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Integration of Information Literacy Training across University

Objective. The purpose of this article is to present information literacy integration into university curriculum at all levels and to provide insights into how artificial intelligence is changing information retrieval and information behaviour. **Methods.** The methodology used in this article was a case study. As a case analysed Kaunas University of Technology information literacy integration into all study levels. The literature review, analysis of documents, and results of students' surveys were used as methods to collect data and gain a more in-depth understanding of certain issues of a targeted group of individuals. **Results.** The library plays a key role in supporting the development of information literacy at all levels of study. In order to strengthen collaboration with academics and assist students in developing information literacy skills, new positions were established in the library, such as subject librarians and data librarians. Information literacy (IL) training is fully integrated into all levels of study. Bachelor and master's students receive six hours of compulsory IL training, while doctoral students take an optional course in Research Data Management (RDM). University students, researchers, and academic staff can improve their information literacy skills by participating in stand-alone training courses provided by the library. The library also offers Moodle-based self-paced courses in Lithuanian and English, as well as training on artificial intelligence tools and ethical information use. Students rate the training courses high value and very high value the competence of librarians in delivering training and providing assistance on various information literacy issues. **Conclusions.** Integration of information literacy training across all levels of university study programmes is essential to prepare students for academic and professional success in an information-rich society. Libraries play a key role as educators, facilitators, partners, and resource providers in this endeavour. A disciplinary and developmental approach ensures that IL skills are relevant, meaningful, and effectively embedded within the curriculum. The content and scope of information literacy education must be improved in line with the emergence and development of information technology and artificial intelligence. By adopting strategic, collaborative, and innovative practices, universities can cultivate a culture of information competence that benefits students throughout their academic journey and beyond.

Keywords: information literacy; library training; university curriculum; artificial intelligence; case study

Introduction

Today's university students are considered part of the "digital generation," but they begin their studies without advanced information search or evaluation skills (Gross & Latham, 2012). However, information literacy is important for university students so that they could succeed academically, conduct research effectively, and become lifelong learners. The term "information literacy" is sometimes incorrectly used as a synonym for "library instruction", but its meaning is much broader. Information literacy is defined as "the set of integrated abilities that encompass reflective discovery of information, understanding how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning" (The Association of College and Research Libraries [ACRL], 2015). Information literacy is concerned with the ability to identify the information needed and to find, evaluate, use, and communicate that information ethically and legally. The aspect of information literacy education proposed by the Library and Information association CILIP (2018) involves a shift from a prescriptive, mandatory approach to information literacy, where information specialists have the

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"right" answer and test students' ability to achieve it according to universal standards, to a relative, contextual approach, in which students actively search and use information according to their needs.

The approach that introductory level classes, are sufficient for developing students' information literacy is changing. Information literacy education is integrated throughout the entire study programme; it is designed to be systematically integrated into the university curriculum at various study levels. Information literacy education reflect the shift from information literacy to information fluency, and the expanding definition of information literacy to include multiple literacies, for example, media literacy, digital literacy, artificial intelligence (AI) literacy, etc. (Ruan, 2025).

Information retrieval is "non-linear and iterative, requiring the evaluation of a range of information sources and mental flexibility to pursue alternative avenues as new understanding develops" (ACRL, 2015). The search begins with a question that guides the choice of search tools and information sources. Involving research, discovery, and chance, the search identifies both possible relevant sources and the means to access those sources. Novice learners may search for a limited set of resources as well as use a limited set of search strategies, while advanced users and experts may search more broadly and deeply to identify the most appropriate information for the scope of the project (ACRL, 2015). Different levels of study require the development of information literacy skills of varying complexity. Information literacy skills involve basic information retrieval skills, such as identifying information needs, searching, selecting, etc., as well as higher-level cognitive skills such as critical evaluation of information sources, their use in written work, and analysis and synthesis skills, the development of which cannot be ensured by the efforts of librarians alone. Information literacy research has indicated that librarians teach lower-level information literacy skills, while teachers help students acquire higher-level IL skills, mainly through writing an essay (Svensson, Wilk, Gustafsson Åman, 2022). Therefore, collaboration between librarians and teachers in developing information literacy skills is important for the continuous and sustainable development of information literacy.

Information literacy training cannot depend solely on knowledge of a single discipline; it must transcend disciplinary boundaries and facilitate the integration and combination of multidisciplinary knowledge and skills. The information literacy curriculum "incorporates and integrates science and technology, characterised by interdisciplinary integration and the properties of science across disciplines" (Ruan, 2025). Information literacy development is both a disciplinary and a transdisciplinary learning agenda, and using a conceptual framework for information literacy programme planning, librarian-faculty collaboration, and student co-curricular projects can offer great potential for curricular enrichment and transformation. Students with strong information literacy skills can conduct comprehensive literature reviews, critically evaluate research findings, and effectively communicate their research through appropriate citation practices. This leads to the production of high-quality results and promotes the participation in research within the institution.

The development of information literacy is traditionally the responsibility of librarians. Librarians not only teach students how to find information sources in the library and the Internet, but also have broader goals, such as teaching them how to evaluate information, critical thinking skills, and other abilities. The efforts of librarians alone are not enough to develop these skills. Information literacy education requires the collective efforts of librarians, media specialists, technologists, and educators across the educational spectrum (Head, Fister, & MacMillan, 2020).

The emergence and development of artificial intelligence is significantly changing the methods and possibilities of information discovery, screening, selecting, and integrating

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information, requiring new skills from individuals for information retrieval and critical evaluation of information, becoming a particularly relevant skill. Long and Magerko (2020) define AI literacy as “a set of competencies that enables individuals to critically evaluate AI technologies, communicate and collaborate effectively with AI, and use AI as a tool online, at home, and in the workplace.” Artificial intelligence tools undoubtedly have a significant impact on students' information search behaviour, so librarians need to re-evaluate, update, and enhance information literacy education programmes; innovate teaching methods in order to respond more effectively to the challenges of modern society. Changes caused by artificial intelligence and digitalisation make developing higher-order skills, lifelong learning, and recognition of learning more relevant (Ramírez-Montoya, Quintero Gámez, Sanabria-Z, & Portuguez-Castro, 2024). Integrating artificial intelligence training into information retrieval practices is important to continue monitoring how AI impacts education, with the goal of fostering positive outcomes (Reiter, Jörling, Fuchs, & Böhm, 2025).

In this context, traditional information literacy education, focused on teaching literature search skills, does not meet the needs of today's students to improve and achieve success. Therefore, information literacy training must be urgently improved, updated, and modernised. IL training must focus on systematic IL training, intentional training in advanced skills, and iterative training in basic and advanced skills (Svensson, Wilk, Gustafsson Åman, 2022). IL education should be based on stronger faculty-librarian collaborations to improve students' IL skills (Perez-Stable, Arnold, Guth, & Meer, 2020). Establishing a scientifically based support system, covering educational implementation methods, team formation, and effectiveness assessment, is essential to facilitate the effective implementation of information literacy education (Ruan, 2025): explicit courses; invisible curricula; special training seminars; information literacy workshops; online instruction.

The purpose of this article is to present information literacy integration in university studies at all levels and to provide information on how artificial intelligence is changing information retrieval and information behaviour. The article discusses the practices applied by the Kaunas University of Technology Library in programmes at all levels of study and their value for student academic success and lifelong learning. It also presents the results of a student survey on the training provided by librarians.

Methods

The methodology used in this article was a case study. As a case is analysed Kaunas University of Technology information literacy integration into all study levels. A case involves a detailed examination of a subject (the “case”) within its real-life context (Yin, 2018). The case analysis allows us to look at the object of study from different perspectives and combine various data collection methods and select several qualitative and quantitative methods that complement each other. The case analysis was chosen on the basis of the research objectives. It explores the details of the research object and the connections between them as a unified whole.

The literature review, document analysis, and survey results analysis were used as methods to collect data and gain a more in-depth understanding of certain issues from a targeted group of individuals. The data for the analysis were collected from the university's and library's annual reports, as well as from annual surveys of students at all levels of study.

Results and Discussions

Kaunas University of Technology case

The university aims to improve the learning environment, the quality of studies, and the student experience at the University, aiming to provide modern and diverse opportunities for development for each student. In response to the changing environment, evolving student needs and the need to rapidly implement innovations in the field of study, the university continues to improve its teaching / learning methods and infrastructure. The university is expanding its spaces for practical skills training and is supplementing them with exceptional technologies. Much attention is paid to the renovation of spaces dedicated to challenge-based, blended, and hybrid learning, as well as to the implementation of digital technologies.

Currently, 7,549 students are studying at the university: 4,932 of them are students of the first cycle (bachelor's) and integrated studies, 2,212 – master's students, 333 doctoral students. More than 1,278 international students study at KTU. At the university, students can choose from 121 study programs (43 bachelor's, 55 master's, and 22 doctoral). Most of the programs are available in Lithuanian and English: 80 bachelor's and master's degree programs and all doctoral degree programs are taught in English. All doctoral degree programs are taught in English. The university offers 24 joint and double degree programs (*Annual Report, 2024*). Flexible learning opportunities are approved in first and second cycle study programs. The study process includes the preparation of an individual study adjustment plan, according to which a person with individual needs agrees on a study plan at the beginning of the academic year.

The total number of employees is 1,845 FTE, academic staff is 1,072 employees (909 full-time equivalent (FTE)). The library is being transformed together with the university. As university didactics change and innovative active learning methods are introduced, library resources and services need to change with them. Libraries and their role have also evolved over the last few decades, becoming open, communicative, and providing support and access to e-resources. The library has shifted their focus towards user-centered design principles, taking into account the needs and preferences of library users. They gather feedback, conduct usability studies, and continuously improve services and spaces based on user input. The library strengthen collaboration with other University units, including academic departments, research centres, and technology services. Librarians collaborate to meet the evolving needs of the students, researchers and academics and to explore opportunities for shared resources, expertise, and innovation.

The subject librarian position was established at the library in 2014. The subject librarians are responsible: for communication with faculty members; renew study modules catalogue (main study literature); provide training sessions and consultations; provide support and approve final thesis uploaded into institutional repository.

The university is one of the institutions most actively involved in data management competence development, as it has been a partner in OpenAIRE since 2009. The library organised numerous events related to open access and research data management: conferences, workshops, training sessions, and also have developed a web-based training course. With the support of OpenAIRE and FOSTER, events e.g. conferences, workshops and round-table discussions were organised for research administrators, researchers, librarians, etc. The data librarian position was established in the library in 2015. With the growth of data-driven research, the library expanded their services to include data management support. Librarians provide training, assist researchers in organising, storing, and preserving research data, as well as providing guidance on data management plans, data sharing, and open access to research output.

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The university has developed and implemented an information literacy system for both face-to-face and online courses. In this framework, basic information literacy covers skills from beginners to advanced and experienced information users.

Library training is integrated into undergraduate, graduate and postgraduate curricula and is compulsory for first and second cycle studies. Information literacy education has been integrated into master's level studies since 2016. By order of the Vice-Rector for Studies, 6 hours of information literacy education are integrated into the final project module. In bachelor's studies, information literacy education has been integrated into the introduction to studies in the first year and the final project module since 2019. The duration of the training for bachelor students is 6 hours. Library training is provided by 12 subject librarians, 4 information managers, and 4 FTE data librarians.

One of Library attempts to move from stand-alone to built-in activities in RDM was developing a PhD course on Research Data Management. The work started with developing materials in Lithuanian and also formalising the course. Librarians developed a data management course for PhD students. The course "Research Data Management" consists of 7 topics. It was approved on the committee of the joint Doctoral Programme in Educational Sciences in June 2017. It is part of the PhD curriculum as an elective course from September 2018. At the beginning it was 6 ECTS course, since 2021 it was converted into 1 ECTS course as one of the electives for developing generic competences for PhD students. Topics covered in the module are: scholarly communication, open science initiatives, RDM, RDM plan and guidelines, FAIR data, data standards, data licencing and data citations; using and sharing data; data repositories and archives.

The Library has been promoting the development of students' information literacy: introductory training sessions on the Library information system, information searching, evaluation and ethical use are given to first-year bachelor students, while master's students receive advanced information retrieval and ethical use and resources management skills development. PhD students are trained in research data management, open access, publishing and related topics. The artificial intelligence tools, University policy on AI use is introduced as well. Training is not only integrated into bachelor's, master's, and doctoral study programs, but independent training as stand-alone training is also provided, and individual consultations are offered to users. This is the result of intensive collaboration with the Study department and faculty administrations.

Students, researchers and academics also have possibility to learn online using self-paced Moodle learning courses in two languages: Lithuanian and English. Moodle courses contain learning materials, videos, assignments, self-assessment questions, quizzes, and other tasks.

Students survey results

The university annually conducts surveys of students at all levels of study programmes to assess the quality of the resources, services, and training provided by the library. Bachelor, master's, and doctoral students provide their assessments of various library services, including training, which is conducted as integrated into study programs or as independent training. A total of 1,370 students participated in the 2025 survey evaluating library services and training: 912 bachelor's students, 386 master's students, and 62 doctoral students, including 180 international students.

Students rated the library trainings and services on a 5-point scale. Library training was rated 4.05 points, and the assistance provided by librarians was rated 4.32 points. Students at different levels of study evaluated the training provided by the library quite differently. Doctoral students gave the highest ratings to the training and support provided by librarians. Master's

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students gave slightly lower ratings. Bachelor's students gave the lowest ratings to the training provided by librarians.

Table 1

Question statement	Bachelor students	Master's students	Doctoral students
The competence of the staff delivering library training is appropriate	3.94	4.14	4.42
I can use the knowledge I have acquired in IL training	3.88	4.10	4.45
The duration of the training sessions organized by the library is appropriate	3.91	3.96	4.39
The training sessions organized by the library are useful	3.81	4.01	4.33
The number and frequency of library training courses organized are sufficient.	3.67	3.95	4.29
I prefer remote library training sessions to traditional ones because they are convenient for me to attend	3.59	4.04	4.23

When asked what topics they would like to see prioritised in training, most of the students expressed a preference for training related to copyright and plagiarism prevention, citation and referencing, and detecting plagiarism in the final thesis and assignments. The need to participate in training on various topics related to information literacy varies. Students' responses indicate that training needs depend on their field of study and the course they are taking. However, it is clear that students most often feel the need for training related to the legal and ethical use of information. Some responses, such as those regarding the need for training in artificial intelligence, require deeper analysis and investigation. Although students are increasingly using content created by artificial intelligence, the need to learn how to use artificial intelligence to obtain information has decreased from 13.2% in 2024 to 9.7% in 2025. It can be assumed that during this period, students' ability to use artificial intelligence tools to search for and obtain information has improved, so they need less training. However, the question arises as to whether students always provide information about the artificial intelligence tools they use, whether they mention this in their work, cite and include them correctly in the reference list. The decrease in demand for "information retrieval using AI tools" does not necessarily imply mastery; it may indicate overconfidence or insufficient understanding of the associated risks. IL training needs to evolve from teaching how to find information to teaching how to ethically verify, validate, and use AI-generated content.

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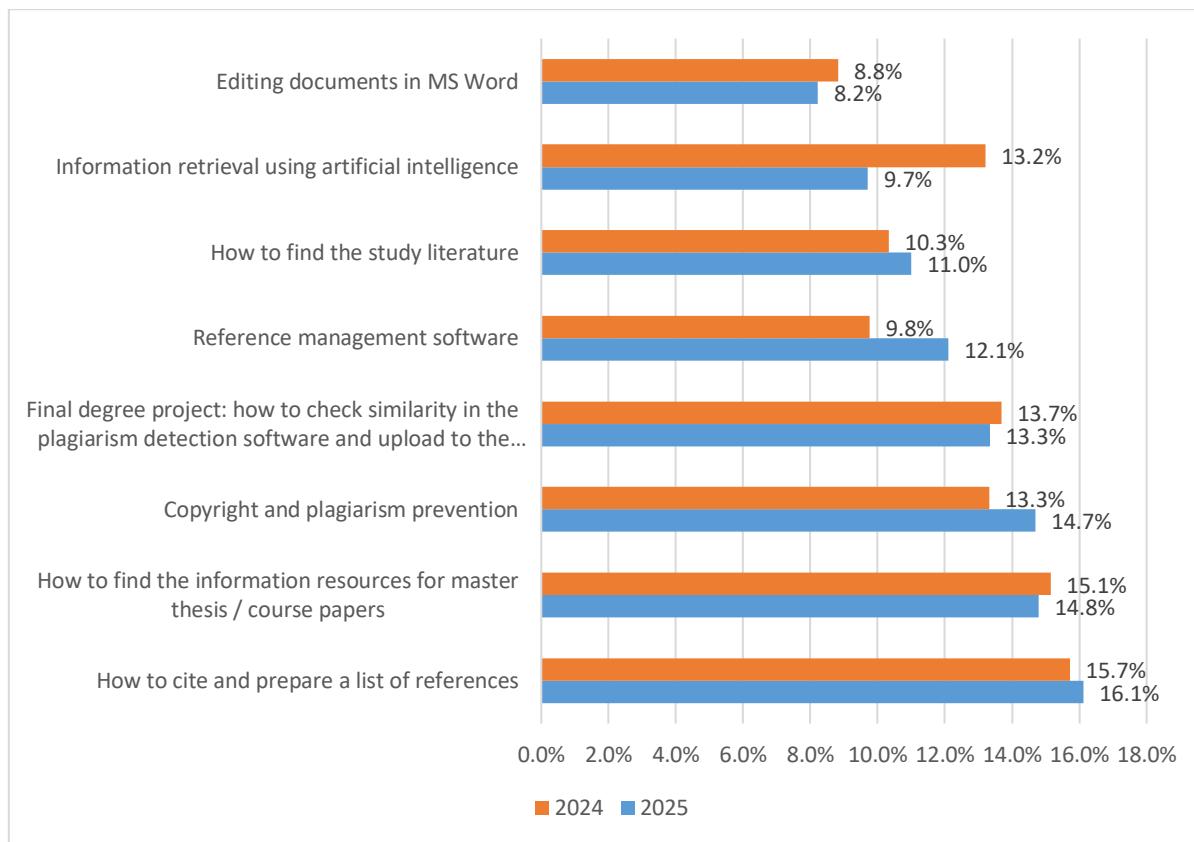


Fig. 1. Training topic priorities according to student survey

Conclusions

Integration of information literacy training across all levels of university study programmes is essential to prepare students for academic and professional success in an information-rich society. Libraries play a key role as educators, facilitators, partners, and resource providers in this endeavour. A disciplinary and developmental approach ensures that IL skills are relevant, meaningful, and effectively embedded within the curriculum. The content and scope of information literacy education must be improved in line with the emergence and development of information technology and artificial intelligence. By adopting strategic, collaborative, and innovative practices, universities can cultivate a culture of information competence that benefits students throughout their academic journey and beyond.

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Впровадження навчання інформаційної грамотності в університеті

Мета. Мета цієї статті – представити інтеграцію інформаційної грамотності в університетську програму навчання на всіх рівнях та надати уявлення про те, як штучний інтелект змінює пошук інформації та інформаційну поведінку. **Методика.** У цій статті використовувалася методологія кейс-стаді. Як кейс аналізувалася інтеграція інформаційної грамотності в Каунаському технологічному університеті на всіх рівнях навчання. Для збору даних та отримання більш глибокого розуміння певних проблем цільової групи осіб були використані огляд літератури, аналіз документів та результати опитувань студентів. **Результати.** Бібліотека відіграє ключову роль у підтримці розвитку інформаційної грамотності на всіх рівнях навчання. З метою зміцнення співпраці з науковцями та надання допомоги студентам у розвитку навичок інформаційної

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грамотності в бібліотеці були створені нові посади, такі як бібліотекарі-предметники та бібліотекарі даних. Навчання інформаційної грамотності (ІГ) повністю інтегровано в усі рівні навчання. Студенти бакалаврату та магістратури проходять шість годин обов'язкового навчання ІГ, а аспіранти – факультативний курс з управління даними досліджень (RDM). Студенти, дослідники та наукові співробітники університету можуть покращити свої навички інформаційної грамотності, беручи участь в окремих навчальних курсах, що проводяться бібліотекою. Бібліотека також пропонує курси на базі Moodle, які можна пройти у власному темпі, литовською та англійською мовами, а також навчання з використання інструментів штучного інтелекту та етичного використання інформації. Студенти високо оцінюють навчальні курси та дуже високо оцінюють компетентність бібліотекарів у проведенні навчання та наданні допомоги з різних питань інформаційної грамотності. **Висновки.** Інтеграція навчання інформаційної грамотності на всіх рівнях університетських навчальних програм є необхідною для підготовки студентів до академічного та професійного успіху в суспільстві, багатому на інформацію. Бібліотеки відіграють ключову роль у цій справі як освітяни, посередники, партнери та постачальники ресурсів. Дисциплінарний та розвивальний підхід гарантує, що навички інформаційної грамотності є актуальними, значущими та ефективно інтегрованими в навчальну програму. Зміст та обсяг навчання інформаційної грамотності необхідно вдосконалювати відповідно до появи та розвитку інформаційних технологій та штучного інтелекту. Застосовуючи стратегічні, спільні та інноваційні практики, університети можуть розвивати культуру інформаційної компетентності, яка приносить користь студентам протягом усього їхнього академічного шляху та після нього.

Ключові слова: інформаційна грамотність; бібліотечна підготовка; університетська програма; штучний інтелект; тематичне дослідження

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