Fostering Learners' AI Readiness

FLAIR

Co-funded by
the European Union

KEY ACTION

Partnerships for cooperation and exchanges of practices

ACTION TYPE

Cooperation partnerships in higher education

WEB INFORMATION

https://erasmus-plus.ec.europa.eu/projects/search/details/2024-1-AT01-KA220-HED-000250730
https://wu.ac.at/flair

Tilburg University
Understanding Society

UCC
Coláiste na hOllscoile Corcaigh
University College Cork, Ireland

Universitat Ramon Llull

University of Tartu

WU Wirtschaftsuniversität Wien
Vienna University of Economics and Business

Yeditepe Üniversitesi

Work Package 2

AI Competence Frameworks and Policies in Higher Education: Analysis and Recommendations

National Report by

WU – Vienna University of Economics and Business

Claudia Böck
Hedda Guggenberger
Johanna Warm
Katrin Bleckenwegner

4th April 2025

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or OeAD-GmbH. Neither the European Union nor the granting authority can be held responsible for them.

For further information please contact:

Dr. Johanna Warm
Coordinator

Vienna University of Economics and Business
Teaching & Learning Development | Program Management & Teaching & Learning
Welthandelsplatz 1
1020 Vienna
Johanna.warm@wu.ac.at

Table of contents

Executive Summary

This report explores the current state of the integration of AI into higher education on national and global levels, with the aim of developing a comprehensive framework for AI literacy in teaching and learning. Currently, there are no binding national regulations regarding AI in higher education in Austria. In 2021, the national AI strategy titled “Artificial Intelligence Mission Austria 2030” (AIM AT 2030) was published, which also applies to the education sector. This strategy promotes certain areas of utilization such as intelligent tutoring systems or analysing learning data. Furthermore, it highlights the importance of using AI tools in teaching in a responsible and pedagogically sound manner. It further emphasizes data protection and the need for accompanying evidence-based research on the effectiveness of AI.

A national study conducted by Brandauer et al. (2024) on the use and competence of AI among Austrian rectors, teachers and students reveals that AI applications have primarily been limited to language processing and text analysis. Future applications are anticipated to focus mainly on material creation and plagiarism detection. The study identified several challenges, including data protection, copyright law, and the learning effort required for the effective use of AI. Both teachers and students expressed concerns about the potential loss of specialized knowledge and the uncertainties around AI usage. Interviews with rectors and vice-rectors highlight the importance of AI competencies, which encompass not only technical skills but also critical thinking, ethical considerations, and the evaluation of AI-generated results.

At the university level, institutions have developed their own individual guidelines for integrating AI into teaching and learning. They have also established measures such as task forces and provided didactic resources to support their faculty.

Vienna University of Economics and Business (WU) has addressed the challenges and opportunities of integrating AI into its teaching and learning processes by further measures beyond the abovementioned, such as the development and provision of a series of tailored workshops to support teachers use AI competently.

Regular faculty meetings provide an opportunity for teachers to exchange experiences and strategies in dealing with AI. Additionally, a comprehensive survey was conducted to assess the use of AI within departments, and the results will be used to develop targeted support measures.

Current and future efforts aim to enhance WU’s strategy by teaching students' essential skills for utilizing generative AI tools. A significant milestone in this initiative was the introduction of a *Policy on Lists of Aids Used in Student Seminar Papers and Theses*.

Moreover, the performance agreements for 2025–2027 with the Austrian Ministry of Education include provisions for additional modules, training offerings, and digital resources to strengthen AI skills at various levels.

The findings of the national study align with the results of the content analysis described in Chapter 4 in several ways. This analysis shows that AI literacy, in all the examined documents, goes far beyond technical knowledge and encompasses a profound understanding of ethical, societal, and pedagogical dimensions of AI use. For the analysis

of AI competence frameworks in this national report, the content analysis of the following four publications has provided valuable results:

- Australian Department of Education (2023). Australian Framework for Generative Artificial Intelligence in Schools.
- Chan, C.K.Y. (2023). A comprehensive AI policy education framework for university teaching and learning.
- Hervieux, S./Wheatley, A. (2024). Building an AI Literacy Framework: Perspectives from Instruction Librarians and Current Information Literacy Tools.
- World Economic Forum (2025). Future of Jobs Report 2025.

The Australian framework emphasizes the safe, ethical, and inclusive integration of AI in schools, guided by six key principles. Chan (2023) presents the "AI Ecological Education Policy Framework", a systemic model that brings together pedagogical, operational, and governance aspects. Hervieux & Wheatley (2024) particularly stress the importance of a critical and reflective engagement with AI, while the World Economic Forum (WEF) focuses on the labour market relevance of AI literacy.

Core competencies are grouped into technical, pedagogical, ethical, societal, and workplace dimensions. Teachers need a basic technical understanding of AI, skills in prompt engineering, and the ability to integrate AI meaningfully into teaching and learning. Students should be empowered to use AI tools critically and responsibly and recognize ethical concerns.

As ethical issues, data privacy, bias in AI systems, and risks to academic integrity are mentioned among the major challenges, there is a clear need for professional development opportunities for teachers and the establishment of institutional guidelines for the responsible use of AI.

The reviewed documents mention comprehensive teacher training programs, the promotion of interdisciplinary skills among learners, and the integration of ethical reflection as a core element of AI literacy. Overall, AI should not only be seen as a technical tool but also as a pedagogical and reflective instrument.

To summarize, AI literacy must be understood as a dynamic and evolving set of competencies. The growing presence of AI technologies calls for regularly updated frameworks, flexible educational processes, and a stronger focus on societal values.

1. Introduction

With the rise of generative artificial intelligence in the public discourse and consciousness, since ChatGPT was released for public use on 30 November 2022, expectations have been high. It can be observed that the use of AI tools in different types of business is not only becoming more frequent, but also more varied. This raises the question how higher education institutions can deal with this topic – and its rapid development.

Starting from early 2023, higher education institutions across the globe have increased their efforts in integrating AI skills in their curricula, developing guidelines, exchanging good practices and discussing what future skills students need to be equipped with. This is even more relevant, as the global labor market shows a clear surge of demand for AI-related skills.

Within the FLAIR project, the consortium will be working on one aspect within this discourse: AI competences for teaching staff and students at higher education institutions – in theory (e.g. in this first deliverable of the project) and in practice (in the subsequent work packages, where self-learning modules for students and learning nuggets that teachers can use in their classes will be developed).

In this report, as part of work package 1, we will focus on AI frameworks and competences that can be derived from these frameworks. Within the FLAIR consortium, a selection of AI frameworks was collected, that the partner universities will analyse with the scope of identifying skills and competences that are considered a relevant part of AI literacy. The outcome, a synthesis across the analyses of all partners, will be the basis for the development of a novel AI literacy framework, that can then be fruitfully translated into an application-oriented didactic framework as the basis for self-learning modules and learning nuggets that will be used in the partners' institutions.

In chapter 2 of this report, we will provide an overview of the national context regarding AI in Austria, before we share insights on the way WU addresses AI in learning and teaching (chapter 3). Chapter 4, the main part of the report, will focus on four selected AI skills frameworks and the competences they rely on. We will end with a comprehensive conclusion, including recommendations for competences to be included in our AI literacy framework.

2. National policy and practice regarding AI in Higher Education in Austria

The following section presents a general overview regarding AI in Higher Education in Austria based on relevant political strategies and university-specific guidelines and frameworks. Current research projects about using AI in HEI are also included.

National Policy and Strategy

In Austria, there are no specific national regulations for AI in higher education, however there is a very comprehensive national strategy for AI with some measures in the education sector that was published in 2021 ("Artificial Intelligence Mission Austria 2030" AIM AT 2030). This strategy emerged from an extensive stakeholder engagement process involving over 160 experts from diverse fields. Parallel to this, an agile approach to new requirements and challenges has been adopted in the development of the 2024 Implementation plan. In line with the vision of 'human-centred AI' in the Austrian AI strategy, all measures in the 2024 implementation plan are based on the fundamental European values and the upcoming European legal framework. The implementation of the European AI Act itself is also part of the Implementation Plan 2024 (Federal Chancellery Republic of Austria, 2024). The measures mentioned in the AIM AT 2030 strategy relate to 11 fields of application, including AI in education.

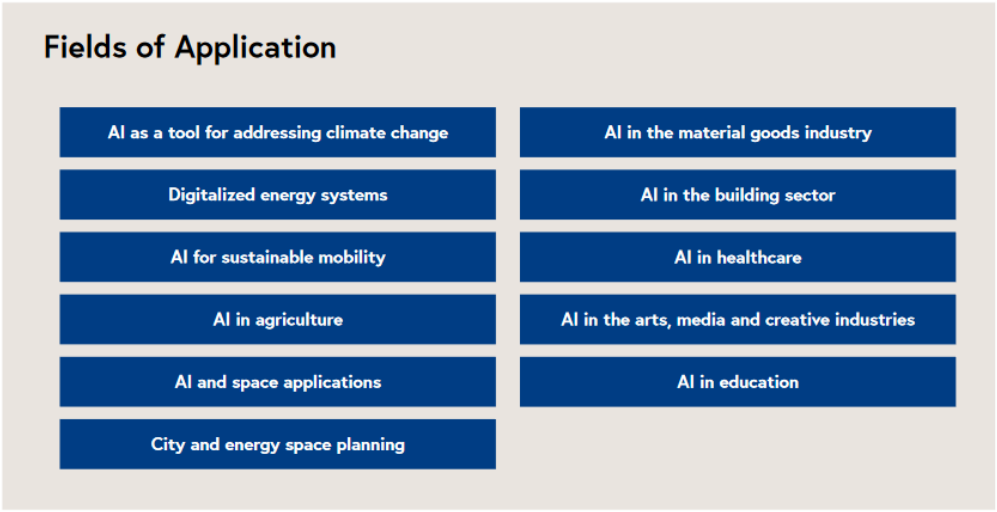

Fig.1: Fields of KI-Applications. Source: Federal Government Republic of Austria, 2021a, p.11

The section on AI in education gives a positive endorsement with specific actions worthy of funding:

"*AI-based tools offer potential for personalised and individual support for lifelong learning at all levels of education. The aim is the responsible and pedagogically/didactically meaningful use of AI-based tools as support for teachers and learners, always with critical reflection on the framework conditions and possible effects, e.g. in relation to data*

protection (personal data). This is always accompanied by the creation of evidence for the effectiveness of the aforementioned AI-based tools (accompanying research).” (Federal Government Republic of Austria, 2021b, p.22; translated with deepL)

Furthermore, four areas of utilization are mentioned that are being promoted by the ministry through pilot projects in the educational sector (Federal Government Republic of Austria, 2021b, p.22):

- Smart content: Use of AI for the automatised preparation of learning materials
- Intelligent tutoring systems: automised, personalised provision of learning materials and real-time feedback, tailored to different learning styles and needs
- Virtual learning guides: Automated communication systems for standardised scenarios in virtual learning environments
- Analysing learning data (learning analytics, predictive analytics)

The above-mentioned Implementation plan also includes two measures relating to the education sector. One measure is “Enhancing AI literacy among the population“. To this end, a study on AI literacy by the University for Continuing Education Krems (UWK) is being conducted as an initial evaluation of the current situation. Furthermore, low-threshold educational workshops are being implemented to increase AI literacy and awareness. As part of lifelong learning, the courses are offered free of charge to adults at all educational levels throughout Austria (Federal Government Republic of Austria, 2024, p. 57).

The second relevant measure for Austrian universities is the prioritisation of AI-related endeavours in the performance agreements with the public universities for the period 2025-2027 (Federal Government Republic of Austria, 2024, p. 48). Through this steering instrument, the federal ministry has direct influence on initiatives at Austrian universities. Amongst other things, the focus in the performance agreements is on:

- Harnessing the potential of AI tools in teaching, to individualise teaching and increase learning success.
- Increasing the AI skills of teachers, researchers and students to minimise potential risks associated with AI and AI use.

Besides the strategy papers, the Federal Ministry Education has drawn up the guideline “Discussion of Artificial Intelligence in the Education System”, in 2023 with the goal to raise awareness of the topic and accompany the public discourse (Federal Ministry Education Republic of Austria, 2023).

The analysis of national key policy documents shows that there are currently no mandatory regulations from the government for Austrian universities regarding the use, application or promotion of AI and AI competences in teaching and learning. The Federal Ministry steers through funding, e.g. through the prioritisation in the performance agreements with the public universities, and other initiatives, such as pilot projects and grants for research projects.

University-Specific Approaches

Austrian universities have developed individual approaches to the use of AI in teaching and learning. Overall, it can be observed that the approaches to date have focused more on

guidelines, orientation frameworks and resource materials than on policies. In the following, various AI approaches shall be outlined for illustration:

- **Vienna University's** interdisciplinary AI task force published extensive guidelines for dealing with AI in teaching and learning including an overview of AI tools, educational use cases as well as concerns regarding data protection, copyright and plagiarism. Additional support for teachers is provided by their Center for Teaching and Learning (CTL) through a video series on AI and workshops.

- **Graz University** likewise published an AI orientation framework and provides an extensive collection of resources and guidance for both teachers and students. They emphasize the importance of AI transparency and for instance provide four different text blocks on AI use for teachers to adapt and integrate in their syllabus.

- **Johannes Kepler University Linz (JKU)** has established a competence center for higher education didactics and AI-competent teaching and learning (ZHD). The core task of this competence centre is an interdisciplinary service centre for didactic, innovations and research and evaluation projects of all JKU departments. It is noteworthy that the topic of AI in teaching and learning is very prominently integrated here and has been closely interlinked with higher education didactics.

- **Paris Lodron University Salzburg (PLUS)** published specific tips for using ChatGPT & Co for integration in teaching and supporting learning for teachers in summer 2023. In addition, guidelines on the use and understanding of AI and specifically generative AI in the academic environment have been published.

National AI Research Project

In addition to existing national strategies and institutional guidelines, a national study provides concrete results on the use of AI at Austrian HEIs. In the context of this project a few designated results are highlighted in the following section.

The Austrian association fnma ('Forum neue Medien in der Lehre Austria') addressed the question of how AI will change teaching and learning in higher education in a research project funded by the Austrian Ministry of Education, Science and Research from 2023 – 2024 (Titel: "Learning from AI, teaching with AI: The future of higher education"; original title: „Von KI lernen, mit KI lehren: Die Zukunft der Hochschulbildung")

The project initially analysed the current status of the use of AI at Austrian Higher Education Institutions. It includes an analysis of the current state of art and existing policy papers. Using a quantitative survey, students and teachers were asked about their use of and experiences with AI in teaching and learning in March 2024 (teachers: n = 1.767, students: n = 3.165). During the same period (March 2024), qualitative interviews were conducted with relevant stakeholders at the universities regarding strategic orientation and structural institutional changes due to AI. Finally, options for action were developed to deal with the opportunities and risks associated with the use of AI in T&L (Brandauer et al. 2024,p.74, p. 127).

Use of and experiences with AI of Austrian teachers and students

The research project provides a very comprehensive insight into the current status of AI in the context of teaching and learning at Austrian universities. One of its strengths is certainly the detailed quantitative analyses of the structural resources and applications used by teachers and students. The data was collected in March 2024 and thus portrays the picture rather at the beginning of the increased availability of genAI tools. The results are summarised below according to three key aspects based on the project report.

Subjectively perceived competence in dealing with AI

The survey results indicate that both teachers and students in Austria generally consider themselves to be competent in the use of digital technologies. However, they feel less confident in dealing with AI applications and have little experience with predictive AI such as learning analytics or intelligent tutorial systems. There are significant gender differences that penalise female teachers and female students. Male students and teachers consider themselves to be more competent in dealing with digital technology in general as well as in dealing with the various types of AI than female students and teachers (Brandauer et al. 2024, p. 98).

Usage behaviour: Previous frequency of use and purposes of use

The majority of teachers and students have not yet used AI to predict learning outcomes or to model, adapt and optimise teaching and learning processes. Many students do not see any current or future benefits of AI for reflecting on their own learning or for group work, as do almost half of the teachers. So far, teachers and students have mainly used AI for language processing, information searches, research and text analyses. In the future, however, teachers plan to use AI in particular to create non-text-based material and for plagiarism checking. Students would like to use AI in the future primarily to increase efficiency and automation and plan to create more data analyses and data visualisations with AI tools (Brandauer et al. 2024, p. 97ff).

Opportunities, challenges and how to overcome them

Both teachers and students consider data protection and copyright to be the biggest institutional challenges when using AI. Data protection issues and the expected time required to learn how to use AI in a meaningful way are also perceived by both groups as the greatest individual challenges. Teachers also see the impending loss of expertise as a personal challenge, followed by personal rights aspects and their changed role in teaching. Students, on the other hand, are personally concerned with copyright issues, the error-proneness of AI-supported answers and outputs and learning the necessary skills for the effective use of AI tools (Brandauer et al. 2024, p.108 ff.).

Perspectives of the Rectors and Vice-Rectors of Austrian HEIs (with focus on AI literacy)

Interesting aspects about AI literacy in higher education result from the qualitative interviews with 14 members of the rectorates from different universities in Austria (Public Universities, Universities of applied sciences and University Colleges of Teacher Education). The online interviews with the rectors and vice rectors were conducted in March and April 2024 as guided, semi-structured interviews.

Almost all (vice)rectors (n=12) understand AI competences as

> *"... the ability to use different AI applications in a meaningful way and in accordance with one's own objectives. This also includes the ability to prompt appropriately, or the knowledge of different AI applications and to be able to select them according to specific targets."* (Brandauer et al. 2024, p.170; translated HG).

The analysis of the qualitative interviews resulted in a list of 10 competences, which gives a clear picture of AI literacy. These competences are:

- Targeted use of AI
- critical dealing with AI and media
- technical understanding of AI
- scientific work with AI
- critical evaluation of AI-generated output
- critical thinking
- ethical use of AI
- data protection/copyright
- critical attitude/mindsets
- source evaluation and comparison (Brandauer et al. 2024, p. 171).

Beyond this, it is remarked that professional knowledge remains essential, as it is crucial for the evaluation of AI-generated outputs, for example.

In addition, the interviewees were asked about relevant interdisciplinary competences. From the university leaders' point of view, the most important interdisciplinary competences (transversal skills) are

- critical and reflective thinking
- communication skills and
- personality-building self-competence (Brandauer et al. 2024, p. 186).

In summary, the qualitative interviews show that university management has a consistently positive and constructive attitude towards AI. The surveyed HEIs are currently focussing primarily on developing a comprehensive AI strategy and dealing with generative AI in examinations and theses. The heterogeneity of the stakeholders in terms of their level of AI knowledge is seen as a challenge internally. There are uncertainties, as AI is perceived as a disruptive and fast-moving change, the effects of which are not yet fully foreseeable. Nevertheless, the rectors and vice rectors recognise the many opportunities and potential that AI offers for their universities and society. Overall, it can be stated that Austrian HEIs are already in the process of integrating AI into everyday university life (Brandauer et al. 2024, p. 184 ff).

3. Policy and practice at Vienna University of Economics and Business: case study

Since the spring of 2023, WU (Vienna University of Economics and Business) has proactively addressed the challenges and opportunities presented by the integration of generative artificial intelligence (AI) into teaching and learning (T&L).

- Websites summarizing information and support offers for students and teaching staff have been created.
- Regular faculty meetings have been organized to facilitate open discussions on integrating AI into T&L. These sessions provide a platform for educators to share experiences, strategies, and best practices, fostering a collaborative approach to AI integration.
- A comprehensive survey and interviews were conducted across WU's departments to assess the discipline-specific use of AI in teaching, learning and research. The insights gained from this survey inform the development of targeted support and resources for faculty and students.
- Students were asked about their use of tools in the student panel monitoring in winter semester 2023/24.
- A series of workshops for faculty and students has been designed, covering critical areas such as AI citation practices (separate workshops for staff and students), addressing legal issues like copyright and data protection in relation to teaching and learning, incorporating AI in teaching planning and making teaching and learning AI-resilient. These workshops aim to equip faculty with the knowledge and tools necessary for responsible AI integration and were well received and attended by faculty.
- In November 2023, a new chapter dedicated to generative AI has been added to the "Teaching and Learning Academy," WU's online repository for educators. This chapter offers a collection of concrete methods and resources on utilizing generative AI for teaching planning and supporting students in working with AI.
- In December 2024, the new Policy on Lists of Aids Used in Student Seminar Papers and Theses was published. Starting from January 2025, students will have to submit a list of aids together with their master's and bachelor's thesis. The list of aids provides an overview of which aids students have used where, how and to what extent in a paper.
- In addition to these initiatives, WU has been actively involved in broader discussions and collaborations concerning AI in education. For instance, the Seamless Learning Conference 2024, hosted by WU, focused on the theme "AI as a Co-Teacher?" and explored how AI enables and/or limits learning and teaching effectiveness.

However, the acquisition of competences in using generative AI tools largely depends on individual teaching staff and their approach to integrating these tools into their daily practices and their teaching. To address this gap, ongoing and future activities aim to

complement WU's efforts in providing a comprehensive approach to equipping students with essential skills in using generative AI tools.

For the period of 2025-2027, within the performance agreements with the Austrian ministry for Education, WU has promised to work on students' and staffs' AI literacy at several levels. Discussions with the departments revealed a need in terms of adapting teaching and assessment designs to current AI developments and supporting staff in building AI literacy. Hence, online short modules, additional workshops and additions to the Teaching and Learning Academy are envisioned and a dynamic community hub will be piloted. Additionally, the existing range of courses and e-learning content for students on the use of AI in research-based learning and library-related topics is to be further developed and expanded.

4. Analysis of AI competence frameworks

This section presents a qualitative content analysis to examine four scientific publications for integrating AI into educational systems, with an emphasis on higher education. It explores frameworks and guidelines for AI adoption and identifies core competences required for teachers and students alike, such as prompt engineering and ethical AI use. Additionally, it highlights significant challenges faced by institutions, including issues of equity, data privacy, and the need for professional development.

Finally, it suggests specific competence areas to enhance the effective implementation of AI technologies in educational settings, aiming to foster an inclusive and forward-thinking academic environment.

4.1 Methodology and documents included in the analysis

The analysis follows a structured approach, using predefined categories, including key concepts to define AI literacy, AI competencies, challenges, recommendations, examples, ethical considerations, and future trends.

The methodology consists of the following steps:

1) Data selection: The four reports were identified by the partner institutions of the project consortium, based on their relevance to AI literacy and their focus on either educational policy or competency development.
2) Categorization: The content of the reports was reviewed according to the key themes the consortium agreed on.
3) Content analysis and interpretation: Recurring themes, similarities, and differences between the documents were identified to present a concluding interpretation of the findings in light of AI skills frameworks and the discourse on AI literacy.

Reports included in the analysis:

	Document 1	Document 2	Document 3	Document 4
Type of document (Framework, Policy, Guideline, ...)	Framework	Scholarly work	Economic/data report	Framework, scholarly work
Date of publication	Nov. 17, 2023	July 7, 2023	Jan. 2025	2024
Responsible Institution(s)	National AI in Schools Taskforce	University of Hong Kong, HKSAR, China	World Economic Forum	Choice is a publishing unit of the Association of College and Research Libraries
Responsible Persons/Authors (Position and Role)	Dep. of Education Australia	Cecilia Ka Yuk Chan	Saadia Zahidi Managing Director World Economic Forum (responsible for preface, no author indicated)	Sandy Hervieux: Head Librarian at McGill University, Montreal, Canada. Amanda Wheatley: Liaison Librarian for Management, Business, and Entrepreneurship at McGill University.
Stakeholders who play a role in the frameworks/policies	Teachers, students	Senior management, Staff, Teachers, Students	Companies, HR	Instructors, teachers, students
Target group(s)	School management	Policy makers	Companies	Academic librarians

4.2 Findings

4.2.1 Key Concepts used in the documents to define AI literacy – for students and for teachers

The Australian Framework for Generative AI in Schools developed by the National AI in Schools Taskforce and published by the Australian Department of Education (2023) does not explicitly define AI literacy but emphasizes to guide Australian schools with the use of AI- tools, and the necessity for schools and teachers to understand the workings, possibilities, and limitations of generative AI. This understanding is crucial to ensure that AI-supported tools are used safely, ethically, and inclusive for the benefit of the school communities (see Australian Department of Education, 2023, p. 3f.). Based on these three goals, the framework presents six principles (illustrated in figure 1), with 25 guiding statements.

Fig.2: Visualisation of Australian Framework for Generative AI in Schools. Source: Australian Department of Education, 2023, p.4

The principles in the area "teaching and learning" include the following:

- **Teaching and Learning**: Generative AI tools are used to support and enhance teaching and learning.
- **Impact**: generative AI tools are used in ways that enhance and support teaching, school administration, and student learning.
- **Instruction**: schools engage students in learning about generative AI tools and how they work, including their potential limitations and biases, and deepen this learning as student usage increases.
- **Teacher expertise**: generative AI tools are used in ways that support teacher expertise, and teachers are recognised and respected as the subject matter experts within the classroom.
- **Critical thinking**: generative AI tools are used in ways that support and enhance critical thinking and creativity, rather than restrict human thought and experience.

- **Learning design**: work designed for students, including assessments, clearly outlines how generative AI tools should or should not be used and allows for a clear and unbiased evaluation of student ability.
- **Academic integrity**: students are supported to use generative AI tools ethically in their schoolwork, including by ensuring appropriate attribution
  (Australian Department of Education, 2023, p.6)

Based on these principles, the following definitions of AI literacy can be derived:

- For teachers, AI literacy means using AI to enhance teaching while maintaining their role as experts. It involves understanding AI's capabilities, limitations, and biases, integrating it effectively into learning design, and guiding students in its ethical use.
- For students, AI literacy means developing the skills to use AI responsibly in their learning. This includes understanding how AI works, recognizing its potential biases, and applying it in ways that enhance critical thinking and creativity while maintaining academic integrity.

The study "A comprehensive AI policy education framework for university teaching and learning" by Cecilia Ka Yuk Chan (2023) seeks to create an AI education policy for higher education by exploring the perceptions and implications of text-generative AI technologies. Data was gathered from 457 students and 180 teachers and staff from various disciplines at universities in Hong Kong, utilizing both quantitative and qualitative research methods.

Based on the findings, the study proposes an "AI Ecological Education Policy Framework" (Chan, 2023, p.20) designed to address the complex implications of integrating AI into university teaching and learning. This framework is organized into three dimensions: Pedagogical, Governance, and Operational. The pedagogical dimension focuses on enhancing teaching and learning outcomes through AI. The governance dimension addresses concerns related to privacy, security, and accountability. Finally, the operational dimension deals with issues related to infrastructure and training (ibid., p.20).

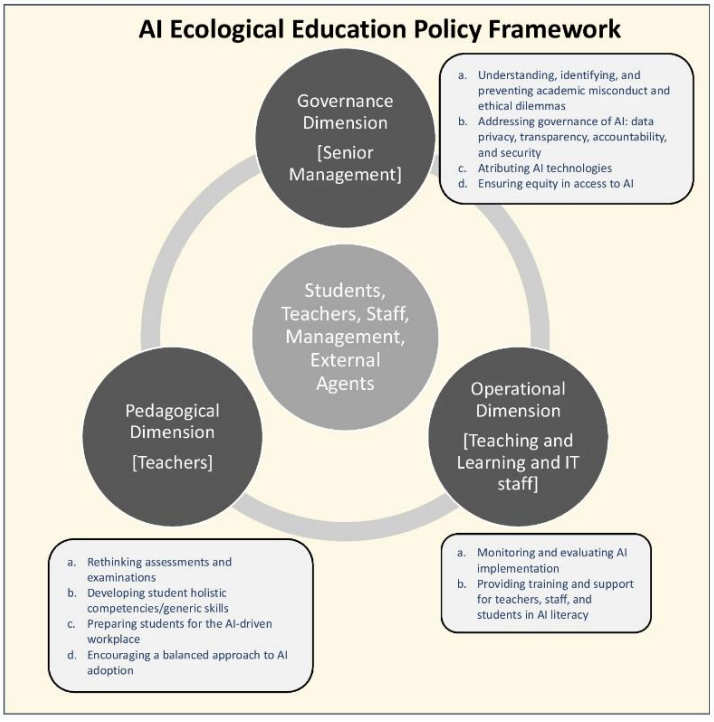

Fig.3: AI ecological education policy framework, Source: Chan, 2023, p. 20

Based on the key areas in the pedagogical dimension, AI literacy for teaching can be defined as the ability to competently utilize AI tools and incorporate them into teaching practices in a balanced manner. This includes e.g. rethinking assessments, with the aim of fostering students' holistic competencies and generic skills to prepare them for an AI-driven workplace (see Chan, 2023, p.20)

The Future of Jobs Report 2025 published by the World Economic Forum (WEF) is a data-based report that compiles insights from over 1,000 leading global employers, representing a total workforce of more than 14 million employees across 22 industry sectors and 55 economies worldwide. It examines the effects of significant trends on jobs and skills, as well as the workforce transformation strategies that businesses plan to implement until 2030. The focus does not lie on AI literacy in higher education context. However, based on its data-driven findings of future workforce skill needs, we can determine the competences to include in our framework to equip students with the skills required in the near future (see WEF, 2025, p. 4).

The report "Building an AI Literacy Framework: Perspectives from Instruction Librarians and Current Information Literacy Tools" by Sandy Hervieux and Amanda Wheatley (2024) and defines AI literacy as "the conscious choice to partake in discourse surrounding AI; it is learning about AI and using technology to better understand its presence in everyday life" (Hervieux/Wheatley, 2024, p. 6). It highlights the importance of active participation in the social discourse surrounding AI, differing from other interpretations that primarily view AI literacy as a set of skills. Additionally, the report presents other definitions of AI literacy from the literature, which focus on various aspects such as ethical considerations and the application of AI technologies (Hervieux/Wheatley, 2024, p. 7, Table 1).

Author(s)	Definition
Long and Magerko (2020)	"A set of competencies that enables individuals to critically evaluate AI technologies; communication and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace" (p. 2).
Lee et al. (2021)	AI literacy is achieved "through an integration of AI concepts, ethical and societal implications of AI, and the adoption of AI in future jobs" (p. 196).
Mikalef and Gupta (2021)	"An AI capability is the ability of a firm to select, orchestrate, and leverage its AI-specific resources" (p. 2).
Hermann (2022)	"We conceptualize individuals' basic understanding of (a) how and which data are gathered; (b) the way data are combined or compared to draw inferences, create, and disseminate content; (c) the own capacity to decide, act, and object; (d) AI's susceptibility to biases and selectivity; and (e) AI's potential impact in the aggregate" (p. 1270).
Dai et al. (2020)	"Considering the increasing importance of AI, we refer to a student's ability to access and use AI-related knowledge and skills as AI literacy" (p. 3).
Kong et al. (2021)	"AI literacy includes three components: AI concepts, using AI concepts for evaluation, and using AI concepts for understanding the real world through problem solving" (p. 2).

Fig. 4: Definitions of AI literacy, Source: Hervieux/Wheatley, 2024, p. 7

4.2.2 Key AI competences (for students and for teachers)

The Australian Framework (2023) outlines several competences essential for both teachers and students when engaging with generative AI. Teachers should maintain the expertise to manage AI-supported educational processes and comprehend their impact. Instructions for students include training them not only in the technical functionalities of AI-tools but also to recognize their

limitations and biases. Therefore, AI competences include an understanding of the technology and its functionalities, and – particularly for "learning" – critical thinking regarding AI-generated content, and the ability to interact with AI tools while critically evaluating their outputs (see Australian Department of Education, 2023, p. 6).

In contrast, Chan (2023) emphasizes general competences such as critical thinking (p.17), digital competence and time management (p.12), and competence impeded by AI like teamwork and leadership (see Chan, p.17f.). She places particular importance on the training of teachers to help them "feel more confident and capable in navigating the complexities of AI in their classrooms" (Chan, 2023, p. 15). Chan's statement reaffirms that teachers must be confident in using AI tools and be capable of teaching the associated risks and ethical implications. This requires a deep understanding of how AI works and learns.

The report of the World Economic Forum (2025) predicts that technologies like generative AI will not replace the human workforce but change the roles and tasks of employees in the process of collaborating with the machine. Therefore, it is crucial to develop advanced skills in prompt engineering to communicate with AI systems effectively and to cultivate a broader understanding of generative AI technologies. These skills enable employees to leverage AI's capabilities to augment work and decision-making processes (see WEF, 2025, p. 43).

Hervieux & Wheatley (2024) emphasize several important skills necessary for the effective use of AI, such as prompt engineering. Additionally, it is crucial to critically evaluate AI outcomes regarding their accuracy, potential biases, and ethical considerations. Furthermore, there should be an understanding of how AI affects labour markets and the environment (see Hervieux/Wheatley, 2024, p. 5). The report presents a six-level hierarchical competence model that incorporates Bloom's Taxonomy, detailing the gradual development of AI competences. This model includes not only a basic understanding of AI but also analysis and critique on both micro and macro levels, ethical reflection, and active participation in societal discussions about AI (see Hervieux/Wheatley, 2024, p. 13f.). In detail, the levels include the following competences:

1. Establish a base knowledge for artificial intelligence; learn the difference between narrow and general AI
2. Understand the different types of AI; understand how technologies branch into subcategories
3. Undertake elective experiences; develop your own AI
4. Analyze and critique on a micro-level
5. Discuss issues on a macro-level; evaluate societal impact; engage in ethical considerations of AI
6. Engage with AI discourse Engage in AI discourse; stay involved in the conversation

The analysis indicates that AI competences must encompass both technical and ethical dimensions. For students, the focus should be on understanding, applying, and critically evaluating AI, while for teachers, it is essential to meaningfully integrate AI into their teaching methods. Continuous professional development is necessary for both groups to keep up with the rapid advancements in AI technology. The key competences summarized from the analysis are presented in Table 1.

Table 1: Key competences for AI use for teachers and students

Competence area	Teachers	Students	Source
Technical understanding of AI	Profound understanding the functionality and limitations of AI	Understanding of AI technology and its mechanisms	Australian Framework (2023)
Critical thinking	Critical reflection on AI use in education	Critical analysis of AI-generated content	Chan (2023), WEF (2025)
Ethical competence	Awareness of bias, data protection, and ethical issues in AI usage	Reflection on ethical issues and AI impact	Hervieux & Wheatley (2024)
AI-supported teaching strategies	Integration of AI tools to support lesson planning, creation of learning material, support for assignments	Application of AI to enhance personal learning processes	Australian Framework (2023)
Prompt engineering	Creating effective AI inputs for educational purposes	Developing precise queries for AI usage	WEF (2025), Hervieux & Wheatley (2024)
Digital and information literacy	Ability to assess AI-generated content for accuracy and relevance	Evaluate AI results in terms of accuracy and relevance	Chan (2023)
Workforce and future orientation	Preparing for changes due to AI in education	Acquiring competences for an AI-driven workplace	WEF (2025)
Social and societal reflection	Engaging in societal discussions on AI	Active participation in the critical debate on AI	Hervieux & Wheatley (2024)
Lifelong learning in AI use	Continuous professional development in emerging AI technologies	Adapting to technological advancements through lifelong learning	Chan (2023), WEF (2025)

4.2.3 Challenges of AI use for teaching and learning addressed in the document

A key challenge is **academic integrity** and **plagiarism**. The Australian framework (Australian Department of Education, 2023) points out that generative AI can produce content that is difficult to distinguish from original work (see Australian Department of Education, 2023, p.5). This poses a risk of students' non-compliance to academic standards, particularly when they use AI platforms to create assignments and exams. According to Chan (2023), a survey revealed that approximately one-third of US students have used AI chatbots for their homework, with 60% relying on these programs for more than half of their assignments. While 75% of students believe using AI for this purpose is wrong, many continue to do so, and nearly 30% think their professors are unaware of their usage (see Chan, 2023, p. 2).

In addition to academic integrity, the **ethical dimension** is addressed. The Australian framework (Australian Department of Education, 2023) highlights risks such as **algorithmic bias** and **potential discrimination** by AI systems. Chan (2023) recommends ethical questions such as these as a starting point for a well-founded discussion of AI, as they form the basis for responsible use (see Chan, 2023, p. 6f.).

A further challenge lies in the **insufficiency of policies and regulations** to adequately address the current challenges of integrating AI into higher education. While Hervieux & Wheatley (2024) explicitly point out that there are no official guidelines for AI integration in higher education teaching, the Australian framework (Australian Department of Education, 2023) and Chan (2023) both provide frameworks with the call for clear cooperation with policymakers.

Another key point is the need for **teachers' training**. There is a clear overlap in this regard between Chan (2023), Hervieux & Wheatley (2024), and the World Economic Forum (2025). The first two reports emphasize that higher education faculty must acquire **new skills** to meaningfully **integrate AI into teaching**. The report of the World Economic Forum (2025) points to the challenge of an increasing need for reskilling, adapting to technological changes, and data protection and security risks. Furthermore, the potential displacement of traditional job profiles by AI technologies is cited as a risk (see WEF, 2025, p.32).

While the first two reports focus more on challenges within higher education institutions, the WEF goes further by drawing a connection to the global economy and the employability requirements of graduates.

4.2.4 Recommendations for using AI in the context of teaching and learning

A central recommendation across the reviewed reports is the **need for clear and transparent guidelines**. Hervieux & Wheatley (2024) emphasize that these guidelines should go beyond traditional information literacy models to include AI-specific skills (see Hervieux/Wheatley, 2024, p.13). Similarly, the Australian framework (Australian Department of Education, 2023) highlights the importance of promoting critical thinking and media literacy so that students can engage with AI in a meaningful and reflective manner (see Australian Department of Education, 2023, p.6). Chan (2023) expands on this by stressing that AI guidelines must address ethical, legal, and academic challenges to uphold academic integrity (see Chan, 2023, p.13). These perspectives converge on the idea that **AI policies must provide a structured yet adaptable framework** for its use in education.

Another recurring theme is the **necessity of comprehensive AI training for teachers**. Teachers need professional development opportunities to integrate AI effectively into their pedagogical strategies. This involves not only mastering AI tools but also engaging in **careful instructional planning** to ensure that AI serves as a complement to, rather than a replacement for, traditional teaching methods. AI-enhanced assessments, for example, could provide personalized feedback, supporting more adaptive learning environments.

The **importance of continuous education and upskilling** is further underscored by the World Economic Forum (2025). The report recommends developing continuing education programs to improve AI skills and increasing the integration of AI into educational offerings. Companies also plan to further train existing employees through targeted training in new technologies (in-house training). This suggests that universities must integrate AI literacy not only in isolated courses but across disciplines to prepare students for an evolving job market, as well as to foster their ability to adapt to new requirements and openness to learning something new. (see WEF, 2025, p.45 ff.).

Hervieux & Wheatley (2024) further emphasize the **ethical use of AI** as a fundamental component of higher education. They call for structured training programs that equip teachers with the skills needed to critically assess AI-generated content and guide students in ethical AI usage. Their perspective aligns with the broader consensus that AI education should not only focus on technical proficiency but on a **deep understanding of AI's societal implications** (see Hervieux/Wheatley, 2024, p.14).

In conclusion, the recommendations for using AI in teaching and learning emphasize the need for **clear policies, targeted training for educators and students, and a strong ethical framework**.

The reports do not provide detailed strategies for integrating AI literacy into existing curricula or ensuring equitable access to AI education. While the reviewed reports agree on these core aspects, challenges remain in the practical implementation of these recommendations.

4.2.5 Examples of the use of AI in teaching and learning

The Australian framework emphasizes that AI can be utilized in schools to assist teachers with **lesson planning** and **automate administrative tasks,** ultimately **reducing their workload**. AI should be integrated into learning in a way that enhances critical thinking and fosters student creativity. For example, AI can serve as a **valuable tool for content creation** (see Australian Department of Education, 2023, p. 5f).

There is an overlap with the findings of Chan (2023), although she goes into more detail about the role of AI in **personalized** teaching and **learning**. AI can adapt learning paths to individual needs and provide students with targeted resources. Furthermore, she also mentions the application of AI for assessments and administrative processes, which can relieve teachers' workload (see Al Braiki et al., 2020; Schiff, 2022; UNESCO, 2021a quoted from Chan, 2023, p. 6).

The report by the World Economic Forum (2025) approaches the use of AI from a different perspective: It emphasizes that generative AI excels in areas like reading, writing, mathematics, and multilingual communication, where it can assist with **summarizing complex information, drafting text, performing calculations, and translating content**. It has a higher potential to replace tasks that rely on theoretical knowledge combined with digital manipulation. This applies particularly to specialized skills in AI and big data, such as data mining and machine learning applications (see WEF, 2025, p.44). These functions have potentially profound implications for educational processes, as they can **change the way students work**, particularly in data-driven or language-based disciplines.

Hervieux & Wheatley (2024) address the teaching of AI skills. They show that universities are increasingly offering workshops on generative AI, **prompt engineering**, and **machine learning**. Furthermore, AI topics are increasingly being incorporated into information literacy training, particularly with regard to **ethical issues** and **bias in AI systems** (see Hervieux/ Wheatley, 2024, p.9). This perspective complements the other sources by addressing the need for training for both students and teachers to ensure that AI can be used meaningfully and critically.

4.2.6 Values, ethical principles, and security framework

A key shared concern is ensuring **fairness, transparency, and data protection.** The Australian framework places significant importance on ethical principles such as transparency and fairness.

It insists that generative AI tools must be employed in ways that do not reinforce existing inequalities or discrimination against individuals or groups (see Australian Department of Education, 2023, p. 7). This position is supported by Chan (2023), who specifically emphasizes the need for fair access to AI-supported educational opportunities for all students (see Chan, 2023, p. 15). Both reports also underscore the importance of data protection to ensure the security of personal information.

In this context, a further key point of discussion is the **prevention of bias and discrimination in AI systems**. Both the Australian framework and Chan (2023) emphasize that AI algorithms can reinforce systemic distortions and prejudices if they are not carefully monitored and regulated. This is particularly problematic in the education sector, as faulty or biased AI models could further deepen existing educational inequalities.

Hervieux & Wheatley (2024) go beyond these principles and call for critical reflection on the societal implications of AI. They argue that AI literacy should encompass not only technical skills but also a deep **understanding of the social and ethical consequences of the technology**. In their framework, they propose an additional competence: "Evaluate the impact of AI on a societal scale" (Hervieux/Wheatley, 2024, p.14). This perspective expands the discussion to include a **long-term, sustainable consideration of AI use**.

In contrast, the report of the World Economic Forum (2025) remains vague in this discussion. While the report emphasizes the need to adapt to technological developments, it lacks an explicit discussion of ethical principles or safety issues in the working context.

While three out of four reports emphasize the importance of values and ethical principles in the use of AI, none of them provide a clear security framework for implementation. Specifically, they do not outline how these principles can be applied at the institutional and classroom levels.

4.2.7 Future trends in AI and education

The Australian framework acknowledges the **rapid evolution of generative AI** and highlights the need for regular reviews and updates to the guidelines. It is recommended that the framework undergo an annual review to keep pace with technological advancements (see Australian Department of Education, 2023, p. 5).

Similarly, Chan (2023) emphasizes the importance of **continuously adapting educational strategies to keep pace with technological developments** (see Chan, 2023, p.21). The authors of both reports agree that a proactive response to these changes and the preparation of teachers and students for the associated challenges are necessary.

The World Economic Forum (2025) adds another dimension by highlighting the impact of AI and digital technologies on the world of work. According to the report, expanding digital access is anticipated to be the most transformative trend across both technology-related and broader business developments, with 60% of employers expecting it to reshape their industries by 2030. Key technological advancements – particularly in AI and information processing (86%), robotics and automation (58%), and energy systems (41%) – particularly are also predicted to drive significant change. These developments will have a dual impact on employment, creating both rapidly growing and declining job roles. As a result, **demand for technology-related skills is expected to surge**, with AI and big data, networks and cybersecurity, and technological literacy emerging as the top three fastest-growing skill sets. In addition to technical competences, **soft skills such as creative thinking, resilience, adaptability, curiosity, and a commitment to**

lifelong learning are projected to become increasingly valuable between 2025 and 2030. (WEF 2025, p.5f.)

Hervieux & Wheatley predict that generative AI tools will be omnipresent. Not only will technical skills become increasingly important in higher education but being AI-literate. They advocate for their refined and targeted AI literacy framework for libraries and educational institutions to offer support for both students and teachers to support them to flexibly react to new developments to come (see Hervieux/Wheatley, 2024, p. 6/15).

Overall, it can be concluded that the future of AI in education is closely linked to the ability to continuously evolve and proactively integrate new technologies into teaching and learning processes. This requires close collaboration between educational institutions, policymakers, and the technology industry to harness the potential of AI while developing the necessary ethical and practical guidelines.

4.3 Discussion

While the Framework by the Australian Department of Education (2023) and Chan (2023) focus on AI as a tool to be integrated into educational settings, Hervieux & Wheatley (2024) emphasize AI literacy as active participation in discourse and critical engagement with AI technologies. The World Economic Forum report (2025), in contrast, frames AI literacy in terms of workforce adaptability, emphasizing technological and digital skills. These diverse priorities give reason to advocate for **a holistic approach** for **defining AI literacy in higher education** contexts.

Furthermore, the findings from the Framework by the Australian Department of Education (2023) and the research by Hervieux & Wheatley (2024) underscore the lack of standardized guidelines for the use of AI in teaching and learning processes. This gap reinforces the need for the institutions to establish or align existing **guidelines that govern the (ethical) use of AI technologies** in T&L.

A recurring theme highlighted in various reports is the challenge of maintaining **academic integrity** in the context of AI integration in higher education contexts. Chan (2023) and the Framework by the Australian Department of Education (2023) bring attention to critical concerns about plagiarism among students, as well as the inappropriate use of AI technologies, which may lead to discrimination that would affect specific groups. Both stress that AI must not reinforce inequalities and should be accessible to all students while protecting their data. Their frameworks highlight that AI literacy should also foster **ethical awareness**.

In addressing the challenges posed by algorithmic bias and the potential for misuse of AI systems, the reports advocate for the development of structured training programs specifically tailored for teachers and staff in higher education.

The World Economic Forum report (2025) also underscores the need for workforce reskilling, emphasizing that continual adaptation to AI-driven changes is crucial for both educators and students.

However, the WEF report centers on AI's role in shaping workforce skills but lacks an ethical focus. This gap underscores the need to integrate ethical considerations into AI literacy for professional settings. Hervieux & Wheatley (2024) address this issue by advocating for greater awareness of

AI's societal impact and biases, proposing that **evaluating AI's role in society should be a core competency**.

The reports collectively underscore the rapid evolution of AI and the necessity for continuous learning. The World Economic Forum report (2025) focuses on the upskilling of digital skills as well as adaptability and changing job roles, while the Australian framework and Hervieux & Wheatley (2024) advocacy for ongoing AI literacy engagement aligned with trends in digital education. AI literacy must be seen as a **lifelong competence**, requiring not only initial training but also **sustained adaptation to emerging AI capabilities and ethical dilemmas**.

5. Conclusions and recommendations

Besides the *technical understanding* of AI, *critical thinking* skills and the *competence to reflect on ethical issues* of AI generated content, *reflection on social and societal implications*, *workforce and future orientation* as well as *lifelong learning* in AI use are recommended be considered as core competencies (see table 2).

Technical skills require a comprehensive understanding of AI technologies, how they function, operate, and learn, as well as data analysis and its application in various fields. This skill forms the basic prerequisite for AI literacy.

Another important aspect is preparation of students for future, AI-supported working environments. Specific technical skills depend on the respective job profile, but it is clear that AI permeates the entire world of work, which is why transversal skills such as lifelong learning and workforce and future orientation represent additional core competencies.

Since AI-driven change will also change ethical and social issues, it is also necessary for students to have the skills to understand the social impacts and actively engage with them, critically questioning the advantages and disadvantages of these technologies.

Table 2: Recommendations for core competences

	Teachers	**Students**
Technical skills	▪ Profound understanding the functionality and limitations of AI	▪ Understanding of AI technology and its mechanisms
	▪ Ability to assess AI-generated content for accuracy and relevance	▪ Evaluate AI results in terms of accuracy and relevance
	▪ Creating effective AI inputs for educational purposes	▪ Developing precise queries for AI usage
Ethical and social competences	▪ Critical reflection on AI use in education	▪ Critical analysis of AI-generated content
	▪ Awareness of bias, data protection, and ethical issues in AI usage	▪ Reflection on ethical issues and AI impact
	▪ Engaging in societal discussions on AI	▪ Active participation in the critical debate on AI
Workplace orientation	▪ Preparing for changes due to AI in education	▪ Acquiring competences for an AI-driven workplace
	▪ Continuous professional development in emerging AI technologies	▪ Adapting to technological advancements through lifelong learning

The results of the analysis underscore the need for a holistic, adaptive, and interdisciplinary approach to AI literacy. The analysis of the four reports highlights that AI literacy within the context of higher education is a multifaceted and dynamic process. It encompasses not only technical skills but also critical engagement and ethical considerations.

The reviewed contributions suggest that AI literacy is not a static set of skills, but rather an evolving competence that must keep pace with technological advances and societal changes throughout lifelong learning. AI literacy frameworks should therefore be continuously developed to address new challenges such as AI bias, misinformation, and ethical dilemmas.

By incorporating AI into learning designs – for example, by leveraging AI for personalized learning paths and providing automated feedback mechanisms – there is a shift toward an AI-enabled educational framework rather than focusing exclusively on AI literacy. It is crucial to develop a teaching and learning framework that takes this aspect into account holistically.

Bibliography

Australian Department of Education (2023). Australian Framework for Generative Artificial Intelligence in Schools. Retrieved from: https://www.education.gov.au/schooling/resources/australian-framework-generative-artificial-intelligence-ai-schools [31.03.2025]

Brandhofer, G., Gröblinger, O., Jadin, T., Raunig, M., Schindler, J. (Ed.). (2024). *Von KI lernen, mit KI lehren: Die Zukunft der Hochschulbildung. Projektbericht,* Verein Forum Neue Medien in der Lehre Austria <fnma>; https://www.fnma.at/medien/fnma-publikationen

Chan, C.K.Y. (2023). A comprehensive AI policy education framework for university teaching and learning. In: International Journal of Educational Technology in Higher Education 20, 38, https://doi.org/10.1186/s41239-023-00408-3 [31.03.2025]

Federal Chancellery Republic of Austria. (2024). *Harnessing the Potential of AI. Artificial Intelligence Mission Austria 2030*, https://www.digitalaustria.gv.at/eng/strategy/strategy-AI-AIM-AT-2030.html#ai-implementation-plan [04.04.2025]

Federal Government Republic of Austria. (2021a). *Artificial Intelligence Mission Austria 2030 (AIM AT 2030)*, https://www.digitalaustria.gv.at/dam/jcr:6dacb3c5-ca2b-4751-9653-45ed8765cacd/AIM_AT_2030_UAbf.pdf [04.04.2025]

Federal Government Republic of Austria. (2021b). *Artificial Intelligence Mission Austria 2030 (AIM AT 2030) - Annex*, https://www.digitalaustria.gv.at/dam/jcr:0bf64999-925a-47e9-96e9-b2e2fccad936/AIM_AT_2030_Annex_UAbf.pdf [04.04.2025]

Federal Government Republic of Austria. (2024). *Artificial Intelligence Mission Austria 2030 (AIM AT 2030) – Implementation Plan*, https://www.digitalaustria.gv.at/dam/jcr:4132e710-187c-42e9-9329-a1449ddf484f/KI-Umsetzungsplan%202024-mit%20CCBY4.0.pdf [04.04.2025]

Federal Ministry Education Republic of Austria. (2023). *Auseinandersetzung mit Künstlicher Intelligenz im Bildungssystem*, https://www.bmbwf.gv.at/dam/jcr:b77eacd7-3926-460e-955a-0754e419e577/ki_bildungssystem.pdf [04.04.2025]

Hervieux, S./Wheatley, A. (2024). Building an AI Literacy Framework: Perspectives from Instruction Librarians and Current Information Literacy Tools. Choice White Paper, https://www.choice360.org/wp-content/uploads/2024/08/TaylorFrancis_whitepaper_08.28.24_final.pdf [31.03.2025]

World Economic Forum (2025). Future of Jobs Report 2025. Insight Report. January 2025. Retrieved from: https://www.weforum.org/publications/the-future-of-jobs-report-2025/ [12.03.2025]