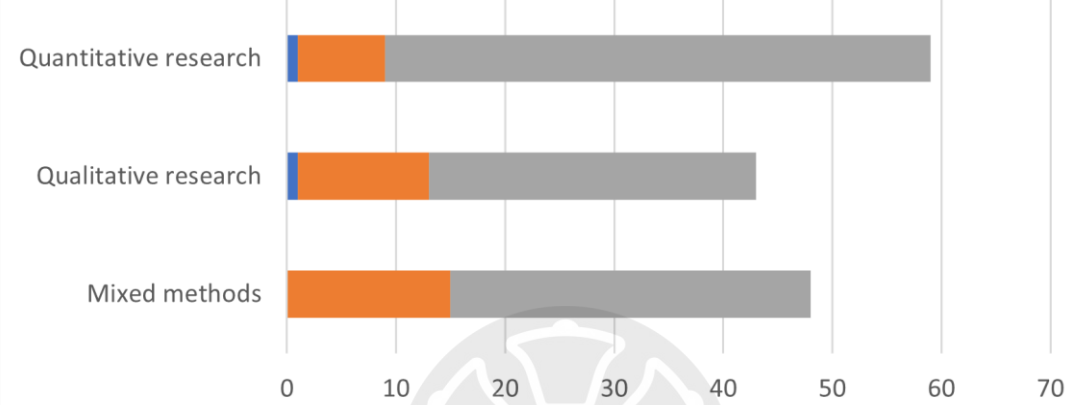


	Large (>150)	Medium (30-150)	Small (<30)	Unspecified
2016-2022	56	37	16	4
2008-2015	18	9	7	1
2000-2007	0	1	0	1

Figure 19. *Sample sizes in ILHE research*

4.2.2 Research methods

As depicted in Figure 20, most studies conducted in the field of ILHE of Asian countries employed quantitative methods (n=59). This was followed by studies utilizing mixed methods (n=48) and qualitative methods (n=43) to explore their respective research topics. Notably, there was an increasing trend in the use of these research methods from the first period to the third period, indicating a growing preference for quantitative and mixed methods in studying information literacy in higher education.



	Mixed methods	Qualitative research	Quantitative research
2000-2007	0	1	1
2008-2015	15	12	8
2016-2022	33	30	50

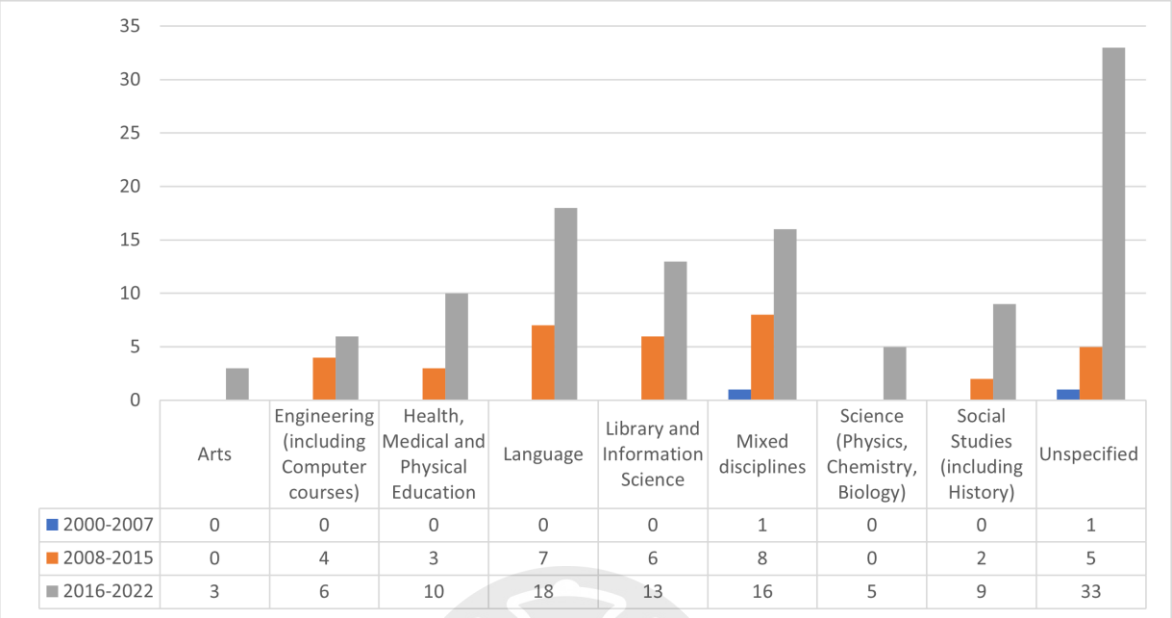
Figure 20. *Research methods in ILHE research*

4.2.3 Research domains

As illustrated in Figure 21, the most discussed research domains in ILHE of Asian countries were categorized as Unspecified (n=39). This was followed by research domains classified as Mixed disciplines and Language (n=25), and Library and Information Science (n=19). In Tu et al.'s (2023) research, it was found that mixed disciplines were mentioned the most frequently when considering each time period. Specifically, during the years 2008-2015, mixed disciplines were mentioned the most, followed by language, library, and information science. In the years 2016-2022, the category of unspecified had the highest mention, followed by language, and mixed disciplines.

During the period from 2000 to 2007, the research domains for ILHE of Asian countries were predominantly classified as Mixed disciplines and Unspecified (n=1). In the subsequent period of 2008 to 2015, the research domains were mainly associated with

Mixed disciplines (n=8) and Language (n=7). In the most recent period from 2016 to 2022, the prominent research domains were Language (n=18) and Mixed disciplines (n=16), followed by Library and Information Science (n=13).



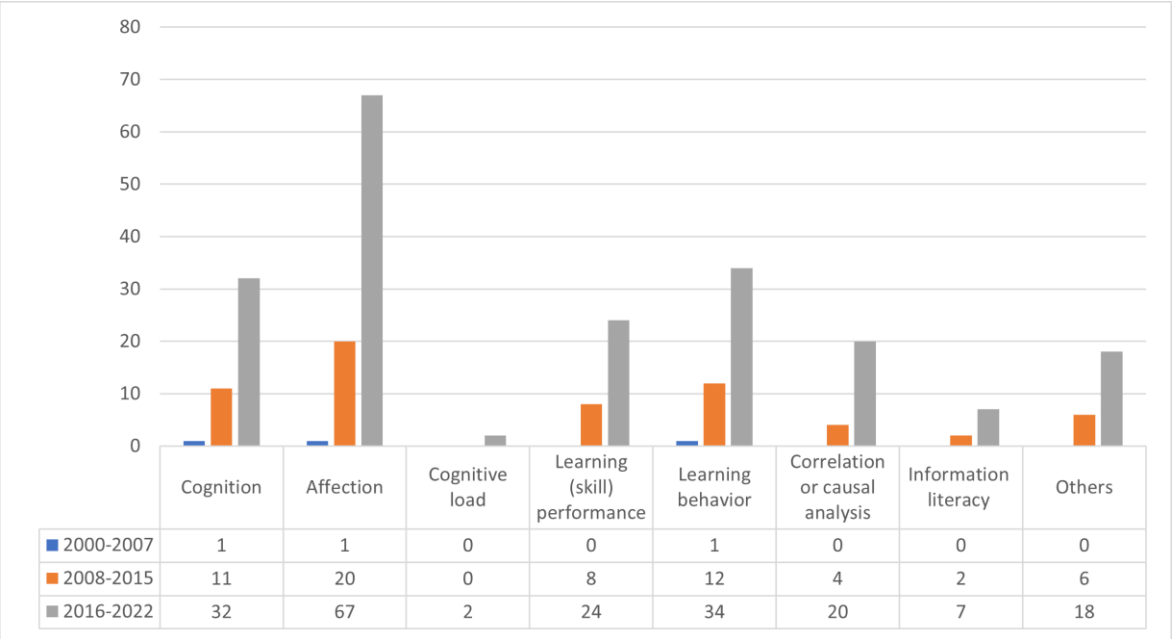
	Arts	Engineering (including Computer courses)	Health, Medical and Physical Education	Language	Library and Information Science	Mixed disciplines	Science (Physics, Chemistry, Biology)	Social Studies (including History)	Unspecified
2000-2007	0	0	0	0	0	1	0	0	1
2008-2015	0	4	3	7	6	8	0	2	5
2016-2022	3	6	10	18	13	16	5	9	33

Figure 21. *Research domains in ILHE research*

These findings indicate that researchers in the field of ILHE of Asian countries have explored a wide range of research domains, with a particular focus on Mixed disciplines, Language, and Library and Information Science. The inclusion of diverse research domains reflects the multidisciplinary nature of information literacy and its relevance across various academic disciplines and professional domains.

4.2.4 Educational objectives

As depicted in Figure 22, most research studies on ILHE in Asian countries have focused on educational objectives related to affection (n=88). This is followed by research addressing learning behavior (n=47) and cognition (n=44). In Tu et al.'s (2023) research, it was found that the affection dimension had the highest number of articles, followed by others and correlation. For example, in the cognition dimension, learning achievement was explored the most with 36 articles, followed by higher order skills with 6 articles, and collaboration or communication with 5 articles. Additionally, in the affection dimension, attitudes or effort was explored the most with 53 articles, followed by learners' opinions or learning experiences with 41 articles, and self-efficacy or beliefs with 14 articles.



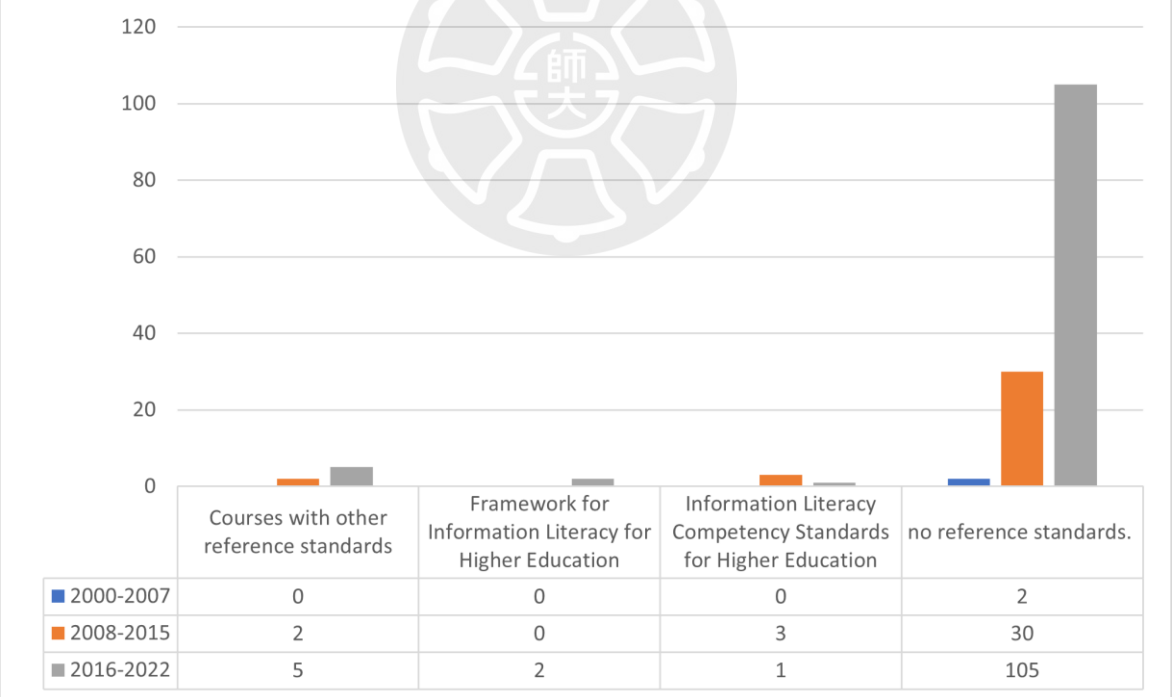
	Cognition	Affection	Cognitive load	Learning (skill) performance	Learning behavior	Correlation or causal analysis	Information literacy	Others
2000-2007	1	1	0	0	1	0	0	0
2008-2015	11	20	0	8	12	4	2	6
2016-2022	32	67	2	24	34	20	7	18

Figure 22. *Educational objectives in ILHE research*

The educational objectives related to affection encompass various aspects such as technology acceptance, attitudes or effort, self-efficacy or beliefs, satisfaction or interest, and learners' opinions or learning experiences. Researchers have shown a significant interest in exploring the affective domain of information literacy, recognizing the impact of learners' emotions, attitudes, and beliefs on their engagement and interaction with information resources. Additionally, a considerable number of studies have investigated learning behavior, examining factors such as learners' study habits, information-seeking behavior, and strategies for information evaluation and utilization. Understanding learners' behaviors and approaches to information literacy is crucial for designing effective instructional interventions and supporting learners' information needs. Furthermore, cognition, including learning achievement, higher-order thinking skills, and collaboration or communication, has been a prominent focus in information literacy research. Scholars have examined the cognitive processes and outcomes associated with information literacy, exploring the development of critical thinking, problem-solving skills, and effective collaboration in higher education contexts. These findings highlight the significance of studying the affective, behavioral, and cognitive dimensions of ILHE. By addressing these research themes, researchers contribute to a deeper understanding of the factors that influence learners' information literacy development and their overall learning experiences in the academic setting.

4.2.5 Information literacy standards

As depicted in Figure 23, the reference standards used for curriculum design in studies on ILHE in Asian countries varied. It is important to note that most articles did not explicitly mention the specific reference standards employed for curriculum design (n=137). However, among those that did mention reference standards, several different approaches were observed. Courses with other reference standards mentioned (n=7) were identified, indicating that researchers considered alternative frameworks or guidelines specific to their educational context. Additionally, some studies referred to widely recognized standards such as the Information Literacy Competency Standards for Higher Education (n=4) and the Framework for Information Literacy for Higher Education (n=2). These standards serve as valuable resources for curriculum development, providing guidance on the essential information literacy skills and competencies that students should acquire in higher education. Furthermore, these findings were published during the period when the mentioned standards were announced.



	Courses with other reference standards	Framework for Information Literacy for Higher Education	Information Literacy Competency Standards for Higher Education	no reference standards.
2000-2007	0	0	0	2
2008-2015	2	0	3	30
2016-2022	5	2	1	105

Figure 23. *Information literacy standard in ILHE research*

The diverse range of reference standards used in curriculum design reflects the evolving nature of information literacy and the contextual variations across Asian countries. While some researchers may rely on established frameworks, others may adapt or

incorporate additional standards based on their specific educational needs and goals. It is worth mentioning that the absence of explicit mention of reference standards in the majority of articles indicates a potential area for further exploration and discussion. Future research could delve into the reasons behind the omission of reference standards and the implications for curriculum design and implementation in information literacy education. Overall, the findings underscore the importance of considering reference standards when designing information literacy curricula in higher education. The utilization of appropriate standards can provide a solid foundation for aligning instructional objectives, ensuring consistency, and promoting the development of essential information literacy competencies among students.

4.3 The situation of information literacy instruction in higher education in Asian countries through interview method

To collect qualitative data on characteristics and distribution of research related to information literacy in higher education across Asian countries, trends including the directions, and gaps and challenges of information literacy instruction in higher education, the researcher conducted semi-structured interviews with nine instructors actively involved in the field of library and information science (LIS) programs in Taiwan and Thailand. The informants represented multiple universities, including National Taiwan Normal University, National Taiwan University, National Chung-Hsing University, National Chengchi University, Khon Kaen University, Chulalongkorn University, and Mahasarakham University. These universities all offer LIS programs, which are considered relevant to information literacy skills. Taiwan and Thailand were chosen as case studies to gain a comprehensive understanding of information literacy education in Asian. To ensure the suitability of the key informants, the researcher specifically sought instructors from LIS programs, as they possess valuable insights into information literacy within their respective disciplines. Prior to commencing the interviews, the researcher introduced herself and clearly communicated the research objectives to the key informants. Subsequently, the interviews were conducted, providing a platform for interviews and the exploration of key points related to the study. All interview data was recorded through an audio recorder and interview notes. The data collected were then transcribed and coded into themes for analysis purposes. After identifying the themes of the interviews, the interviews' data reliability values were determined through the analytical methods of the Kappa index. These interviews

allowed for a comprehensive examination of information literacy education in Taiwan and Asian. The insights gained from these interviews are instrumental in understanding the important aspects of information literacy instruction in higher education and contribute to the overall objectives of the research.

4.3.1 The roles of the university and the library

The interviews revealed that all sampled LIS educators from Thailand and Taiwan agree on the importance of information literacy skills in higher education. It is revealed by the following quote,

> *"Yes, I agree. With the abundance of information technology in today's world, information is embedded within it. This necessitates the need for individuals to possess better skills in accessing, searching, and evaluating information to engage in effective information exploration." (G)"*

Information literacy is essential for students' success in higher education. It is the ability to find, evaluate, and use information effectively. Information literacy skills include critical thinking, the ability to use various information sources, and the ability to search, select, and ethically use information. This is conveyed by one of the interviewees in the following excerpt,

> *"From my understanding, information literacy encompasses various aspects, including information seeking. It involves identifying your information needs, searching for relevant information to fulfill those needs, finding solutions, and then presenting the information. There are different models of information literacy available. In today's world, with the abundance of information, information literacy is particularly important." (H)"*

However, information literacy is not only crucial in higher education but also for individuals of all ages and educational levels. It encompasses the ability to search, evaluate, and use information effectively in the constantly changing and growing landscape of information. Information literacy is necessary for making informed decisions in all aspects of life.

> *"I think information literacy extremely, regardless of the level of education. Essentially, we should focus on developing courses or training programs for students." (F))*

Additionally, the continuous development and advancement of technology has led to the emergence of new skills, such as media literacy, digital literacy, and other related skills. These skills are interconnected and mutually reinforce each other in the evolving landscape of information, where information literacy is necessary for informed decision-making in

various aspects of life. This is expressed by one participant in the following interview excerpt,

> *"Information literacy skills are undoubtedly important, but the trend of technological changes has led to the emergence of new skills, such as digital literacy. At the same time, digital literacy now encompasses information literacy. However, information literacy remains necessary as an aid or support in daily life. Universities still need to prioritize information literacy, but it must be combined with digital literacy." (E)"*

Another participant also revealed the following quote,

> *"Currently, information literacy is quite transformed into digital literacy skills, which replace information literacy skills in the educational context of Thailand, particularly within the Ministry of Higher Education, Science, Research and Innovation (MHESI). The MHESI issued a standardization announcement regarding the details of learning outcomes according to the qualification's framework for higher education in the year 2 0 2 2 , which mentions digital skills as a mandatory skill for graduates who have completed their education at the tertiary level. Although information literacy skills have been changed, digital literacy still has components related to information literacy. Therefore, information literacy is a part of and necessary for digital literacy. However, its scope is broader, not limited to just information literacy but also includes digital literacy. If we consider from the perspective of global changes or policies and our own perspectives, when teaching information literacy, it must be integrated with digital literacy in the teaching process. It is still an important skill in higher education." (C)"*

Some Thai instructors consistently express concerns about the transition from upper secondary education to higher education regarding information literacy skills. This is because students have different backgrounds and levels of information literacy knowledge, which leads to variations in their individual information literacy skills. Some students may lack sufficient information literacy skills. Therefore, information literacy skills are important, and universities have a role to play in supporting and promoting the development of students' information literacy skills. This problem was commented on by one participant,

> *"Learners at the tertiary level still need to study information on their own, especially undergraduate students who have transitioned from studying at the upper secondary level, they still lack sufficient information literacy skills." (D)"*

As illustrated in the following excerpt,

> *"However, the importance of information literacy skills in the current context of learning at the university level is a topic of concern. In the Thai education system, it is believed that students who have completed their secondary education have primarily learned from textbooks and followed what their teachers told them. Although students may have some skills in searching for information, the classroom environment mostly remains one-way communication, with teachers providing information more than students expressing their opinions. As students transition to higher education in Thailand, it is a period of change where individuals are being nurtured to become more independent and capable of functioning in the real world. They are expected to become decision-makers who can work independently. To achieve this, it is important to manage information effectively. We need to have knowledge in various aspects of information management." (A)"*

Another participant also revealed the following quote,

> *"There is still inequality or differences in the foundational knowledge of information literacy at all levels of secondary education. Information literacy is a crucial skill for learning in higher education and for daily life in the current era. Therefore, it is necessary for learners in higher education to learn and acquire information literacy skills." (B)"*

Information literacy skills are abilities that require learning and practical training. Universities play a significant role in shaping individuals who are competitive in a knowledge-based society and who can succeed in their future lives. This includes cultivating individuals as information-literate individuals. The most important aspect is raising awareness of the importance of information literacy through the integration of information literacy concepts into teaching and learning processes. Some universities provide support and initiatives from various departments, such as the university itself, educational institution libraries, faculties, or specific programs. Ultimately, it depends on the decisions made by administrators. Additionally, universities may define the desired attributes of graduates, with information literacy skills being a crucial component. The opinions of teachers gathered from interviews tend to align on these matters. As illustrated in the following excerpt,

> *"Universities have policies regarding information literacy, but they may not delve deep into the subject. They may touch upon the desirable characteristics of graduates and the information technology skills that learners should possess. Universities may promote the development of information literacy skills through library support." (A)"*

In addition, it shows only one have further stated that:

> *"In our educational institution, we have policy from university to faculty level. Even before the COVID-19 pandemic, there was a clear emphasis on developing information literacy to support the feasibility of learning. This includes the implementation of foundational structures and programs that support learning, such as the Learning Management System (LMS) that facilitates posting and access to search functions. The central library of the university has a database and resources that enable learners to develop their information literacy skills. At the faculty level, training and learning activities have been organized, and the teaching and learning methods have been transformed to focus on active learning and the utilization of information literacy skills." (B)"*

Interviews have revealed that most universities have long been promoting and developing information literacy under the course name " Library Orientation." However, the policy to promote information literacy has been changed to make it a general education course, which means that all students must take it. However, the content of the course is quite extensive, resulting in a reduction in the content related to information literacy. As a result, students are unable to fully learn and comprehend the subject matter. The development of information literacy skills now depends on the curriculum policy and the changes made to the teaching and learning processes to facilitate authentic learning experiences for students. This is conveyed by one participant in the following excerpt,

"Previously, there were direct information literacy courses, but with policy changes, multiple skills have been integrated. As the content increases, the intensity of teaching information literacy skills decreases, and the content is divided. The main curriculum does not have this specific course because students can enroll in general education courses. We have redesigned the teaching and learning approach into a set of courses where students must work practically, integrating information literacy skills into the course sets. This approach is expected to promote better learning than teaching a standalone course. (D)""

Universities and libraries in higher education play a vital role in promoting information literacy skills for students. There are several ways in which they can do this. One approach is to offer information literacy courses or training to new students or current learners. These courses can teach students how to identify information needs, search for relevant sources, evaluate the quality of information, and efficiently utilize information resources. Another approach is to provide students with access to information resources, such as online tutorials, databases, and reference libraries. Finally, universities and libraries can integrate information literacy skills into the curriculum by assigning information literacy homework or tasks within their courses. As illustrated in the following excerpt,

"The library holds great significance at our university, as it plays a central role in helping students enhance their information literacy skills. The library provides training for new students, offers access to various resources, and delivers lectures on database usage for both undergraduate and graduate students. In recent years, Academic Library has also implemented tutorials on information literacy. Additionally, there are faculty members who teach courses related to information in different departments, such as the School of Communication, where the focus is on media literacy. Many of these courses fall under the umbrella of general education. (I)"

In summary, the interviews conducted with instructors from Thailand and Taiwan revealed that information literacy skills are considered important in higher education. Participants emphasized the significance of information literacy as a fundamental aspect of students' learning processes. These skills encompass critical thinking, the ability to use various information sources, and effective information exploration through searching, selecting, and utilizing information ethically. They highlighted that information literacy is not limited to higher education but is essential for individuals of all ages and education levels (Anwar & Naveed, 2019). It enables efficient information searching, evaluation, and utilization in today's rapidly changing and information-rich world. They suggested integrating information literacy into educational curricula and training programs to ensure students' success. Furthermore, the advancement of technology has led to the emergence of new skills such as digital literacy, which encompasses information literacy. However, information literacy remains a necessary component for decision-making in all aspects of life. Therefore, participants emphasized the need to combine information literacy with digital literacy, especially in higher education. However, participants also acknowledged that there

are disparities in information literacy skills among students, particularly as they transition from secondary to higher education. Some students may lack sufficient information literacy skills, even at the tertiary level. Thus, universities should play a role in supporting and enhancing students' information literacy skills. Overall, the interviews indicated that universities should recognize the importance of information literacy, integrate it into teaching processes, and collaborate with libraries and faculties to provide support and training opportunities. By incorporating information literacy into the education system, universities can nurture students to become independent learners and decision-makers who can effectively manage information in various aspects of their lives.

4.3.2 Information literacy standards

In order to develop information literacy skills accurately and effectively, and to ensure that learners possess genuine information literacy skills, there is a need to establish consistent standards. Information literacy standards have been defined to cultivate individuals with information literacy skills. These standards serve as criteria or guidelines for assessing and evaluating the knowledge and information literacy skills of students at the highest level of education, such as undergraduate, graduate, and doctoral levels. These standards have emerged from research and development in the field of information literacy, aiming to ensure the highest quality and standards of education in this domain. However, it is important to note that most interviewees did not adhere to any specific international standards as a basis for policy development in enhancing information literacy skills (Ellis et al., 2017). It is revealed by the following quote,

> *"In terms of the curriculum, there is currently no specific standard or framework as the basis. This is because they have similar characteristics, but we understand together that learners should have certain characteristics. Therefore, in developing the curriculum, we do not adhere to any specific standards or international models to serve as a template for policy development in enhancing information literacy skills." (C)"*

As illustrated in the following excerpt,

> *"Thailand does not have specific international standards or models as a basis for policy development in enhancing information literacy skills. However, it can be meaningful in the context of the Education Act, both within and outside the formal education system, which emphasizes lifelong learning and access to information." (E)"*

It is considered a positive development that information literacy standards have been established at the national level in Taiwan. However, it is disappointing that these standards have not been effectively implemented by the Ministry of Education as explained by one participant,

"Thirteen years ago, we developed information literacy standards for the nation and announced them through the professional association for information literacy. Unfortunately, these standards were never adopted by the Ministry of Education." (G)"

Information literacy standards for higher education are widely adopted internationally, including in Thailand and Taiwan. These standards were established by the Association of College and Research Libraries (ACRL) in 2000. The ACRL Information Literacy Standards for Higher Education serve as guidelines for faculty and educators in assessing students' information literacy skills. This is expressed by one participant in the following interview excerpt,

"I have utilized the ACRL 2000 standards as the basis for developing students' information literacy skills. I still adhere to the ACRL 2000 standard. The structure of my course closely aligns with the ACRL 2000 framework, incorporating additional concepts" (I)"

In 2016, the Association of College & Research Libraries (ACRL) developed the Framework for Information Literacy for Higher Education to help students develop the necessary skills for success in college and beyond. The framework enables students to learn how to identify, evaluate, and use information effectively. Additionally, the framework is designed to be flexible and adaptable to different disciplines and learning contexts. This means that there are multiple ways to teach information literacy depending on the needs of the students. The framework is an important resource for librarians, faculty, and students to gain a shared understanding of information literacy. It can be used as a guide for program development and innovative thinking in information literacy. However, some instructors have expressed the view that there is no significant difference compared to the standards set in the year 2000. This is conveyed by one participant in the following excerpt,

"While the new framework emphasizes the continuous attention to the environmental ecology of information within the digital ecosystem, it does not differ significantly from the ACRL 2000 standards. The essence of information literacy lies in the ability to create and adapt, encapsulating the spirit of the framework." (I)"

Universities in Thailand and Taiwan have adopted the ACRL Framework in various ways, incorporating both the 2000 and 2016 versions. Some universities have implemented the framework in its entirety, while others have customized it to meet their specific needs. It is revealed by the following quote,

"In our department, we do not use all international standards or models. For example, the 21st-century framework is selectively applied to the relevant curriculum areas that can be adapted, such as information search skills and media assessment. These are integrated into the design of teaching and learning, including activities that promote and develop learners' information literacy skills." (B)"

It is revealed by the following quote,

> *"The main curriculum adopts international standards or models as a basis for policy development in enhancing information literacy skills. However, we have not explicitly specified which international standards are used as the foundation. Instead, we adhere to the standards in structuring the curriculum, with adjustments made according to content suitability" (D)"*

Instructors can access the ACRL Framework for Information Literacy Sandbox, a platform and repository that hosts a variety of information literacy teaching and learning resources in all formats. The platform provides access to media created by libraries, and it is a valuable resource for instructors who are looking for new and innovative ways to teach information literacy. It is revealed by the following quote,

> *"The department mentioned the ACRL Framework for Information Literacy for Higher Education, as it provides a sandbox for experimentation. For searching for teaching and learning resources related to information literacy in the curriculum." (A)"*

However, it is not possible to select a specific model or standard as a national framework or standard in each country. This is because the context of universities varies, such as state universities, private universities, or open universities. Each type of university has different characteristics in terms of instructors, target groups, or learners. Therefore, adopting international standards as the best option may be a good choice. It is revealed by the following quote,

> *"Higher education context consists of various types of universities, such as public universities or private universities. These variations result in different approaches to teaching and learning. It would be challenging to apply a single model universally. These differences can be observed among instructors and target groups or students, not to mention their different interests and levels of engagement in learning. If we apply any model, it must be referenced from international standards." (B)"*

In addition, Thai educators have mentioned models related to education in the context of Thailand that reflect a lack of vision in developing the quality of educational leaders as explained by one participant,

> *"At the national level, there are currently no models related to education in Thailand because education leaders do not have academic ideas or express the vision of developing human quality, which should be defined by ministry-level organizations. It only comes out as research from academics but is not used in policy terms. The perspective on human development is not clear. Even though the Electronic Transactions Development Agency (ETDA) under the Ministry of Digital Economy and Society of Thailand has organized training courses on 'Building Awareness in Internet Usage' or 'Digital Citizen' suitable for Thai people, focusing on the target groups of youth and the elderly, not specifically targeting higher education level groups." (C)"*

In summary, the importance of establishing consistent standards for developing information literacy skills and ensuring learners possess genuine skills. Information literacy

standards serve as criteria for assessing students' knowledge and skills at different educational levels. However, most interviewees do not adhere to specific international standards for policy development in enhancing information literacy skills. The ACRL Information Literacy Standards for Higher Education in 2000 and The ACRL Framework for Information Literacy for Higher Education, developed in 2016, are widely adopted internationally, including in Thailand and Taiwan. It provides guidelines for faculty and educators to assess students' information literacy skills. Some instructors still use the ACRL 2000 standards, while others find the 2016 framework similar to the previous standards. Universities in Thailand and Taiwan have implemented the ACRL Framework in various ways, either in its entirety or customized to meet their specific needs.

Additionally, the ACRL Framework for Information Literacy Sandbox is a platform that allows instructors to access a variety of teaching and learning resources related to information literacy. It serves as a valuable resource for instructors looking for innovative ways to teach information literacy. However, each country cannot select a specific model or standard as a national framework due to the diverse contexts of universities. State universities, private universities, and open universities have different characteristics, making it challenging to apply a single model universally. Adopting international standards is considered the best option. Moreover, Thai instructors have expressed concerns about the lack of vision in developing the quality of educational leaders in Thailand. There are no specific education models in Thailand that reflect a clear perspective on human development. Although training courses on internet usage and digital citizenship are available, they mainly target specific groups such as youth and the elderly, rather than higher education level groups.

4.3.3 Responsibility for instruction of information literacy

The interview found that professors, librarians, and students are all involved in teaching information literacy skills at the tertiary education level. Professors are responsible for teaching and guiding students in developing information literacy skills. They instruct on topics such as information retrieval, data analysis and evaluation, and the use of information technology. Librarians provide support to students and faculty in finding and using information resources. They also offer instruction on information literacy skills. Students are responsible for taking responsibility for their own learning and for using information literacy

skills to effectively complete their coursework. This is expressed by one participant in the following interview excerpt,

> *"Faculty members would teach information literacy skills within their respective courses. Teachers themselves would receive training in information literacy knowledge and skills, as well as course design and instructional strategies." (G)"*

Librarians play an important role in teaching information literacy skills. They provide guidance and assistance in learning about proper information searching, database usage, and selecting appropriate information sources. Librarians are crucial in helping students develop the skills needed to navigate through the vast amount of information available and make informed decisions regarding information sources as explained by one participant,

> *"The library plays a crucial role in supporting IL skills through the presence of librarians, workshops, and training programs." (A)"*

Lastly, students play a crucial role in developing their own information literacy skills. They need to learn how to search for information effectively, analyze and evaluate data, and present information efficiently. Students are responsible for actively engaging in the learning process, applying critical thinking skills, and honing their abilities to navigate and utilize information in a meaningful and impactful way. Their active participation and commitment to developing information literacy skills are key to their overall success in this area. As illustrated in the following excerpt,

> *"In higher education, the learning process is student-based and involves active learning. Various learning formats have changed, and learners are encouraged to explore and research independently. In the current era, learning is done online, and instructors provide initial resources or information sources. Learners then need to further develop their skills and explore topics of their own interest. Therefore, information literacy skills enable learners to continue their lifelong learning and pursue their interests." (B)"*

In addition, teachers and librarians can collaborate in designing and managing instructional activities to enhance information literacy skills. They can work together to develop curricula, design learning experiences, and provide guidance and support to students in their information-seeking endeavors. This collaboration ensures a holistic approach to information literacy education and promotes the seamless integration of information skills across different subjects and disciplines as explained by one participant,

> *"I'm not entirely certain, but it seems that each faculty member is responsible for designing their respective courses. There could be shared responsibility among faculty members for incorporating IL elements." (A)"*

This is conveyed by one participant in the following excerpt,

> *"Both faculty members and librarians play important roles in supporting undergraduate and graduate students. I think there is great potential for collaboration between them. Librarians can provide students with skills and strategies to develop their information literacy, while faculty members can focus on enhancing their academic skills. Although there may be some overlap, this collaboration can provide students with a well-rounded education." (H)"*

In summary, instructors or faculty members, librarians, and students all play a role in teaching information literacy skills at the tertiary education level. Instructors or faculty members are responsible for teaching and guiding students in developing information literacy skills. They instruct on topics such as information retrieval, data analysis and evaluation, and the use of information technology. Librarians provide support to students and faculty in finding and using information resources. They also offer instruction on information literacy skills. Students are responsible for taking responsibility for their own learning and for using information literacy skills to effectively complete their coursework. In addition, teachers and librarians can collaborate in designing and managing instructional activities to enhance information literacy skills. This collaboration ensures a holistic approach to information literacy education and promotes the seamless integration of information skills across different subjects and disciplines.

4.3.4 Characteristics of teaching information literacy

The government plays a role in promoting and developing information literacy skills by creating and supporting access to public information and online learning. It can also create an environment that fosters learning and information sharing within government agencies. Meanwhile, the Ministry of Education has a role in education, focusing on developing curriculum and teaching methods that emphasize information literacy and the use of information technology to enhance systematic and responsive learning in the digital age. This may include online teaching, the use of online resources, and online learning tools to meet the needs of students in the digital era as explained by one participant,

> *"Our government, specifically the Minister of Education, views information literacy primarily as computer skills. They consider teaching information literacy to be focused on information technology skills, information crimes, information ethics, and information security, with less emphasis on teaching information skills such as learning, critical thinking, and decision making." (G)"*

From the interviews, it was found that the predominant teaching approach is to integrate information literacy into every subject in the learning process. This means that students are taught how to find, evaluate, and use information in a variety of contexts. The

focus is on developing understanding of the research process, analyzing and evaluating information, and verifying reliable and trustworthy data. Additionally, there is an emphasis on developing presentation and communication skills, as well as proficiency in using information technology and communication tools. Various tools are utilized, such as creating learning aids like slideshows, videos, or presenting through online platforms, to enable learners to express their thoughts, share knowledge, and receive training in using relevant software and applications. This approach aims to empower students to become experts in applying technology for learning purposes. This is expressed by few participants in the following interview excerpt,

> *"In our LIS program, IL education is integrated into various courses. Instead of having a specific course solely focused on IL, students may encounter IL components in different courses such as Introduction to LIS, Reference Resources, or other courses that cover IL-related topics." (F)"*

> *"I don't believe we have a standalone information literacy course. Most courses incorporate information literacy skills within different subjects. In the field of Library and Information Science (LIS), we often refer to these skills as library skills or library life skills." (G)"*

> *"Undergraduate education focuses on knowledge and classroom discussions. Students may need to acquire knowledge from the instructor before applying and exploring relevant information sources in their areas of interest. They may conduct specific research, write reports, and engage in discussions or debates. Case studies are used to share knowledge on related topics." (B)"*

Many universities, particularly at the tertiary level, consider information literacy to be a necessary skill for students. However, the formats of teaching information literacy can vary. For example, some institutions may require information literacy to be a compulsory subject in the general education curriculum for all first-year students across all faculties. In other cases, it may be compulsory only in certain faculties, or it may be offered as an elective course. The specific approach to integrating information literacy into the curriculum can differ based on the institution's educational philosophy, disciplinary focus, and overall program structure. As illustrated in the following excerpt,

> *"One of the vital responsibilities of librarians is to promote information literacy skills among students. During the first 9 weeks of the general education course, students are taught to utilize databases for research reports and develop their report-writing abilities. The development of college students' information literacy skills relies on the collaboration between librarians and teachers." (I)"*

In addition to promoting and developing information literacy skills, libraries also offer a variety of formats for teaching skills. These include practical training workshops, seminars, and discussions, as well as the creation of instructional guides or tutorial videos. It is revealed by the following quote,

"I believe the library holds significant importance within the university, serving as its heart. They possess the expertise in providing IL training, and therefore, the library has the potential to effectively promote and contribute to IL education." (F)"

In addition, one university in Thailand has an assessment called the "exit exam" for undergraduate students. This exam is used to measure the students' skills necessary for graduation. The exit exam assesses students' digital intelligence, specifically their knowledge and skills in essential computer skills, essential software skills, and using technology in the workplace. Information literacy skills are an integral part of this assessment. As illustrated in the following excerpt,

"Our University has the exit exam for undergraduate students. Previously, it was an exam on computer technology, but now it has been changed to digital intelligence (DQ). Students must pass this exam, which is conducted by the Learning and Teaching Innovation Center, incorporating information literacy into digital literacy. DQ is similar to DL (Digital Literacy) because it is a mandatory exam that assesses students' ability to use technology and incorporates information literacy. Information literacy still exists, but it is not a separate characteristic. Instead, it is a part of digital literacy." (C)"

For graduate-level students, the teaching and learning approaches in information literacy may differ from undergraduate level due to their higher knowledge foundation in information literacy. Graduate-level education places emphasis on advanced research skills, critical analysis, and the ability to contribute new knowledge to the field. The teaching methods often involve more advanced and specialized topics in information literacy, such as advanced research methodologies, scholarly communication, data management, and information ethics. It is revealed by the following quote,

"Graduate-level students who already have foundational knowledge in each subject. In this case, instructors provide overviews for students to further expand their knowledge. The instructors emphasize research exploration, opening topics for students to express their opinions or arguments, which may lead to clearer presentation of ideas. Students may find evidence to substantiate or challenge arguments." (B)"

"In the case of graduate students, there is no specific teaching, but it is specified in the desired graduate attributes. The curriculum design includes learning outcomes related to technology skills, such as the ability to use technology for research and analysis in communication." (C) "

A Thai instructor mentioned that the teaching format in general education courses in Thailand requires a curriculum revision every two years. Learning takes place in both classroom and online environments. There are diverse learning materials available throughout the study period, such as textbooks, reference books, and supplementary documents. Instructors monitor the progress of students periodically by setting specific time frames. Information technology is integrated into teaching and learning practices, including

communication channels between students and instructors. Online exercises and activities are also available as explained by one participant,

> *"The teaching format in general education subjects needs to be revised every 2 years to update the content or processes to keep up with changing technologies. Our curriculum includes both classroom and online teaching. There are learning materials such as books, textbooks, and lecture materials developed to familiarize learners with digital media and information literacy processes. Learners are assigned projects to teach them teamwork and presentation skills. The instructors set deadlines for project submissions to track the progress of the work and use Facebook for communication and coordination between teachers and students. There are online exercises through Google Forms to generate interest and awaken the learners' enthusiasm for learning." (E)"*

Interviews revealed that a variety of learning media are being used. Currently, there is an increasing use of information technology in teaching and learning. This is conveyed by one participant in the following excerpt,

> *"There are various learning media used in teaching, such as:*
>
> *- Virtual classrooms like Google Classroom and Canvas, which are programs that help manage students' learning and provide access to various resources. Students can learn independently.*
>
> *- Video conferencing platforms like Zoom, Google Meet, and Microsoft Teams, which allow face-to-face interaction in an online setting, replacing traditional classroom teaching.*
>
> *- Learning activities technology, which promotes learning in the classroom, such as interactive boards, game-based learning, and animations, where students can discuss, compete, and learn together. Although universities may not directly support applications, there is considerable training provided to instructors.*
>
> *-Social media, real-time or online communication platforms like Line Bot and Facebook Live, to facilitate interaction between instructors and students." (C)"*

Examples of using information technology in teaching and learning include developing internal university systems or utilizing free access programs as illustrated by following quote,

> *"The primary learning management system (LMS) used is the Blackboard program. Additionally, CourseVille, an LMS system, supports active learning, and there are pre-developed programs with free access that enhance interactive learning in the classroom, such as online learning tools that encourage brainstorming, discussions, and knowledge sharing. Sometimes, representatives may be involved in presenting and developing information presentation skills. Additionally, free access tools have been developed to enhance teaching and learning. These programs promote interaction among learners, allowing them to express their opinions and engage in discussions. Online learning tools are often used to stimulate brainstorming sessions and knowledge sharing among students. In some cases, facilitators may be present to help develop presentation skills. Programs for creating infographics or mind maps are used to organize and connect different pieces of knowledge. They help identify relevant topics and acquire genuine knowledge. Interactive tools like Kahoot! are*

used in classrooms to create engagement and interactivity among students." (B)"

In addition, information technology has been used to assess learning outcomes. As illustrated in the following excerpt,

> *"Due to the curriculum's integrated nature, the assessment of learners' information literacy skills relies on observing assigned tasks and there are no clear criteria, such as considering document references, plagiarism, or inappropriate source selection. In Thailand, the emphasis is on the ASEAN University Network Quality Assurance (AUNQA) for university quality assurance. It divides learning outcomes into general outcomes (generic outcomes) and subject-specific outcomes (subject-specific outcomes). We assess information literacy skills as a generic outcome, which is a soft skill that is integrated and applied in every step of the learners' work. This depends on how the teachers manage that particular set of subjects." (D)"*

> *"There are pretests, post-tests, mid-term exams, and final exams." (E)"*

> *"Currently, technology is being used to assist in the assessment of learning outcomes, exams, processing, and grading. Students can evaluate their peers and help instructors in homework evaluation. It can improve the quality of learning outcomes, and some tools even offer analytics. Moodle is an example of such a tool." (C)"*

In addition, some instructors believe that exams alone are not an accurate measure of student learning. Therefore, they emphasize practical training to give students hands-on experience and promote learning through practice as explained by one participant,

> *"Examinations are minimal because they do not assess information literacy skills, as these skills emphasize practical application and real-world implementation to demonstrate students' abilities. Final outputs are created, such as academic papers, as a final project to evaluate the student's ability to apply the various skills taught." (B)"*

In the context of Thailand, there are challenges in managing information literacy education in general subjects. One of the main issues is the lack of knowledge and expertise of instructors in information literacy. Some instructors may not have a formal background in Library and Information Science (LIS), and therefore lack expertise in this field. Since information literacy is a discipline within LIS, this can lead to ineffective teaching methods and misinformation being taught. It is crucial for instructors to have genuine knowledge and understanding of the subjects they teach. This is conveyed by one participant in the following excerpt,

> *"One drawback is that any teacher can come and teach, but some topics are specialized in the field of information science that some teachers may not truly know. Sometimes, teaching is done incorrectly, which may not be necessary for the learners, but the teachers should have genuine knowledge in what they teach." (D)"*

In addition to well-structured teaching methods, student interaction plays a significant role in promoting information literacy learning. Learner engagement and interaction are essential factors in fostering information literacy as illustrated by following quote,

"I believe that interaction is crucial in teaching. A combination of lectures, interactive activities, and tasks for students to complete is important. Relying solely on traditional lectures may not be sufficient, as students need opportunities for interaction to fully comprehend the information and apply it effectively. Therefore, incorporating pedagogical methods that encourage interaction, such as group discussions and case studies, is highly valuable. These tasks and activities can engage students in practical application, analysis of relevant literature, and a deeper understanding of academic concepts. The course itself should be designed to incorporate a balance of lectures, group discussions, and tasks or case studies, as this combination is essential for effective learning." (H)"

Currently, online learning has played an increasingly significant role since the outbreak of COVID-19. Due to the policies implemented by many universities to prevent the spread of the virus, online learning has become widely adopted. This has led to the careful design and development of effective curriculum to maximize the benefits for both learners and instructors. It is revealed by the following quote,

"Well-designed online courses can enhance students' learning skills. Students have the opportunity to ask questions and develop notetaking and discussion skills through online small-group discussions. In addition to class lectures, teachers should allocate time for students to reflect on what they have learned and the questions they have. Students also need opportunities to engage in oral communication and presentations. I believe these types of training are very helpful in developing information literacy skills." (G)"

In conclusion, the characteristics of teaching information literacy include the government's role in promoting access to public information and online learning, as well as creating an environment for information sharing. The Ministry of Education focuses on curriculum development and teaching methods that emphasize information literacy and the use of technology in learning. The predominant teaching approach integrates information literacy into various subjects, emphasizing research skills, critical analysis, and the use of reliable information. Different institutions have varying approaches to integrating information literacy into their curriculum, ranging from compulsory subjects to elective courses. Libraries play a crucial role in offering practical training workshops and instructional resources. Teaching methods for graduate-level students focus on advanced research skills and contributing new knowledge to the field. Information technology is widely used in teaching and learning, including virtual classrooms, video conferencing platforms, and online communication channels. Assessment of information literacy skills varies, with a shift toward practical training and project-based evaluations. Challenges include instructors' lack of expertise in information literacy and the need for genuine knowledge in teaching the subject. Learner engagement and interaction are essential, and online learning has become more prevalent, requiring effective curriculum design to enhance information literacy skills.

4.3.5 Factors influencing to the development of information literacy skills

There are several factors involved in learning, starting with learner-related factors. Learners' existing knowledge encompasses their background knowledge in both information literacy skills and information technology skills as explained by one participant.

> *"Their educational background and their access to information technology. These factors are crucial." (A)"*

In addition, the personal attitudes of learners towards the instructional format are another factor related to the development of information literacy skills. When the curriculum incorporates online learning methods more extensively, some learners may not prefer the online teaching format, which can affect their learning outcomes. It is revealed by the following quote,

> *"Students have varying preferences regarding online and traditional teaching methods. The effectiveness of their learning experiences depends on individual preferences. In the context of Library and Information Science (LIS) courses for undergraduate students, I have observed that some students who were less likely to participate in classroom discussions became more active in online discussions. However, finding meaningful interaction online can be a challenge. The professor plays a crucial role in stimulating online discussions and engaging students. On the other hand, some students prefer face-to-face interactions and may not engage as much in online discussions. Therefore, the impact of online learning on information literacy may vary among students based on their personal preferences." (H)"*

Moreover, the varying levels of information literacy skills among learners, which may be lacking in some individuals, require instructors to adapt their teaching to accommodate learners with different levels of skills as illustrated by following quote,

> *"The main factor is that the majority of learners and people lack critical thinking, analytical thinking, and information synthesis skills, including ethical considerations. These are skills that should be taught to everyone." (E)"*

The second factor is related to the instructors' knowledge and abilities in teaching information literacy skills. This factor enables them to effectively transfer knowledge to learners accurately. As illustrated in the following excerpt,

> *"The abilities of the instructors are crucial because they need to keep up with new technologies and be aware of emerging sources of information. If they stick to the traditional methods, they will not be able to help students develop their information literacy skills." (B)"*

In addition to that, other factors within the context of society, technology, economy, and culture are also relevant. For example, the infrastructure of information technology plays a significant role. If there is sufficient allocation and provision of infrastructure, such as

internet connectivity and readily available computer devices, it will contribute to improved learning outcomes for the learners. As illustrated in the following excerpt,

> *"We can see that students who have a strong foundation in the basic structure are able to develop their information literacy skills effectively. For example, having the right and good equipment/tools, technologies, and networks. Moreover, most information formats are available online or through university libraries or faculty libraries that have efficient management systems, which affect access to knowledge, research, and information literacy skills." (B)"*

The development of information technology has had a significant impact on the knowledge and technological skills of educators. Educators must continuously study and understand emerging technologies in order to stay updated. This enables them to keep pace with technology and apply it in teaching and learning. By incorporating technology into teaching and learning practices, educators can effectively utilize technology to enhance the learning experience. This is conveyed by few participants in the following excerpt,

> *"In the modern era, information literacy educators need to keep up with the advancements in technology. Technology keeps evolving, so as educators, they need to plan the content, teaching techniques, and understanding the basics of learners. It is quite different from traditional teaching methods because the development of technology changes the way learners grow. Therefore, it poses a challenge for information literacy educators. In addition, the process of producing information content, information gathering, information seeking, and information evaluation differs from before and cannot rely on the old models." (A)"*

> *"It is a matter of technology disruption, as well as the society of the new era. Learners are born into a technologically advanced world, which means that it is not just about searching for information for learning or work purposes, but also about using technology in everyday life. Technology plays a role in every aspect, and it goes beyond just information and communication technology (ICT). It has implications for the development and promotion of information literacy skills." (C)"*

Furthermore, some instructors believe that there is a significant body of research in the field of information literacy, such as studies that measure students' understanding of information literacy skills. However, they may find it challenging to apply the research findings to address the issues that arise in their teaching practices. It is revealed by the following quote,

> *"There have been several research studies examining factors that impact the development of information literacy skills. However, these research studies have been relatively limited as they have not been presented or promoted as policies. Personally, I believe that the Thai Library Association should play a key role in advocating for research that can be applied in practice." (E)"*

However, at the country level, education-related policies play a role in planning and promoting the development of information literacy skills. However, these policies often change with changes in leadership, such as a Minister of Education. Therefore, the awareness

of the importance of information literacy skills may either persist or fade away. As illustrated in the following excerpt,

> *"Additionally, the educational policies in Thailand are subject to changes based on the government's decisions, which leads to discontinuity in work and a top-down policy approach. This is a problem that exists in almost every country, where public policies are often broadly interpreted and lack specificity for particular groups." (E)"*

> *"I believe that both the Ministry of Education and the university administration should establish supportive policies for information literacy education." (G)"*

> *"While policy plays a significant role in highlighting the importance of information literacy, it is crucial for the university or program to prioritize and support information literacy initiatives. If information literacy is not valued in the policy or educational objectives, it is less likely to be emphasized in course design." (H)"*

In conclusion, the development of information literacy skills is influenced by a variety of factors. Learner-related factors, such as existing knowledge and personal attitudes towards instructional formats, impact the acquisition of information literacy skills. Instructors' knowledge and abilities in teaching information literacy also play a crucial role. Societal factors, including the availability of information technology infrastructure and the continuous advancement of technology, shape teaching and learning practices. However, challenges arise in applying research findings to teaching practices, and education-related policies at the country level can impact the emphasis on information literacy. Overall, a comprehensive approach that considers these factors is necessary to foster the development of information literacy skills effectively.

4.3.6 Challenges and difficulties in promoting information literacy skills in higher education

Promoting information literacy skills in higher education is widely recognized as highly important in the current digital era. However, there are challenges and obstacles that need to be addressed in fostering information literacy skills at the advanced education level. One of the existing challenges is the rapid changes in technology and communication within the education system. Educators and students must learn and adapt to the use of new technologies. In fact, information literacy skills are constantly evolving due to the advancements in technology, which require continuous understanding and adaptation. It is revealed by the following quote,

> *"Whether instructors or a student or a general person are required to have knowledge or utilize technology. We must prepare individuals with the necessary skills in the 21st century, enabling them to stay informed, possess analytical thinking skills, and synthesize information." (E)"*

When considering the students' perspective, the most important factor is to instill motivation in them. This is consistent with the research of Aharony et al. (2020). This helps increase their enthusiasm for learning. Students with high motivation tend to be more enthusiastic in exploring and further studying topics of interest, leading to the more effective development of knowledge and skills. Additionally, it helps build self-confidence in students. Students who feel confident in their abilities are more likely to overcome obstacles and have better focus in their learning. This results in efficient learning outcomes and access to high-quality skills. As illustrated in the following excerpt,

> *"However, I believe motivation could be a significant factor. If students lack motivation to learn IL skills, believe they are already proficient, or are overly confident, they may not be inclined to further their knowledge in this area." (F)"*

However, regardless of whether students are pursuing a bachelor's, master's, or doctoral degree, there are still challenges related to information literacy skills. These challenges include issues such as plagiarism (Gullikson, 2006; Bury, 2011), information evaluation, and information analysis. Therefore, the curriculum must incorporate teaching and learning strategies to address these challenges and enhance the lacking skills of students. This is conveyed by one participant in the following excerpt,

> *"Learner lack skills in evaluating the credibility of information sources and frequently encounter issues with plagiarism. While search skills may not be a problem for learners in the digital age, they still lack skills in evaluating, analyzing, and synthesizing information. Additionally, graduate-level students often struggle with referencing and citing sources due to a lack of training in bibliographic studies. Furthermore, students sometimes choose inappropriate sources for their theses that do not align with the depth of the content." (D)"*

Additionally, it has been observed that the number of students conducting research in the field of information literacy has declined. This is primarily due to the limited number of faculty members who are actively engaged in research in this area. However, there may be studies related to information literacy in other disciplines or within the emerging dimensions of new skills as explained by a few participants.

> *"One challenge is the lack of research in information literacy. If there are no learners conducting research in information literacy, it may disappear. However, it does not mean that it is replaced." (A)"*

> *"Additionally, since there are still students in the curriculum who have not conducted extensive research, there is an opportunity to delve deeper into the human interaction aspect, the interaction between humans and information, or topics related to digital humanities, digital archives, or research on teaching and learning related to information literacy to enhance students' knowledge and learning skills. This includes educational technology, which plays a role in creating information communication for learning as information service providers." (B)"*

"I feel that information literacy education is very important, but there are too few people doing this in Taiwan. Librarians are doing it, but most of them are database retrieval." (I)"

Additionally, some researchers who still adhere to the traditional framework or model for studying information literacy are concerned that information literacy skills should be limited to the field of library science. As a result, instructors may not be adequately prepared to adapt to the current real-world situations and contexts that arise as illustrated by following quote,

"However, many other universities conduct extensive research in this field, including other disciplines such as education. But the main concern is the important issue of research that does not occur in our research community. The new paradigm or framework that adapts to changing times is still based on old models. This is a more significant concern. For example, there are few who know and understand the ACRL Framework, which has been announced for 1 0 years. Most research still relies on old standards, and it can be a significant problem. I'm not worried about the decrease in the number of researchers in this field but concerned that researchers cannot step out of the old framework they used to work with, which is more alarming. I think in many countries, they don't need researchers who work extensively in information literacy and are not tied to information science. However, the important issue is how to design teaching models that are in line with the social context of each area." (A)"

Awareness of the true significance of information literacy remains a challenge that requires a genuine and clear understanding**.** There is still a general lack of understanding about the perspective of information literacy and the efforts made by Library and Information Science (LIS) to promote information literacy skills. As a result, most educational management tends to focus more on programming than on topics related to LIS as explained by one participant,

"In my university, information literacy courses are integrated into the curricula for all undergraduate students, but the focus is often on programming rather than on topics relevant to LIS. This creates a challenge in terms of raising awareness and promoting the true essence of information literacy." (H)"

Additionally, as the participants expressed their concerns, it affected the educational management of different learners' knowledge groups. It is also considered one of the challenges in managing higher education. This is consistent with the research of Aharony et al. (2020).

In conclusion, promoting information literacy skills in higher education faces several challenges. The rapid changes in technology and communication within the education system require educators and students to continuously learn and adapt to new technologies. Additionally, there is a need to address challenges such as plagiarism, information evaluation, and information analysis, which students often encounter. Limited research in

the field of information literacy and a narrow focus on traditional frameworks or models also hinder the promotion of information literacy skills. Furthermore, there is a lack of awareness and understanding regarding the true significance of information literacy and the efforts made by LIS to enhance these skills. To overcome these challenges, it is essential to incorporate teaching and learning strategies that address the specific needs of students and prepare them to navigate the complexities of the current information landscape.

4.3.7 Expectations of instructors in promoting information literacy skills in higher education

In the current digital era, information literacy skills have become increasingly important for individuals to navigate and thrive in a data-rich society. In the context of higher education, educators play a crucial role in promoting and fostering these skills among students. They are expected to be one of the key players in fostering and promoting these skills among students. They have the expectation that students will possess information literacy skills and be able to apply them in real-life situations.

In interviews, several points were mentioned. The first point emphasizes the significance of information literacy skills at all levels. Therefore, it is recommended that government agencies have a role in promoting and supporting the development of information literacy skills.

> *"Ministry of Education should provide support for this matter at all levels, starting from early childhood education. Information literacy skills should be integrated into every subject and taught to all students, regardless of their background. It should be taught in an integrated manner to avoid wasting time and to ensure its applicability in all subjects and in the present time." (E)"*

As illustrated in the following excerpt,

> *"The first step toward promoting information literacy is to garner attention from the government, universities, and teachers. A consensus must be reached on the significance of information literacy, and indicators of ability should be constructed. Courses aligned with the information literacy skills of college students can be offered as general education or model courses. The utilization of MOOCs, similar to the approach in Sri Lanka, can help popularize information literacy education. However, I believe that further promotion requires the development of a white paper on information literacy education in Taiwan. This document would provide guidance to the government and universities on how to effectively implement such education." (I)"*

The next point is research in the field of information literacy. Researchers have studied various aspects of information literacy in order to find methods for developing these skills. Research and scholarly studies are essential in this regard, and it is evident that there is a

significant amount of research conducted in both library science and other disciplines related to information literacy. One of the instructors has expressed concerns related to research in information literacy that are relevant to their perspectives as illustrated by the following quote,

> *"The important point of research that does not occur in our research circles is in terms of new paradigms or new frameworks that are adaptive to the changing times. We still use the original model. This issue is more than a concern. For example, is there anyone who knows and understands the ACRL Framework that has been published for 10 years, which is very rare? Most research is still using old standards, and this is likely to be very problematic. I'm not concerned about the decrease in the number of people doing research in this area. But I'm worried that people doing research in this field will not be able to step out of the traditional framework that they used to be able to do." (A)"*

As illustrated in the following excerpt,

> *"Personally, I believe that research on information literacy in Thailand may be replaced due to the current research landscape being predominantly focused on digital literacy. Therefore, research aimed at finding methods or approaches to develop information literacy skills may undergo changes." (C)"*

In addition to this, teachers also have expectations related to the need for changing learning formats to effectively develop students' information literacy skills. Teachers aim to enable students to collect, organize, and present information efficiently. They also emphasize the importance of students' ability to analyze and evaluate information systematically, so that they can apply the knowledge and information they have learned in real-life situations effectively. Ultimately, teachers have the expectation that students will become individuals with information literacy skills who are ready to participate and thrive in a digital society that is abundant with data.

> *"I believe that in the future, there will be more emphasis on interactive, task-based activities in education. Traditional lectures may take a back seat, and instead, there will be increased opportunities for students to engage in discussions, interact with each other, and apply what they have learned through various tasks and activities. This interactive approach can enhance the learning experience and allow students to actively implement the knowledge and skills they have acquired. In terms of expectations, the content of information literacy courses may focus on evaluating the quality of information. Students will learn how to assess the reliability and credibility of sources, discern between accurate and inaccurate information, and determine the relevance of information to their needs. It's not just about identifying right or wrong information, but also about understanding whether the information is suitable and useful for their specific purposes." (H)"*

In summary, in the current digital era, information literacy skills are essential for individuals to thrive in a data-rich society. Instructors in higher education play a critical role in promoting and fostering these skills among students. They expect students to possess information literacy skills and apply them effectively in real-world situations. Government agencies should support the integration of information literacy skills into the education

system at all levels. Research in the field of information literacy is essential for developing effective methods and frameworks. Teachers also emphasize the need to change learning formats to enhance students' information literacy skills, focusing on tasks, interactivity, and practical application. The expectations include students' ability to evaluate information quality, discern its relevance and suitability for specific purposes, and communicate effectively about information.

4.4 Summary

This study utilized bibliometric, content analysis, and interview methods to investigate information literacy research and instruction in higher education in Asian. The bibliometric analysis focused on the direction and trends of research, identifying key journals, influential authors, and common keywords. The study employed bibliometric mapping analysis to categorize and visualize keyword clusters, providing insights into the research landscape. The content analysis examined information literacy research in Asian higher education, revealing a growing body of literature distributed across different periods. It identified top contributing countries, journals, participant demographics, research methods, domains, and research themes. The research themes explored affective, behavioral, and cognitive aspects, contributing to understanding information literacy development. The study also discussed the use of information literacy standards in curriculum design, highlighting the need for further exploration in this area.

Instructors from Taiwan and Thailand highlighted the role of universities and libraries in promoting information literacy skills in higher education. They emphasized the importance of information literacy skills across all educational levels and discussed integrating it with digital literacy. Concerns were raised about disparities in information literacy skills during the transition to higher education. To enhance students' information literacy, participants suggested universities support and enhance skills through policies, programs, and collaborations with libraries and faculties. Recommendations included incorporating information literacy into the curriculum, providing access to resources, and offering courses or training. Libraries were recognized for facilitating information literacy development, and raising awareness among administrators and educators was deemed significant.

While consistent information literacy standards were emphasized, most interviewees did not follow specific international standards. The ACRL Information Literacy Standards for Higher Education (2000) and ACRL Framework for Information Literacy for Higher Education (2016) were widely adopted, with some instructors still using the older standards. Universities in Thailand and Taiwan implemented the ACRL framework in various ways, either in its entirety or customized to their needs. The ACRL Framework for Information Literacy Sandbox offered valuable resources, but the diverse contexts of universities prevented selecting a single national framework. The challenges arose due to the different characteristics of state universities, private universities, and open universities. Therefore, adopting international standards was considered the best approach. In Thailand, there was a lack of vision in developing educational leaders and specific models reflecting a clear perspective on human development. Training courses on internet usage and digital citizenship primarily targeted specific groups rather than higher education levels.

At the tertiary education level, information literacy instruction involves professors, librarians, and students. Professors teach various information literacy topics within their courses, while librarians provide guidance and assistance to students in information searching and source selection. Students play an active role in developing their own information literacy skills through critical thinking and effective information searching. Collaboration between teachers and librarians is crucial for enhancing information literacy skills. They can work together in designing activities, developing curricula, and supporting students. Government initiatives promote access to information and online learning, while the Ministry of Education focuses on curriculum development and teaching methods emphasizing information literacy and technology.

Different institutions have varying approaches to integrating information literacy into the curriculum, and libraries offer training workshops and resources. Graduate-level teaching focuses on advanced research skills. Challenges include instructors' lack of expertise and the need for effective curriculum design for online learning. The development of information literacy skills is influenced by learner-related factors, instructor knowledge, societal and technological factors, and educational policies. A comprehensive approach is necessary to foster effective information literacy skills development.

Promoting information literacy skills in higher education faces challenges due to the rapidly changing technology landscape. Challenges include plagiarism, information

evaluation, and limited research in information literacy. There is a lack of awareness regarding the significance of information literacy. To overcome these challenges, tailored teaching strategies and research in the field are needed. Instructors expect information literacy to be integrated into all subjects, with government support. They emphasize the need for interactive and task-based learning activities. Instructors have high expectations for students to possess strong information literacy skills in order to thrive in a digital society.

Among the three methods scrutinized in this study, congruity in the findings emerged. Be it bibliometric analysis, content analysis, or interviews methods, the evidence resoundingly attests that Asian nations steadfastly uphold information literacy as a central tenet of higher education. This commitment is underscored by their cognizance of the multifaceted challenges inherent in fostering information literacy proficiencies among higher education learners, particularly within an educational landscape profoundly influenced by technological dynamism. The imperative of adapting to the swift cadence of technological evolution in pedagogy is accentuated, necessitating a recalibration of instructional paradigms. This entails the seamless infusion of information literacy into the curriculum, both holistically and at the subject-specific level. The artful orchestration of these integrations coalesces into a potent learning experience, fostering a nuanced comprehension of information literacy principles.

The pivotal roles of educators and librarians cannot be overstated in the cultivation of information literacy competencies. This responsibility is marked by a collaborative synergy, underpinned by a shared commitment to the enhancement of learners' information literacy skills. Their concerted efforts reverberate through the educational ecosystem, impacting the trajectory of student learning outcomes. Yet, this collective endeavor transpires against a backdrop of challenges intrinsic to information literacy education, chief among them being the whiplash-inducing pace of technological mutation. Concomitantly, the formulation of judicious policies, incentivizing these initiatives, assumes a critical dimension. Equally indispensable is the deployment of pedagogical methodologies that align with the swiftly evolving information landscape. In essence, this study underscores the unwavering dedication of Asian nations to information literacy within higher education, notwithstanding the intricate challenges it entails. In this educational milieu profoundly shaped by technological currents, the call for adaptability and synergy among stakeholders resonates as a potent impetus.

Simultaneously, when scrutinizing divergences within the study findings, a notable contrast emerged. Within the ambit of content analysis concerning information literacy research in Asian countries, a distinctive trend surfaced. It became evident that the adoption of the standardized framework outlined by the ACRL assumed a pivotal role. This framework not only served as a foundational reference for propelling the cultivation of information literacy competencies within higher education but also guided the construction of a comprehensive pedagogical scaffold. Conversely, in the realm of interview outcomes, a nuanced differentiation emerged. It was discerned that no singular educational institution rigidly adhered to a solitary standard. Instead, these institutions adeptly maneuvered within a realm of adaptability, judiciously employing overarching principles or frameworks. This strategic alignment was executed with astuteness, ensuring harmonization with the distinctive contours of their curricula and the learning capacities of their diverse student cohorts. In essence, while uniformity characterized the content analysis trajectory, underscored by the ACRL framework, a contrasting flexibility underscored the interview findings. Here, educational institutions judiciously eschewed a one-size-fits-all approach, opting instead to sculpt their information literacy initiatives to the unique tapestry of their educational landscapes and learners' aptitudes.

Chapter 5. Conclusions and Suggestions

This study examined information literacy research and instruction in higher education in Asian countries. Using bibliometric, content analysis, and interview methods, it explored trends including the directions, characteristics and distribution of research, and the situation of information literacy instruction in higher education. The first section analyzes research publications in the Web of Science SSCI database to identify prominent themes, influential journals, and key authors. The second section explores the status and distribution of research through content analysis, revealing growth patterns, top contributing countries and journals, research methods, and emphasis on different dimensions of information literacy. The third section presents insights from interviews with instructors in Taiwan and Thailand on universities' role in promoting information literacy skills.

Based on the study's findings, several suggestions are proposed. These include promoting collaboration between teachers and librarians, adopting consistent information literacy standards, integrating information literacy into the curriculum, and emphasizing learner engagement. It is also important to address challenges related to technology, limited research, and awareness of information literacy's significance. The findings highlight the importance of collaboration between teachers and librarians, consistent information literacy standards, curriculum integration, and learner engagement. Challenges such as technology, limited research, and awareness need to be addressed.

5.1 Conclusions

5.1.1 The direction and trend of information literacy research

The scope of this study encompassed the systematic screening of ILHE studies published between 2000 and 2022, culled from the WoS database, for the purpose of conducting bibliometric mapping analysis as well as content analysis. Among the corpus of 150 ILHE studies examined, notable prominence emerged from authors affiliated with People's Republic of China, Taiwan, and South Korea, was 73, 26, and 17 studies, respectively. Moreover, the ILHE research exhibited a persistent upward spanning the years 2015 to 2022. From the results of the bibliometric mapping analysis, it was found that:

In Asian countries, the ILHE studies from 2000-2022 had 506 key terms. It formed five research themes focusing on “Information literacy needs and challenges among college students, including e-health literacy, information-seeking behavior, media literacy, nursing students, and self-efficacy”, “Integration of information literacy in blended and e-learning environments, focusing on higher education, lifelong learning, and student engagement”, “Technology and information literacy, exploring CALL, digital literacy, EFL contexts, and multiliteracies”, “Information literacy in the context of China and COVID-19, examining the landscape, health information literacy, and undergraduate students”, and “Academic libraries, information literacy, and learning effectiveness in higher education settings”. Moreover, the predominantly employed by authors within Asian scholarly encompasses keywords such as information literacy, digital literacy, higher education, undergraduate students, academic libraries, and college students.

Additionally, these analyses provide insights into the citation and co-citation patterns, highlighting key journals and authors contributing to the research landscape. The analysis examined the citation analysis of 150 articles from 72 different journals. Prominent journals included "Computer assisted language learning," "Computers & education," and "Journal of academic librarianship." Co-citation analysis revealed influential journals such as "Journal of computer education," "Computer human behavior," and "Journal of academic librarianship." The analysis focused on the most cited authors in the field. Notable authors included Lai, Chun, Gu, Ming-Yue, and Sin, Sei-Ching Joanna. A study by Lai, C. & Gu, M. titled "Self-regulated out-of-class language learning with technology" received significant citations. Co-citation analysis identified Tsai, MJ, Bandura, A., Hafner, Christoph A., and Prensky, M. as influential authors in the field.

5.1.2 Characteristics and distribution of research articles

To deeper comprehension of the landscape of ILHE studies, a meticulous process was undertaken. This entailed a deliberate selection of evidence-based research through rigorous manual review, succeeded by comprehensive content analysis. This subsequent content analysis was conducted to facilitate a comparative assessment of the research outcomes across Asian countries as follows:

1. With regarding to the participation and sample sizes, a predominant focus on undergraduate students characterizes a substantial proportion of ILHE studies within Asian

countries. A notable exemplar in this regard is Hafner (2014), who advocated for the adaptation of pedagogical approaches to equip students for future challenges, while also advocating for the integration of project-based learning utilizing digital media to augment language learners' communicative proficiencies. Expanding beyond the purview of undergraduate students, ILHE studies within Asian contexts also extend their examination to encompass mixed participant groups and educational practitioners, particularly teachers. This observation resonates congruently with the findings presented by Tu et al. (2023), underscoring that the discourse on ILHE studies during the period spanning 2011-2020 has prominently featured discussions pertaining to undergraduate students, mixed participant, and teachers. Akin to the present study, this alignment in outcomes is striking. However, divergences emerge in the findings presented by Chen et al. (2021) who identified undergraduate, mixed, and graduate students as the focal subjects of the top 100 highly cited ILHE studies from 2011-2020. Similarly, another study by Chen et al. (2022) noted the prevalence of discussions centering on undergraduate students, teachers, and mixed participants in the top 100 cited ILHE studies from 2011-2020. It is noteworthy that within ILHE studies in Asian countries, there exists a lack of research to matters concerning graduate students and librarians in the context of information literacy education and instruction, a facet deserving of further study.

2. Regarding the dimension of sample sizes, a prevailing trend within the initial and subsequent stages of analysis is the predominant utilization of large sample sizes (>150) in most of the ILHE studies within Asian contexts. This pattern of inquiry is congruent with the findings articulated in the research conducted by Chen et al. (2021) and Tu et al. (2023). Furthermore, the scope of information literacy investigations in higher education, characterized by sample sizes exceeding 150, chiefly centers on two overarching research trajectories. Firstly, a substantial corpus of studies examines the influence of college students' antecedent digital experiences, delving into how these experiences shape their digital literacy competencies. Additionally, a significant subset of research probes the application of self-regulated learning strategies (SRLS) to enhance digital literacy in the context of digital learning. The overarching objective underlying these inquiries is the cultivation of human capital to sustain lifelong learning endeavors, thereby contributing to the paradigm of sustainable educational development (Kim et al., 2018; Anthonysamy et al., 2020). Furthermore, select studies venture beyond the confines of pedagogical contexts to explore broader societal and educational implications associated with technological

advancements in the 21st century (Feng & Ha, 2016). Additionally, inquiries into the interplay between personality traits, specifically conscientiousness, openness to experience, and extroversion, and their consequential impact on information competency also constitute a salient facet of ILHE research (Kwon & Song, 2011).

3. Regarding to research methods, the predominant utilization within ILHE studies across Asian countries is that of the quantitative approach, followed sequentially by mixed methods and qualitative methods. This trend is not only congruent with the findings elucidated by Chen et al. (2021), Chen et al. (2022), and Tu et al. (2023), but also underscores a consistent pattern within the field. The quantitative methods are the predominant research modality adopted in ILHE studies within Asian countries. Its primary application resides in the exploration of various facets, including but not limited to factors shaping university students' attitudes towards employing social media for educational purposes, and the intricate interplay between information literacy and social media competence among university students. Noteworthy instances of this utilization include studies by Yuan et al. (2021) and Zhu et al. (2021). These observations underscore the discernment among researchers in this domain for the value that both quantitative methods and mixed methods bring forth. The deliberate adoption of these rigorous research paradigms furnishes a robust foundation for eliciting comprehensive perceptual insights and delving into profound data pertaining to information literacy within the higher education context across diverse Asian countries. This methodological rigor enables scholars to not only attain a deeper comprehension of the intricacies of information literacy and its ramifications for students, but also to enhance educational practices through informed decision-making.

4. In the realm of research domains, the category of "Unspecified" emerged as the most frequently explored, closely trailed by "Mixed Disciplines" and "Language." As the second stage unfolded, the trajectory of ILHE research witnessed a notable surge in its application within "Mixed Disciplines" as well as "Language," with a pronounced significance observed in the context of "Library and Information Science." Considering these findings, it is suggested that forthcoming ILHE studies delve into the evaluative dimensions of information literacy when applied within additional subject domains, particularly those characterized by interdisciplinary perspectives. It is noteworthy to mention that a somewhat divergent set of results is discerned within Chen et al.'s (2021) study, wherein the analysis of the top 100 highly cited ILHE studies spanning the period from 2011 to 2020 revealed that "Unspecified" fields garnered the highest prevalence, trailed by "Library and

Information Science" and "Mixed Disciplines" Conversely, Tu et al.'s (2023) research findings underscored that "Mixed Disciplines" constituted the focal point of ILHE studies during the same timeframe, followed by "Unspecified" fields and "Library and Information Science."

5. In the context of information literacy standards, the predominant pattern observed in ILHE studies conducted across Asian countries predominantly entails a course design devoid of explicit reference to established standards. This pattern substantiates the findings elucidated in the research conducted by Chen et al. (2021), Chen et al. (2022), and Tu et al. (2023). Furthermore, within the spectrum of ILHE studies undertaken within Asian nations, the course design landscape exhibits a hierarchy wherein a preponderant emphasis is placed on courses that lack reference to established standards. For instance, Ching (2018) has notably contended that the Lighthouse Heritage Research Connections (LHRC) initiative exemplifies a commendable instance of the integration of the ACRL framework. This underscores how the LHRC initiative is attuned to and integrates the fundamental principles and guidelines stipulated by the framework. Similarly, Xie's study (2020) outlined how the University of Macau's library, as per their methodology, aligned its approach to research skills dissemination for honors students with the tenets of the ACRL framework. This encompassed the delivery of information literacy concepts through lectures, practical demonstrations, and in-class exercises.

6. Concerning the research themes, a pronounced proclivity towards the exploration of affection dimensions is discernible within ILHE investigations conducted across Asian countries. This trend aligns with the conclusions drawn by Chen et al. (2021), Chen et al. (2022), and Tu et al. (2023). In a broader context, the predilection for delving into the affection dimension remains a predominant characteristic of ILHE inquiries within Asian countries, with a specific focus on attitudes, learners' perspectives or educational experiences, attitudes and effort. For example, Lerdpornkulrat et al., (2019) mentioned the "motivational goal orientation" scale and the "regulation activities when applying search strategies" scale. These scales were used to assess students' attitudes and efforts in the study. Additionally, in the conclusion section of, it is mentioned that using a rubric as a self-assessment tool allows students to evaluate their effort and strategies used on tasks, which can boost their self-efficacy in learning tasks. Concerning cognition-related topics, the predominant focus of ILHE research within Asian countries has primarily centered on the investigation of learning accomplishments. For example, Chang & Chen (2014) evaluate the

learning effectiveness of the online general education information literacy materials "Library and Information Utilization" in Taiwan using the Kirkpatrick four-stage framework. The findings can guide the future development of digital learning materials and help instructors improve the design and delivery of online courses. The study also suggested that the Kirkpatrick model is a useful tool for measuring the effectiveness of information literacy courses and evaluating the application of information competencies in further study and lifelong learning.

5.1.3 The situation of information literacy instruction in higher education

1. Regarding the role of information literacy skills in higher education and beyond was highlighted through interviews conducted with instructors from Thailand and Taiwan. Participants emphasized the significance of information literacy in today's information-driven world, emphasizing the skills needed to access, evaluate, and utilize information effectively. The findings showed that information literacy is essential across all educational levels and empowers individuals to make informed decisions and actively engage with information. The interviews also emphasized the evolving nature of information literacy, including the integration of digital literacy skills. Concerns were raised about disparities in students' information literacy skills during the transition from secondary to higher education.

However, Educational institutions play a key role in integrating information literacy into the curriculum. This can be done through stand-alone information literacy courses, as well as through embedding information literacy skills into other courses. While libraries offer a variety of services to support information literacy, including instruction, research assistance, and access to information resources. It also plays a pivotal role in supporting information literacy education by providing practical training workshops, seminars, and discussions. They create instructional guides and tutorial videos to assist students in developing information literacy skills. Libraries also collaborate with teachers to effectively promote and contribute to information literacy education.

2. Regarding Information literacy standards, establishing consistent information literacy standards is essential to ensure learners acquire authentic skills. Interviews in Thailand and Taiwan revealed a lack of adherence to specific international standards for enhancing information literacy. The ACRL Standard in 2000 and the ACRL Framework in 2016 are widely recognized and adopted globally. While some instructors perceive the 2016

framework as similar to the previous standards, universities in Thailand and Taiwan have implemented the ACRL framework in various ways, customizing it to their needs. The adoption of international standards addresses the diverse contexts of universities and promotes quality education in information literacy. However, challenges arise in selecting a national framework due to different university characteristics. The ACRL Framework for Information Literacy Sandbox supports instructors with teaching materials. The absence of clear educational models in Thailand and concerns about leadership development highlight the need for vision in the education system. In conclusion, consistent standards, such as the ACRL frameworks, are crucial for fostering genuine information literacy skills, but adopting international standards while addressing local contexts is preferred.

3. In responsibility for instruction of information literacy, highlight the shared responsibility for teaching ILHE among professors, librarians, and students.

- Professors play a crucial role in instructing and guiding students in developing these skills, covering topics such as information retrieval, data analysis and evaluation, and the use of information technology. They receive training in information literacy knowledge and skills, as well as course design and instructional strategies.

- Librarians also have a significant role in teaching information literacy skills. They provide guidance and support to students and faculty in finding and using information resources. Librarians offer instruction on proper information searching, database usage, and the selection of appropriate information sources. They are instrumental in helping students navigate through the vast amount of available information and make informed decisions. The presence of librarians, workshops, and training programs in the library further supports information literacy skills development.

- Students, on the other hand, have a crucial responsibility in taking ownership of their own learning and actively utilizing information literacy skills to complete their coursework effectively. They need to learn how to search for information efficiently, analyze and evaluate data critically, and present information effectively. Active engagement in the learning process, application of critical thinking skills, and the ability to navigate and utilize information play a pivotal role in students' overall success in information literacy.

Collaboration between teachers and librarians is essential in designing and managing instructional activities that enhance information literacy skills. Working together, they can develop curricula, design learning experiences, and provide guidance and support to students in their information-seeking endeavors. This collaborative approach ensures a holistic and integrated approach to information literacy education, promoting the seamless integration of information skills across various subjects and disciplines.

In conclusion, the responsibility for teaching information literacy skills lies with professors, librarians, and students in tertiary education. Professors guide students in developing these skills, librarians provide support and instruction, and students actively engage in their own learning. Collaboration between teachers and librarians enhances the effectiveness of information literacy education. The combined efforts of all stakeholders contribute to the cultivation of well-rounded individuals with strong information literacy skills, enabling them to succeed in their academic pursuits and lifelong learning endeavors.

4. Regarding characteristics of teaching information literacy, the predominant teaching approach observed is the integration of information literacy into various subjects. This approach aims to develop students' understanding of the research process, their ability to analyze and evaluate information, and their capacity to verify reliable and trustworthy data. Emphasis is also placed on developing presentation and communication skills, as well as proficiency in using information technology and communication tools.

The incorporation of information literacy within the curriculum displays a spectrum of divergence among institutions, encompassing a myriad of distinct approaches. Some universities make information literacy a mandatory subject for all students, while others offer it as an elective or restrict it to specific faculties. The specific approach to curriculum integration depends on factors such as the institution's educational philosophy, disciplinary focus, and overall program structure. At the graduate level, teaching and learning methods in information literacy differ due to the higher knowledge foundation of students. Graduate education emphasizes advanced research skills, critical analysis, and the ability to generate new knowledge in the field. Specialized topics, including advanced research methodologies, scholarly communication, data management, and information ethics, are incorporated into the curriculum for graduate students. Information technology is extensively utilized in teaching and learning practices. Virtual classrooms, video conferencing platforms, interactive boards, game-based learning, and social media platforms

are employed to enhance student engagement and interaction. Information technology also plays a role in assessing learning outcomes, with tools like Moodle supporting exam administration, processing, grading, and analytics.

In conclusion, effective information literacy instruction requires the integration of information literacy into various subjects, with an emphasis on research skills, critical analysis, and the use of reliable information. Information technology plays a significant role in teaching and learning, and learner engagement and interaction are crucial. As online learning becomes more prevalent, thoughtful curriculum design is essential to enhance information literacy skills and adapt to the changing educational landscape.

5. Regarding factors related to the development of information literacy skills, the development of information literacy skills is a multifaceted process influenced by various factors. This research has explored several key factors that play a significant role in shaping the acquisition and advancement of these skills. The findings indicate that learner-related factors, instructors' knowledge and abilities, societal factors, the continuous advancement of technology, challenges in applying research findings, and education-related policies at the country level all contribute to the development of information literacy skills.

- Learner-related factors - Learner-related factors, such as existing knowledge and personal attitudes towards instructional formats, have a direct impact on the acquisition of information literacy skills. Learners' educational background and access to information technology were identified as crucial factors. It is essential for instructors to recognize and accommodate learners with different levels of skills, adapting their teaching methods to ensure effective knowledge transfer.

- Instructors' knowledge and abilities - The knowledge and abilities of instructors in teaching information literacy skills are paramount. Instructors must stay updated with new technologies and emerging sources of information to effectively guide learners. The incorporation of technology into teaching and learning practices enhances the learning experience and enables educators to keep pace with the evolving technological landscape.

- Societal factors - Societal factors, including the availability of information technology infrastructure, also play a significant role in the development of

information literacy skills. Access to reliable internet connectivity, computer devices, and efficient management systems for information formats contribute to improved learning outcomes. The rapid development of technology brings about challenges in content production, information gathering, seeking, and evaluation, necessitating a shift from traditional teaching methods.

- Challenges in applying research findings - While research studies have examined factors impacting information literacy skills, applying these findings in teaching practices can be challenging. Further efforts are needed to bridge the gap between research and practical application. The involvement of professional associations and educational institutions can help advocate for research that can be effectively utilized in practice.

- Education-related policies at the country level - At the country level, education-related policies shape and promote the development of information literacy skills. However, these policies may change with shifts in leadership, potentially affecting the continuity and prioritization of information literacy education. It is crucial for both the Ministry of Education and university administrations to establish supportive policies that emphasize and prioritize information literacy initiatives.

In conclusion, fostering the development of information literacy skills requires a comprehensive approach that considers the interplay of learner-related factors, instructors' knowledge and abilities, societal factors, challenges in research application, and education-related policies. Understanding and addressing these factors will contribute to the effective cultivation of information literacy skills, equipping individuals with the necessary competencies to navigate and utilize information effectively in the digital age.

6. In Challenges and difficulties in promoting information literacy skills in higher education, it is crucial in the digital era, but it comes with various challenges and obstacles that must be addressed. This research has examined several key challenges that hinder the effective promotion of information literacy skills at the advanced education level. These challenges include:

• Rapid technological changes: Both educators and students must continuously learn and adapt to new technologies to effectively navigate the evolving information landscape.

Information literacy skills are constantly evolving due to technological advancements, necessitating continuous understanding and adaptation to new tools, platforms, and information sources.

• Lack of strong and clear policies by the government and Ministry of Education: In formulating national policies that show the importance and promotion of information literacy skills. which in fact the government plays a crucial role in creating an environment that fosters learning and information sharing. This includes policies that support access to information and resources, as well as initiatives to promote digital literacy. While the Ministry of Education focuses on curriculum development and teaching methods that emphasize information literacy and the use of technology in learning. This includes providing professional development for teachers on information literacy, as well as developing resources and materials to support instruction.

• Motivation and confidence building: Motivation plays a vital role in promoting information literacy skills from the students' perspective. Instilling motivation in students enhances their enthusiasm for learning and fosters a deeper exploration of topics of interest. High motivation leads to more effective knowledge and skill development, building students' self-confidence and focus. Addressing motivation-related challenges, such as overconfidence or lack of interest, is crucial to promoting information literacy skills effectively.

• Addressing specific skill deficiencies: Specific skill deficiencies, such as plagiarism, information evaluation, and information analysis, pose challenges in promoting information literacy skills. The curriculum must incorporate teaching and learning strategies that address these challenges and enhance students' lacking skills. Evaluating the credibility of information sources, synthesizing information, and referencing and citing sources are essential skills that need to be emphasized and taught effectively.

• Limited engagement in research related to information literacy: The decline in the number of students conducting research in this field poses a risk of diminishing focus on information literacy. However, there are opportunities to explore new dimensions and emerging topics within information literacy, such as human interaction with information, digital humanities, and research on teaching and learning. Encouraging interdisciplinary research and collaboration can expand the scope of information literacy studies.

• Adherence to traditional frameworks or models in studying information literacy: Some researchers and educators still rely on outdated models, limiting their ability to adapt to current real-world situations and contexts. Embracing new paradigms and frameworks that align with the changing times is essential to effectively promote information literacy skills. Designing teaching models that are contextually relevant and aligned with the social context of each area is crucial for promoting information literacy.

• Lack of awareness and understanding about the true significance of information literacy: Many educational institutions tend to focus more on programming rather than on topics relevant to information literacy. Raising awareness and promoting the essence of information literacy requires clear and genuine understanding of its perspective and the efforts made by LIS to enhance these skills.

• Lack of knowledge and expertise among instructors in information literacy: Instructors without a formal background in LIS may lack the necessary expertise, resulting in ineffective teaching methods and the potential dissemination of misinformation. It is crucial for instructors to possess genuine knowledge and understanding of the subjects they teach.

In conclusion, promoting ILHE faces several challenges that must be overcome. Adapting to rapid technological changes, addressing motivation and confidence building, targeting specific skill deficiencies, promoting research engagement, moving beyond traditional frameworks, and increasing awareness and understanding are key areas that require attention. Through the assimilation of efficacious pedagogical methodologies, the cultivation of interdisciplinary research pursuits, and the nurturing of a profound comprehension regarding the import of information literacy, higher educational establishments can effectively champion the cultivation of these indispensable proficiencies. Consequently, they empower students to adeptly navigate the intricate nuances inherent to the digital information landscape.

7. Regarding the expectations of instructors in promoting information literacy skills in higher education, the acquisition of information literacy skills has emerged as a crucial necessity for individuals to effectively navigate and succeed. Within the realm of higher education, instructors play a pivotal role in nurturing and promoting these skills among students. This study delves into the expectations held by instructors regarding the promotion of information literacy skills, shedding light on key aspects including the overarching

significance of these skills across educational levels, the imperative of government support, the centrality of research in the field, and the evolving expectations concerning learning formats. Educators underscore the importance of information literacy skills across all educational levels. They anticipate active promotion and support from government agencies for the development of these skills. It is recommended that information literacy skills be seamlessly integrated into the curriculum of all subjects, reaching all students irrespective of their educational backgrounds, starting from early childhood education. By integrating information literacy skills in a comprehensive manner, educational institutions can optimize time utilization and ensure the practical applicability of these skills across diverse subjects and real-world contexts.

Furthermore, this research highlights the critical role of research in advancing effective methods and frameworks for information literacy. While research has been conducted within library science and related disciplines, concerns persist regarding the limited adoption of new paradigms and frameworks that can adapt to the evolving landscape. Overreliance on outdated models and standards hinders the progress and effectiveness of information literacy research. Consequently, there is an urgent need to foster a deeper understanding and wider adoption of new frameworks, such as the ACRL framework, to propel the field forward and enhance the development of information literacy skills. Instructors also express expectations pertaining to evolving learning formats to effectively cultivate students' information literacy skills. Traditional lecture-based approaches are gradually giving way to more interactive and task-based activities. This transition facilitates a proactive involvement of students in discussions, fosters collaborative interactions among peers, and facilitates the practical application of their acquired knowledge and competencies across diverse tasks and undertakings. Central to this endeavor is the augmentation of the holistic learning experience, fostering an environment wherein students are endowed with the agency to adeptly apply the knowledge and competencies they have garnered. The curriculum of information literacy courses may be strategically tailored to center on the meticulous evaluation of information. Such courses can impart to students the requisite skills to discern the reliability, credibility, accuracy, and relevance of sources. The goal is to equip students with the ability to discern the suitability and usefulness of information for their specific needs, moving beyond a simplistic binary notion of right or wrong information.

To conclude, instructors in higher education harbor high expectations regarding students' information literacy skills. Government support plays a pivotal role in seamlessly

integrating information literacy skills at all educational levels. The research community should focus on developing effective methods and frameworks, alongside a wider adoption of new paradigms and frameworks in the field. Instructors also underscore the importance of embracing evolving learning formats to enhance students' information literacy skills, with a particular emphasis on interactivity, task-based activities, and practical application. Meeting these expectations will empower students to acquire the requisite information literacy skills necessary to thrive in a data-rich digital society, enabling them to effectively evaluate information quality, discern relevance, and communicate about information with confidence and competence.

5.2 Discussions

The results derived from the integration of bibliometric analysis, content analysis, and interview data have provided valuable insights into the notable import of information literacy within the higher education, alongside offering a comprehensive overview of the prevailing landscape of information literacy instruction across Asian countries.

1. The findings of this research elucidated that international, as well as multidisciplinary databases, notably exemplified by the Web of Science, displayed minimal representation of scholarly contributions originating from Asian countries. However, it also identified a consistent upward trend in the number of information literacy publications. It is important to note that a significant body of research may be available within each country's national database. Therefore, to ensure a comprehensive and in-depth examination of the field, the inclusion of studies from national databases would be necessary.

2. This study only focuses on English research articles. But Asian countries have a diversity of national languages in each country. The researcher highly recommended that local researchers undertake comprehensive investigations into information literacy research within their country in both national and foreign languages. Such an approach is necessary to accurately depict the information literacy research landscape in each country and provide a more nuanced understanding of the situation.

3. This study has underscored a dearth of comprehensive investigations concerning information literacy within the landscape of higher education across Asian nations. The research landscape still exhibits a conspicuous gap pertaining to the nuanced examination of the existing landscape of information literacy education within diverse

learning contexts, as well as the exploration of varied research themes inherent to higher education. Furthermore, the integration of information literacy into specialized disciplinary learning endeavors, alongside its amalgamation within interdisciplinary courses, remains a relatively underexplored domain within ILHE studies in Asian countries. Considering these observations, it is prudent to extend the purview of inquiry to encompass domains such as Arts, Sciences (Physics, Chemistry, Biology), Engineering (including computer-based courses), and Social Studies (including History) within the framework of ILHE studies within Asian contexts. This expansion of focus could potentially unearth valuable insights into the interplay between information literacy and diverse disciplines.

4. Researcher recommended a collaborative endeavor involving librarians, educators, and curriculum designers to collectively formulate student-centered learning. This collaborative initiative is advised to be rooted in a comprehensive exploration of diverse standards or frameworks, with a particular emphasis on the assimilation of the ACRL framework during the process of course redesign. This transformative approach to curriculum development should encompass the skillful integration of a range of pedagogical strategies, thereby cultivating a learning environment that resonates with a student-centered learning.

5. The formulation of unequivocal policies by governmental bodies, Ministries of Education, educational institutions, academic libraries, and faculty members is imperative to seamlessly integrate information literacy into the fabric of disciplinary learning within the higher education. Moreover, the efficacy of collaborative efforts among these entities in designing curricula aimed at enhancing the potency of pertinent course offerings merits concerted attention and exploration.

6. Research on ILHE studies within Asian countries predominantly centers on affection issues. Consequently, it is advisable that forthcoming scholarly investigations into relatively less explored issues. For instance, learning performance, learning behaviors, correlation or causal analyses, information literacy assessment, and others.

In conclusion, this study amalgamates insights from three distinct methodologies to reveal a coherent theme. Across bibliometric, content analysis, and interviews, a resounding consensus emerges - Asian nations steadfastly prioritize ILHE. This commitment stems from an acute awareness of the multifaceted challenges posed by rapidly evolving technology. The imperative to adapt teaching and learning to technological shifts is evident. Seamless

integration of information literacy into the curriculum, both holistically and tailored to subjects, forms a potent educational strategy. Educators and librarians play pivotal roles in fostering information literacy skills, resulting in enhanced student outcomes despite the challenges inherent in this domain. Simultaneously, divergences arise. Content analysis emphasizes the role of the ACRL framework as a guiding force, while interviews illuminate a nuanced flexibility in its implementation. Educational institutions adeptly calibrate their approaches, aligning overarching principles with unique curricula and learner profiles. In essence, this synthesis underscores Asian nations' unwavering dedication to information literacy despite challenges. Adaptability and collaboration stand as potent tools in this endeavor. This study thus exemplifies the dynamic interplay between unison and diversity, reflecting the core of education's transformative power and the enduring relevance of information literacy in higher education.

5.3 Suggestions for future research

Considering the outcomes derived from the findings of this study, the researcher proffers the suggestions as viable directions for prospective research endeavors pertaining to information literacy in higher education.

1. Conducting comprehensive information literacy research by utilizing various databases for the expansion of data sources, including both international and national databases. This broader approach will provide a more comprehensive understanding of the direction and trends in information literacy research across different platforms. Furthermore, it helps reduce bias that may arise from relying solely on a single database for data selection.

2. Extends the search terms to include new words emerging in future studies. Ongoing technological progress and evolving dynamics have given rise to a lexicon encompassing diverse facets of information literacy. This semantic expansion has engendered a wealth of connotations associated with information literacy, including but not limited to terms such as information skill, library literacy, media literacy, digital literacy, technology literacy, ICT literacy, IT literacy, transliteracy, internet literacy, media and information literacy, metaliteracy, traditional literacy, computer literacy, network literacy, new literacy, and multiliteracies. The incorporation of this extensive array of terminologies is imperative to facilitate a comprehensive and inclusive exploration of the subject matter.

3. Conducting in-depth qualitative studies to explore the nature of the educational situation from the perspective of instructors. Incorporating a broader spectrum of educators hailing from diverse Asian countries holds the potential to enrich and refine the comprehension of information literacy pedagogy within the realm of higher education. This inclusive approach is poised to engender a multifaceted and intricate perspective on the intricacies of information literacy dissemination and cultivation. This approach will help identify contextual factors and variations specific to Asian countries.

4. Investigation ILHE focuses on other educational levels, such as secondary education or primary education. By undertaking this comparative study, a more comprehensive and interconnected comprehension of the evolution of information literacy can be fostered, spanning various levels of education. Additionally, it can help researchers identify similarities and differences in information literacy practices and pedagogies from different educational levels.

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Appendix 1

Dimensions and questions for the interview

Dimensions	*Questions*
1. The role of the university and the library	(1) Do you agree that information literacy skills are still important in higher education? (2) Does your university have a policy that promotes information literacy? (3) How does your university contribute to the development and enhancement of students' information literacy skills?
2. Information literacy standards	(4) What international standards/frameworks does your institution use as a model for developing information literacy skills?
3. Responsibility for instruction	(5) Who is primarily responsible for developing information literacy skills?
4. Characteristics of teaching information literacy	(6) Can you describe the information literacy course? (Course titles and topics of instruction, Curriculum models, Credit courses, Instructional methods and Activities, Assessment of student learning)
5. Factors related to the development of information literacy skills	(7) What factors affect the promotion/support of information literacy skills in higher education? (8) Due to the COVID situation, many educational institutions have switched to online learning. Does it affect learners' development of information literacy?
6. Challenges and difficulties in promoting information literacy skills in higher education	(9) What are the challenges and difficulties in promoting the development of information literacy?
7. Expectations of instructors in promoting information literacy skills in higher education	(10) What are your expectations for teaching and learning to promote information literacy in higher education in the future?