unesco
International Institute for Higher Education in Latin America and the Caribbean

WORKING PAPERS

12

The challenges of AI in higher education and institutional responses:

Is there room for competency frameworks?

Education 2030

UNESCO – a global leader in education

Education is UNESCO's top priority because it is a basic human right and the foundation for peace and sustainable development. UNESCO is the United Nations' specialized agency for education, providing global and regional leadership to drive progress, strengthening the resilience and capacity of national systems to serve all learners and responding to contemporary global challenges through transformative learning, with special focus on gender equality and Africa across all actions.

The Global Education 2030 Agenda

UNESCO, as the United Nations' specialized agency for education, is entrusted to lead and coordinate the Education 2030 Agenda, which is part of a global movement to eradicate poverty through 17 Sustainable Development Goals by 2030. Education, essential to achieve all of these goals, has its own dedicated Goal 4, which aims to **"ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."** The Education 2030 Framework for Action provides guidance for the implementation of this ambitious goal and commitments.

unesco
United Nations
Educational, Scientific
and Cultural Organization

Education 2030

Published in 2025 by the United Nations Educational, Scientific and Cultural Organization, 7, place de Fontenoy, 75352 Paris 07 SP, France, and the UNESCO International Institute for Higher Education in Latin America and the Caribbean (IESALC), Edificio Asovincar, 1062-A. Av. Los Chorros con Calle Acueducto, Altos de Sebucán. Caracas, Venezuela.

Document code: ED/HE/IESALC/WP/2025/86

Authors: Arianna Valentini and Alep Blancas

Graphic design and layout: César Vercher

For more information contact:
info-IESALC@unesco.org www.iesalc.unesco.org +58 212 2861020

The challenges of AI in higher education and institutional responses: Is there room for competency frameworks?

Table of contents

Foreword

As we navigate the transformative landscape of the 21st century, artificial intelligence stands as one of the most significant forces reshaping higher education. The rapid integration of AI technologies into academic environments presents both unprecedented opportunities and complex challenges that require thoughtful, evidence-based responses from our institutions.

This Working Paper, expertly authored by Arianna Valentini and Alep Blancas, addresses a critical gap in our understanding of how higher education can effectively prepare students, faculty, and staff for an AI-driven world. Building upon UNESCO IESALC's foundational work, including our 2023 publication "Harnessing the era of artificial intelligence in higher education: A primer for higher education stakeholders," this research takes an essential next step by examining the urgent need for comprehensive AI competency frameworks specifically designed for the higher education context.

The authors' systematic review reveals a concerning reality: while AI literacy has become fundamental to success in virtually every field, higher education institutions lack the structured frameworks necessary to develop these competencies effectively. Their analysis of existing initiatives across UNESCO's five regions demonstrates that most institutional responses remain fragmented, focusing primarily on guidelines for generative AI use rather than comprehensive skill development.

What makes this work particularly valuable is its practical approach to extending UNESCO's established K-12 AI competency frameworks to the higher education level. The authors recognize that higher education's unique missions—teaching, research, and extension—require specialized competencies that go beyond foundational AI literacy. Their proposed framework acknowledges the need for deeper interdisciplinary integration, advanced research capabilities, and stronger connections to professional contexts.

The research also addresses critical equity concerns, highlighting how digital divides and varying levels of institutional preparedness can exacerbate educational inequalities. The authors' emphasis on human-centred approaches to AI development and implementation aligns perfectly with UNESCO's core values and commitment to inclusive, sustainable development.

This study comes at a pivotal moment. As the authors note, 60% of global jobs will be affected by AI in the coming years, yet our research shows that 58% of students feel unprepared for an AI-driven workforce. Higher education institutions can no longer afford to approach AI integration in an ad hoc manner; they must develop systematic, comprehensive strategies for building AI competencies across all disciplines.

I commend Valentini and Blancas for their thorough methodology, which combines academic literature review with practical analysis of institutional initiatives across diverse contexts. Their work provides not only a clear diagnosis of current challenges but also actionable recommendations for developing contextually appropriate AI competency frameworks.

This Working Paper serves as both a wake-up call and a roadmap for higher education leaders worldwide. It demonstrates that the question is not whether AI will transform higher education, but whether our institutions will be prepared to

harness its potential responsibly and equitably. The competency frameworks proposed here offer a foundation for ensuring that higher education fulfils its essential role in preparing graduates for meaningful participation in an AI-integrated society.

I am confident that this research will prove invaluable to university leaders, policymakers, and educators working to navigate the complexities of AI integration. It represents exactly the kind of evidence-based analysis that UNESCO IESALC strives to provide—research that bridges theory and practice to support the advancement of higher education across Latin America, the Caribbean, and beyond.

Francesc Pedró

Director
UNESCO International Institute
for Higher Education in Latin America
and the Caribbean (IESALC)

Introduction

In recent years, the use of Artificial intelligence (AI) in higher education (HED) has expanded significantly, leading to increased research on its applications. Much of this research has focused on predictive analytics (Chu et al., 2022) and institutional decision-making (Crompton & Burke, 2023), with comparatively fewer studies addressing its direct impact on students, teachers, and pedagogical practices (Zawacki-Richter et al., 2024). Recognizing the growing importance of AI, the 2024 Horizon Report designated it as an "honorary trend" in education (Educause, 2024), and AI literacy has become a critical topic in educational discussions.

UNESCO has emphasized that AI should complement—not replace—human intelligence and interaction. Transparent and ethical AI systems must prioritize marginalized communities and uphold education's inclusive spirit (UNESCO, 2024). Furthermore, UNESCO envisions AI as a tool to enhance human capacities and protect human rights, ensuring that its application in education is guided by the core principles of inclusion and equity (UNESCO, 2024a). Higher education institutions play a crucial role in this vision by integrating AI literacy into their curricula, fostering responsible AI use, and preparing students for the evolving demands of the AI-driven workforce.

While AI in higher education has historically been centred on STEM disciplines, research on its application in the social sciences and humanities is expanding. Recent studies have examined AI's role in humanities education, ethics, and social sciences, reflecting a broader disciplinary reach than in previous years.

AI already permeates various aspects of daily life, and its influence extends beyond STEM subjects, reinforcing the need for all students to develop AI literacy. With predictions that 60% of global jobs will be affected by AI in the coming years (IMF, 2024), students across disciplines must acquire competencies that enable them to navigate AI-driven workplaces effectively.

Higher education institutions serve as a critical transition point between formal education and the labour market, making them responsible for preparing students for an AI-integrated workforce. In this regard, higher education teachers play a crucial role not only in equipping students with AI-related skills but also in fostering a deeper understanding of AI's ethical, social, and professional implications.

UNESCO has developed AI competency frameworks (CF) for K-12 education, aiming to equip teachers and students with essential AI skills and values (UNESCO, 2024; UNESCO, 2024a). Building upon these efforts, UNESCO's International Institute for Higher Education in Latin America and the Caribbean (IESALC) seeks to develop an AI competency framework specifically for higher education students and teachers. This framework aligns with UNESCO's guiding principles (UNESCO, 2024a, 2024b) but tailors them to the context of undergraduate education across disciplines.

To develop a comprehensive understanding of existing AI competency frameworks in higher education, this literature review and scoping exercise was conducted by searching relevant academic databases, grey literature, and reviewing AI related activities in different higher education institutions (HEIs).

This literature review is structured to provide a comprehensive analysis of AI competency frameworks in higher education. The first section introduces the role of AI in higher education, outlining its current applications, challenges, and opportunities. This sets the foundation for understanding the increasing relevance of AI literacy and competency development among students and educators.

Building on these insights, the next section examines the necessity of an AI competency framework tailored to higher education. Here, we analyse existing frameworks and key policy documents identified through the literature review and scoping exercise, drawing comparisons with UNESCO's AI competency framework for K-12 students and teachers. This comparative analysis highlights both alignment and gaps in AI education across different educational levels.

The final section synthesizes these findings to propose initial considerations for an AI competency framework specifically designed for students and teachers in higher education. This discussion explores how such a framework could complement and extend the UNESCO K-12 framework, ensuring that higher education institutions adequately equip students with the necessary AI-related skills and ethical considerations to thrive in an AI-driven world. By synthesizing these perspectives, this literature review aims to contribute to the development of AI competency frameworks at the higher education level, ensuring that students and teachers across disciplines are equipped with the necessary skills to engage with AI responsibly and effectively.

Methodology

Considering that research on AI competency frameworks for students and teachers in higher education is still incipient (Ng et al., 2022), we expanded the literature review to include a scoping exercise. This approach allows us to map the existing knowledge landscape and uncover gaps in AI competency frameworks development.
For the literature review we considered academic articles as well as grey literature coming from international organisations and for the scoping exercise, we reviewed the documents of a set of 16 higher education institutions distributed in the 5 UNESCO regions.

Our research process and the contextualization of this study were grounded in prior work published by IESALC and UNESCO on Artificial Intelligence, particularly the AI Primer for Higher Education Stakeholders (IESALC, 2023) and the AI competency frameworks for students and teachers (UNESCO, 2024a, 2024b). These foundational documents provided key insights into the evolving role of AI in higher education, shaping the scope and direction of our analysis

For the academic literature review we used Google Scholar as well as AI powered research platforms like Consensus and ELICIT. We also reviewed specific higher education journals and education technology journals. The search words inputted for this research included "Artificial Intelligence", "competency framework", "higher education", "university", "teacher/professor", "student", and "literacy framework". We considered papers and grey literature published between January 2021 and August 2024. For the literature review we considered articles published in English.

From a total of 194 articles only eight were directly related to AI competency or literacy frameworks for higher education whereas the remaining documents discussed AI pedagogy to some extent without making a competency framework explicit but giving ideas and a rationale for including certain competencies or pedagogies in the teaching and learning of AI at a higher education level.

We inputted the eight articles directly related to AI CF in higher education into Research Rabbit to further check the availability of relevant sources in the subject matter and we were able to find two more articles directly related to AI CF in higher education bringing the total to ten articles (Ghnemat et al., 2022; Farrelly and Baker, 2023; Southworth et.al, 2023; Bruneault et., 2022; Blok, Trudeau and Cassidy, 2021; Becker et al., 2024; Zhou and Schofield, 2024; Pretorious and Chusa de Caux, 2024; Georgieva et al. 2024; Chan and Colloton 2024).

Given the limited number of studies explicitly focused on AI competency frameworks, we expanded our review to include research on AI literacy in higher education, AI in higher education pedagogy, and emerging AI skills development. While these studies did not always present structured competency frameworks, they provided insights into the necessary skills, knowledge, and strategies for AI integration in higher education.

This complementary literature helped contextualize our findings and allowed for a broader discussion of how AI competencies are currently being defined and developed in higher education. As a result, additional sources appear throughout the document to support different aspects of the discussion, whereas the articles directly related to AI competency frameworks in higher education are considered in the subsection The absence of a comprehensive AI competency framework for higher education.

This approach aligns with the exploratory nature of a scoping exercise, ensuring a comprehensive mapping of AI competency-related themes in higher education.

Artificial Intelligence and higher education

The incorporation of AI in higher education is set to bring transformative change, enhancing personalized learning, streamlining administrative tasks, and advancing research capabilities. AI-powered tools allow for individualized feedback and adaptive instruction, helping students progress at their own pace while offering teachers real-time insights into student performance. This personalization improves engagement and learning outcomes, as AI identifies students needing additional support and adapts content accordingly. In administrative settings, AI can streamline processes like admissions and student support, allowing institutions to allocate resources more efficiently and provide responsive, round-the-clock assistance through chatbots (IESALC, 2023).

To fully harness these benefits, students and teachers will need to adapt by developing new skills and competencies. A key aspect of this transformation is AI literacy, which can be defined as the ability to critically understand, use, and interact with AI technologies in an informed and responsible manner (Becker et al., 2024). For teachers, this means not only learning to use AI tools but also integrating them thoughtfully into their teaching practices, with a focus on maintaining academic integrity and fostering ethical AI use. Students will need to acquire critical digital literacy skills to use AI responsibly, as well as adapt to evolving assessment formats designed to promote originality.

Both groups will require institutional support, such as training programs and clear policy guidance, to ensure a responsible and effective integration of AI into educational practices. While AI's potential in higher education is vast, there are significant challenges, including data privacy concerns, the need for equitable access, and the risks of bias in AI systems that must be tended to in order to ensure inclusive and ethical use of AI (IESALC, 2023).

Artificial intelligence is not only impacting higher education and our everyday life but also the labour market. Over the last decades, the digitalisation of the labour market has significantly impacted job dynamics. A significant part of this change is a result of the use of artificial intelligence. According to the International Monetary Fund, 60% of the world's jobs will be affected by AI in the coming years (IMF, 2024). However not all countries are prepared to face the challenges imposed by the AI adoption. While advanced economies like the United States of America and Singapore have high levels of exposure, skills and infrastructure, low-income countries face more complex scenarios where AI literacy plays a key role in securing employments and increasing labour market productivity (Georgieva, 2024).

Contrary to initial expectations, which anticipated a rapid adoption and significant job losses, the impact of AI has thus far been limited (OECD, 2023). However, as a general-purpose technology, AI is having and will continue to have an impact on every sector and occupation. According to the WEF (2023), 75% of companies are looking to adopt big data, cloud computing, and AI in the next five years. Consequently, 50% of companies expect job growth, while 25% anticipate job losses. Among the profiles, administrative, traditional security, retail and factory roles will experience the biggest losses, while AI and machine learning specialists will be the fastest growing jobs.

AI literacy is increasingly recognized as a critical workforce competency, enabling individuals to navigate and adapt to evolving job requirements (Becker et al., 2024). However, AI literacy extends beyond technical proficiency; it also involves the ability to critically assess AI's impact on work, identify ethical challenges, and collaborate effectively with AI systems. Preparing AI-literate graduates is essential to ensuring they are

equipped for professional settings, particularly in a world where AI adoption is accelerating and digital skills gaps risk deepening labour market inequalities.

In the coming five years, skills such as analytical thinking, creative thinking, AI, and big data will be in high demand (WEF, 2023). The primary challenge for both employers and employees will be the development of these competencies. Consequently, universities must take an active role in equipping students and graduates with the necessary skills. To achieve this, institutions must also provide faculty with the appropriate tools and knowledge to effectively support students in adapting to AI-driven work environments

The need for an AI competency framework for higher education

As a result of our literature review, we have identified three main reasons that point to the need for an AI competency framework in higher education:

a. **Students and faculty members lack adequate AI competencies**.

b. **Universities have limited progress in developing CFs**. Based on our research, the main strategies developed by universities centre on using AI to support student and teacher activities.

c. **A comprehensive AI CF for HE is lacking**. Our literature review identified few documents specifically focused on higher education. Most available CFs have been developed for K-12. In most cases, the few AI CFs for HE target specific publics and purposes, limiting their usability and adaptability.

In the following sections we explain these reasons in detail.

The AI skills gap

As mentioned before, the rapid advancements in AI have made AI literacy essential (Ng et.al, 2021; Steinbauer et al., 2021), not only to function in the present, but also to anticipate scenarios (Yi, 2021). The term 'literacy' traditionally refers to the ability to read and write and the term has changed to include new literacies, like digital literacy and now AI literacy (Kong et.al 2021; Yi, 2021). However, **AI literacy goes beyond knowing how to use AI applications** and understand the underlying concepts. It also encompasses understanding of the ethical concerns surrounding the use of AI (Ng et.al, 2021; Chu et.al, 2022; Walter, 2024). As such, AI literacy can be considered a set of competencies built over time.

While many students are utilizing AI tools, nearly half feel unprepared for the AI-driven future. 58% lack confidence in their AI knowledge and skills, and 48% believe they are inadequately prepared for the AI-powered workforce while 73% indicated that universities should offer training to faculty for the correct use of AI in the classroom (Digital Education Council, 2024).

On the other hand, **faculty members have concerns about the negative implications of AI**. A common fear is that AI could replace them (Chan and Tsi, 2023). Additionally, there are concerns about academic integrity, as AI tools can be used to generate plagiarized content (Fazackerley, 2023). Furthermore, the ethical implications of AI, such as bias and misinformation, raise serious concerns about its responsible use (Lee et al., 2024).

In this sense, **rather than simply banning the use of AI tools, it is essential to educate students on how to use them responsibly**. This highlights the importance of developing "transversal skills" in higher education, including communication (Michelon and Camacho-Zuñiga, 2023; Southworth et al., 2023), social skills and critical thinking (Ng et al., 2022; Chang and Tsi, 2023).

Using critical thinking can support students to '*analyse information, evaluate different perspectives, and create reasoned arguments*' (Walter, 2023, p. 19), making it an integral part of AI literacy (Yi, 2021). Students should be encouraged to think critically about technology itself, including the implications of bias inherent in AI systems and their impact on society (Walter, 2024). While AI has the potential to revolutionize various fields, it is important to recognize that machines lack certain uniquely human qualities such as emotional intelligence, creativity, and adaptability (Santana and Diaz, 2023).

In an experiment conducted at Tec de Monterrey (México) students were asked by teachers to interact with ChatGPT to reach specific learning objectives. After interacting with the technology on multiple occasions, the students developed a better understanding of how-to use of the application to achieve better results. Throughout the experiment, the researchers identified two relevant insights: *i)* despite being considered digital natives, **the students required training** to properly use the tool, and *ii)* the improvement in the results obtained

in each query made to ChatGPT was related to the **improvement in their communication (written expression), critical thinking, and logical reasoning skills** (Michelon and Camacho-Zuñiga, 2023). In line with this experience, the University of Florida has also identified the developing of communication and critical thinking competencies as vital for the development of their students AI literacy (Southworth et.al, 2023).

Due to the pervasiveness of AI, every student, regardless of their field of study, should gain a fundamental **understanding of AI concepts, ethics, and functionality**. Misuses of AI can lead to negative consequences like discrimination and data privacy breaches (Siau & Wang, 2020). Recognizing this potential for harm, there's a growing emphasis on AI ethics (IESALC, 2023; Ng et al., 2022). To ensure responsible AI development and use, fostering fairness, accountability, explainability, transparency, and ethical considerations is crucial (UNESCO 2022, IESALC 2023, UNESCO 2024). By addressing these aspects, we can strengthen social responsibility in AI applications, ultimately harnessing its potential to address global challenges (Ng et al., 2021) and achieve the Sustainable Development Goals (IESALC, 2023).

Regarding **educators**, literature suggests that a major advantage of AI for higher education professors is the reduction of time-consuming administrative tasks (Popenici & Kerr, 2017; Ng et al., 2022; Chan & Tsi, 2023; Mikeladzee et al., 2024). This includes streamlining assessment processes (Celik et al., 2022). However, not all professors in higher education possess the same level of appropriation of technology. According to the Report Time for Class 2023: Bridging Student and Faculty Perspectives on Digital Learning, **only 22% of the faculty members surveyed reported to use AI** (Shaw et al., 2023).

Another relevant aspect is the **faculty shortage that many universities faced in AI field**. Students pursuing AI-related careers often lack access to professors with the necessary experience and competencies to support their growth, significantly impacting the development of AI professionals sought by industry (Zwetsloot and Corrigan, 2022). Consequently, some companies are waiving degree requirements for certain positions and hiring students directly, providing them with the training needed to excel in AI careers (D'Agostino, 2022). In this regard, any competency framework for higher education teachers should **prioritize the proficient use of AI technologies.**

A variety of reviewed articles advocate for the use of AI in teaching methods for higher education (Eager & Brunton, 2023; Marengo & Pange, 2024; Kakhkharova & Tuychieva, 2024; Semeniuk et al., 2024). This approach, known as **AI-infused pedagogy**, leverages AI tools to promote the acquisition of higher-order thinking skills. For example, using AI and virtual reality to develop customer roles and facilitate negotiation skills for business students can create more realistic and engaging learning experiences compared to traditional methods (Chu et al., 2022).

Collaborative learning, teamwork (Ng et al., 2022), **and interdisciplinarity** (Chu et al., 2022; Southworth et al., 2023) appear to be extremely useful in understanding AI. Collaborative learning, which encourages peer interactions, is essential for developing social skills, an area where AI use might pose challenges (Chang and Tsi, 2023).

Within collaborative learning, project-based learning (PBL) has been commonly used due to its '*versatility in addressing a wide range of AI topics while allowing students to go deeper into specific topics of interest*' (Ng et al., 2022, p. 11). Moreover, PBL allows students to bridge the theory-practice gap and provides opportunities for self-initiated exploration of AI content (Fernandes, 2021), which is vital for preparing them for the job market.

Despite these advantages, **not all universities are supporting the use of AI for teaching and learning through policies.** For example, in the Commonwealth of Learning[1], around 67% of post

1 The Commonwealth of Learning incorporates 56 independent countries from Africa, Latin America and the Caribbean, Europe and North America and Asia and the Pacific.

secondary institutions are already using AI to support teaching and learning, however not many have institutional policies for the application of AI (Commonwealth of Learning, 2024).

While supporting the use of AI is relevant, **the training of professors in the field of AI is also an imperative**. Teaching activity brings to the table sentience and self-awareness (Chang and Tsi, 2023) which are essential for the learning process, throughout learning, including higher education (Schiff, 2020 and Felix 2020 in Chang and Tsi, 2023). In this regard, the role of teachers cannot be replaced by AI (Chang and Tsi 2023; Ng et.al., 2022).

Thus, **AI literacy must be conceptualized with a human-centred approach** (Ng et al., 2021; De Silva et al., 2024; Riordan et al., 2024). This requires teachers to address the needs of traditionally underrepresented groups when teaching AI (Ng et al., 2021). Additionally, it requires integrating the ethical dimension of AI use, including principles like human agency and oversight, transparency, diversity, non-discrimination, equity, social and environmental well-being, privacy, data governance, technical soundness, security, and accountability (Mikeladzee et al., 2024).

In general, **competency frameworks play a crucial role in defining the essential skills and knowledge** students need to thrive in their academic and professional careers. These frameworks help align educational goals with labour market demands, ensuring that students are prepared for the challenges they will face in their future professions and in an increasingly complex global world. Competency frameworks also provide a structure for assessment, ensuring that students are evaluated not only on theoretical knowledge but also on their practical and critical thinking abilities (Holmes et.al, 2021).

Taking into consideration the introduction of AI in the education sphere and in the labour market **it is imperative that all students and teachers in higher education become AI literate**.

Existing universities initiatives

To establish a comprehensive AI framework for higher education, we have mapped several university strategies for integrating AI into their classrooms. While **many universities have developed guidelines for professors and students**, few have taken the next step of designing and formalising competency frameworks.

Key insights from this analysis include:

a) the urgent need for a competency framework in higher education,

b) growing concerns among higher education leaders regarding ethical implications,

c) a strong emphasis on adapting to the AI revolution rather than solely focusing on developing AI skills and technologies to support university missions, and

d) a scarcity of resources for higher education staff, such as managers.

The twenty documents reviewed are a representative sample of sixteen universities from the five administrative regions of UNESCO (See Annex 1). When discussing the aspects involved in AI use, **all the universities consider the ethical domain of AI**, and most provide foundations for the use and application of AI in instruction and academic work development for students. However, **few of the guidelines address how AI can support professional development** or the development of AI itself.

Given the nature of these documents, **there is a noticeable lack of human-centred mindset,** particularly regarding individual responsibility for contributing to the building of safe, inclusive and just AI societies. This is strongly co-related to the fact that **these documents primarily serve as guidelines for the use of generative AI tools** such as ChatGPT and Gemini.

Among the universities reviewed, the University of Melbourne has a comprehensive website

that includes all the available resources for understanding, using, and regulating AI. The website also offers upskilling and reskilling opportunities for students and academics. In terms of resources for the development of teaching and learning, the University of Pretoria has comprehensive guides for professors that provide specific tools and tips for the use of generative AI. Concerning ethics, the Universidad Nacional Autónoma de México provides an extensive analysis of the critical use of AI that could be useful for other universities within LAC region and outside the region.

Overall, the exercise allowed us to identify that, **despite recognizing the urgency of providing students and academics with AI skills and competencies, most universities have not established a clear pathway of action**.

The absence of a comprehensive AI competency framework for higher education

From our literature review, we identified **eleven AI competency frameworks for higher education** (See Annex 2). We categorized them into theoretical frameworks and frameworks developed by universities. The first category includes **eight frameworks that are the result of academic research and are exploratory exercises**. None of these frameworks have yet been implemented, so there is no information available regarding their impact on higher education stakeholders and institutions. The second category includes **three frameworks designed by universities.**

In the following section, we present a summary of the main characteristics of these frameworks and the competencies included in each. To conclude our analysis, and for the purpose of this research, we present the UNESCO AI CF and contrast its characteristics with those of the other frameworks.

Competency frameworks from academic articles

Considering the need for a comprehensive framework for higher education, various researchers have proposed different approaches to fostering AI literacy among students and faculty. Among them, **Becker et al.** (2024) utilize the three main categories defined by Selber (2004) in their framework for a post-digital era to construct specific competencies for AI. As a result, the authors define specific competencies for the ethical use and development of AI. To illustrate their applicability, they present common scenarios requiring these competencies.

Pretorious and Cahusa de Caux (2024) leverage their experience as faculty members and AI users to identify five essential elements of AI literacy for students and educators. These elements encompass:

i) ***Foundational:*** Familiarity with AI.

ii) ***Conceptual:*** Use, location, evaluation, and organization of AI-generated information.

iii) ***Social:*** Utilization of AI for research insights, artistic creations, and as a learning partner.

iv) ***Ethical:*** Understanding AI's societal impact and limitations; and

v) ***Emotional:*** Evaluation of generative AI outputs from an emotional perspective.

Using the AI framework for secondary students proposed by Ng et.al (2021), **Farrelly and Baker** (2023) seek to integrate the cultural context component with the aim of including students who are not English speakers or belong to traditionally excluded groups in higher education. The cultural context component is added to the three levels of AI literacy already proposed by Ng et.al (2021). Similarly, **Zhou and Schofield** (2024) utilize the framework developed by Ng et al. (2021) to specify learning objectives, activities, and GenAI tools for their proposal.

Another framework that links domain, competencies, and outcomes is the one developed by **Georgieva et al.** (2024). The particularity of this initiative lies in the definition of specific competencies for three different user profiles. Among the frameworks analysed, this document is

the only one that formulates a list of competencies for staff members.

With a central focus on ethics, **Bruneault et al.** (2022) present a framework for higher education composed of three main competencies focused on sensitivity, reflective action, and interaction with ethical situations involving Artificial Intelligence Systems (AIS). These elements are intertwined with technical aspects, moral dilemmas, and normative and sociotechnical contexts of AIS.

Chan and Colloton (2024) have designed a dynamic framework that includes five main domains to secure the AI literacy of individuals. Depending on professional profiles, this framework could be extended. To exemplify its use, they provided the example of university professors. In addition to the basic competencies listed, they include pedagogical innovation; ethical, social, and policy awareness; AI for social good; career and industry alignment; continuous professional development; research and scholarly engagement; and responsible AI usage and development.

In a broader approach, **Ghnemat et al.**, (2022) propose a framework to transform the entire higher education institution in the face of AI. Its focus is on the domain of engineering and information technology. Despite the narrow focus both the programme educational objectives and student outcomes of the proposed framework, besides technical skills, include the development of competencies like teamwork, communication, ethics, problem solving and analysis.

Competency frameworks developed by universities

In the case of university-developed competency frameworks, we identified two initiatives: one from the **University of Florida** (United States of America) and another from the **University of Concordia** in cooperation with **Dowson College** (Canada).

The **AI Literacy Model of the University of Florida** created by Southworth et al. (2023) aims to address potential gaps in AI education and integrate AI into all curriculum areas to equip students with the competencies necessary for the modern global landscape. Through their proposal, the authors present various university strategies designed to support AI use both inside and outside the classroom. They also emphasize the need to align the competencies outlined in their model with specific student learning objectives. While the model was designed for undergraduate programs as part of a Quality Enhancement Plan (QEP) for reaccreditation, the authors believe the approach is applicable to other programs.

The other effort identified is the collaborative framework developed by the **University of Concordia and Dowson College in Canada.** This exercise primarily aims to address the need for educators and program developers when defining curricula for AI practitioners. To achieve this, the authors define three domains: technical, business, and human. Each domain includes key areas, subareas, and competencies, ranging from the most general to the most specific. One of the key differences of this framework is its robust and detailed structure.

Recently, **Barnard College** (United States of America) presented its framework for AI. Through a straightforward approach, the authors outlined specific competencies to understand, use, apply, analyse, evaluate, and create AI.

This framework, like other frameworks presented in this research, follows Bloom's Taxonomy to provide a guide for students and faculty members regarding AI knowledge.

UNESCO AI competency frameworks

In 2024 the Unit for Technology and AI in Education of UNESCO, after years of work and diverse consultation processes, published two AI competency frameworks for teachers and students. These frameworks are driven by a set of guiding principles and core values and are intended for K12

education. Both these CF are aligned with the ICT CF originally published by UNESCO in 2008.[2]

The guiding principles of UNESCO's CF (UNESCO, 2024a, 2024b) are different from students and teachers but are always guided by human centeredness and ethics. They are the following:

For teachers	For students
Digital social contract towards inclusive futures of education	Fostering critical thinking on AI for real-world challenges
A human-centred approach	Prioritizing human-centred collaboration with AI
Steering the design and use of more climate-friendly AI	Ensuring ethical and trustworthy AI for education
Teacher development as lifelong learning	Facilitating transferable AI foundations for lifelong learning
	Promoting inclusivity in AI competency development

In the following paragraphs we compare the UNESCO's guiding principles with the competency frameworks for higher education found in the literature and in higher education institutions.

Comparison and contrast

Despite their differences, most of the frameworks we analysed have an incremental approach. They evolve from the more essential competencies for use to more specific and specialized aspects. Additional elements of coincidence are the human and ethical approaches as well as the critical use of AI.

After analysing and identifying various competency frameworks in the literature, we cross-referenced (See Table 1) the coincidences between these frameworks and the dimensions defined in the UNESCO competency framework for teachers and students. Our analysis revealed a significant overlap between the existing frameworks and the principles outlined in the K12 frameworks. Interestingly, three of the analysed frameworks (Farelly and Baker, 2023; Zhou and Schofield, 2024; Southworth et al., 2023) leverage a pre-existing K-12 competency framework (Ng et al, 2022) as the basis for their proposed AI literacy framework for higher education.

While the principles and competencies defined by UNESCO aim for broader applicability, some of the identified frameworks exhibit a more technical approach tailored to the specific needs of IA developer profiles (Ghnemat et al, 2020; Blok, Trudeau and Cassidy, 2021). The main differences lie in the specificities related to the dynamics of each framework.

Only one of the frameworks analysed define a set of competencies for staff members (Georgieva et al., 2024). Clearly, a priority for UNESCO, HEIs, and the international community is the ethical dimension of IA, which is prominently reflected in these documents. While pedagogy, human-centeredness, or basic foundational elements may not be explicitly considered in all cases, some HEIs have demonstrated preliminary efforts in these areas.

2 This competency framework has subsequently been reviewed in 2011 and 2018.

Table 1. Competency frameworks for higher education identified in literature.

Source	Type of document	Professors' dimensions					Students' dimensions			
		Human-centred mindset	Ethics of AI	AI foundations & applications	AI pedagogy	AI for professional development	Human-centred mindset	Ethics of AI	AI techniques & applications	AI System Design
University of Florida	CF	-	-	-	-	-	X	X	X	X
University of Concordia and Dawson College	CF	X	X	X	X	X	-	-	-	-
Barnard College	CF	-	-	-	-	-	-	X	X	-
Bruneault, et al.	TCF	-	-	-	-	-	X	-	-	-
Farelly and Baker, 2023	TCF	-	-	-	-	-	X	X	X	X
Ghenmat et.al, 2022	TCF	-	-	-	-	-	-	X	X	X
Becker et al., 2024	TCF	-	X	X	-	-	-	X	X	-
Zhou and Schofield, 2024	TCF	-	X	X	-	-	-	X	X	-
Pretorious and Cahusa de Caux, 2024	TCF	X	X	X	X	-	X	X	X	-
Georgieva et al., 2024	TCF	-	X	X	X	X	-	X	X	X
Chan and Colloton, 2024	TCF	-	X	X	X	X	-	X	X	-

CF - Competency Framework (from a HEI)

TCF - Theoretical Competency Framework

Extending the UNESCO AI Competency Framework

Higher education distinguishes itself from earlier educational stages through its pursuit of three interconnected missions: education, research, and extension, while also maintaining a close connection with the labour market. Unlike the broad foundation provided in K-12 education, higher education emphasizes specialized, in-depth knowledge within specific disciplines, fostering critical inquiry, research, and self-directed learning. This approach develops advanced skills, such as complex problem-solving, professional communication, and field-specific competencies, which align directly with professional expectations and facilitate smoother transitions into the workforce.

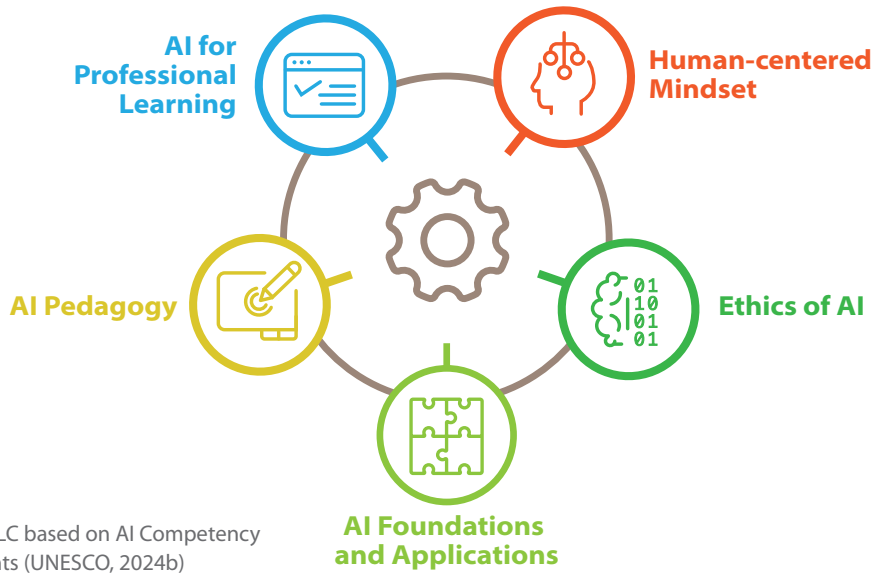
Through industry partnerships, internships, and career-oriented curricula, higher education institutions link students to the labour market, equipping them for meaningful careers. Additionally, extension activities in higher education, such as community engagement and industry collaboration, apply academic knowledge to address societal challenges, thereby reinforcing the social responsibility mission. Together, these missions highlight higher education's dual role in fostering individual expertise and promoting a transformative societal impact that bridges academia, the labour market, and community needs.

Considering the importance higher education has in developing skills and competencies for the labour market as well as for community development, it is necessary to make some additions to the UNESCO AI competency framework for K12 for it to be suitable for higher education teachers and students.

Extending this initiative to higher education presents an opportunity to build upon these foundational aspects, adapting and expanding them to address the specific challenges and roles educators face in a higher education setting. This involves deeper interdisciplinary integration, advanced research, and a focus on social responsibility as well as on national, regional and international policies and regulation.

Figure 1 presents the domains of UNESCO's AI competency framework for K-12 teachers (UNESCO, 2024b), while Table 2 outlines potential ways to adapt and expand these domains for teachers in higher education. The higher education column in Table 2 represents a proposed extension of the K-12 framework, to address the specific needs and challenges of AI competency development at the university level. This proposal aims to complement UNESCO's existing framework, ensuring its relevance and applicability to higher education teachers.

Figure 1: Domains of the AI competency framework for K12 teachers



Source: UNESCO IESALC based on AI Competency Framework for students (UNESCO, 2024b)

Table 2: Initial competency framework for teachers from K12 to HED

K12 (UNESCO 2024b)	Higher education
Human-centred mindset	Human-centred mindset
This dimension emphasizes the need for teachers to prioritize human welfare, promoting a responsible, ethical approach to AI in education. **Competencies**: Teachers are encouraged to understand AI's societal impacts and foster inclusive and accessible learning environments.	In higher education, a human-centred approach goes beyond awareness. It requires critical examination of AI's societal, cultural, and economic impacts, as well as promoting AI solutions that align with values of equity, sustainability, and human well-being across diverse disciplines. It includes developing the ability to critique and apply AI in ways that prioritize human welfare, considering global and societal implications. Understand and guide discussions on the interdisciplinary impacts of AI on various fields, from humanities to social sciences and beyond.
AI foundations	Advanced AI knowledge and interdisciplinarity
Teachers are expected to develop foundational knowledge of AI, including its technical aspects and practical applications. **Competencies**: This includes an understanding of basic AI concepts, common tools, and algorithms, allowing teachers to explain AI concepts to students effectively and will enable to implement AI driven educational experiences.	**Deeper conceptual knowledge:** While K-12 provides a general understanding of AI, HE teachers should have a more sophisticated understanding of AI concepts (e.g., machine learning basics, AI algorithms, data-driven decision-making) even if they are not creating these technologies themselves. **Encouraging interdisciplinary projects**: HE students often work on complex projects that benefit from interdisciplinary perspectives. Teachers should be able to guide students in collaborative, AI-driven projects that combine multiple fields, which is beyond the K-12 framework's scope. **Field-specific AI applications:** HE teachers across all disciplines need to understand how AI applies within their specific fields. For example, humanities professors may need knowledge of AI in digital humanities, while business faculty should understand AI's role in financial modeling or customer analytics. This specialization is missing in K-12. **AI to streamline administrative processes:** HE teachers need to be enabled to optimize administrative workflows, such as grading, scheduling, student tracking, and resource management.
AI Ethics	Advanced ethical and social responsibility competencies
In the K12 framework teachers need to understand ethical issues around AI, including bias, privacy, and transparency. **Competencies**: Emphasis is placed on ensuring that teachers can guide students on the ethical use of AI, promoting fairness and equity in its application.	**Deep ethical frameworks**: HE educators should have a more nuanced understanding of ethical frameworks (e.g., deontological vs. utilitarian perspectives) and be able to guide students in applying these frameworks to AI case studies and real-world scenarios. **Policy and regulatory awareness:** Given that HE students may go on to work in policy or regulatory roles, teachers should understand and discuss AI policy issues, such as data protection regulations (e.g., GDPR), algorithmic transparency, and ethical AI governance. This is not covered in K-12 but is critical in HE. **Understanding bias and limitations in data:** HE teachers need a deeper understanding of data biases and limitations to guide students in analysing data critically. This is especially relevant in fields like social sciences, where data-driven AI applications can have significant societal implications. **Ethical data use:** Beyond basic data privacy, HE educators should engage in more complex discussions about ethical data collection, management, and sharing practices. They should understand the ethical implications of data-driven AI applications, particularly in research contexts.
AI pedagogy	AI pedagogy for higher education
This dimension focuses on adapting pedagogy for an AI-integrated classroom, where AI can support teaching and learning. **Competencies**: Teachers learn to use AI to personalize learning, monitor student progress, and offer adaptive support. This will enable teachers to design new pedagogical methods or tools leveraging AI for deeper student engagement.	**Curriculum design for non-technical courses:** HE teachers in non-STEM fields should have competencies in integrating AI literacy into their courses. This includes discussing the impacts of AI on their discipline, how it changes professional practices, and encouraging students to think critically about AI within their field. **Cross-disciplinary relevance:** Unlike K-12, which tends to focus on general applications, HE teachers need to understand how AI intersects with their specific academic discipline. For instance, in psychology, AI might be used for predictive modelling of behaviour, while in art, it could be used for digital creativity or analysis of art trends. **Incorporate AI for assessments**: Ability to use AI to design, administer, and interpret assessments that adapt to students' individual learning needs and provide timely feedback.
AI for professional learning	AI for professional development
In K12 education this area encourages teachers to use AI for their professional development and continuous learning. It includes utilizing AI-driven platforms for skill enhancement, collaborating with peers, and exploring new AI educational tools.	In higher education, this dimension evolves to foster a commitment to ongoing AI literacy and professional development that is relevant to students' future roles as professionals and educators. This includes a focus on acquiring the skills to navigate and contribute to AI discourse within their professional communities. **Network development:** HE teachers are often involved in professional networks and may collaborate with industry. The framework should encourage HE educators to engage with AI professionals, attend conferences, or even collaborate on interdisciplinary projects, enriching their own understanding and teaching of AI.

A research domain would be added to the HE framework considering that research is one of the core functions of higher education and many teachers also develop research in their field.

Research competencies in AI

Guiding AI-related research: HE teachers are often responsible for guiding student research projects, which can involve AI. This requires competencies in understanding research methodologies relevant to AI, helping students formulate research questions, and critically evaluating AI-related research studies.

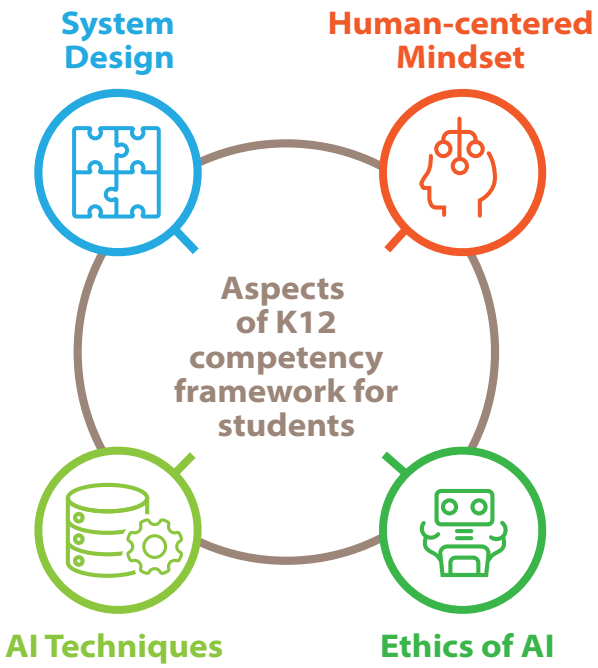
Critical analysis of AI tools and outputs: HE teachers need to help students critically evaluate AI tools, understand limitations, and question the data sources and algorithms behind AI applications. This requires more advanced critical thinking skills than are typically emphasized in K-12.

In a similar way students in higher education will need a specific understanding of the AI applications in their fields, as well as the impact of AI in society and the regulations around AI developments and applications. A deeper emphasis on research and interdisciplinarity would be paramount for higher education students.

Figure 2 presents the key aspects of UNESCO's AI competency framework for K-12 students (UNESCO, 2024a), while Table 3 outlines potential ways to adapt and expand these aspects for students in higher education. The higher education column in Table 3 represents a proposed extension of the K-12 framework, tailored to address the specific learning needs and professional expectations of higher education students. This adaptation aims to complement UNESCO's existing framework, ensuring that it remains relevant and applicable to higher education students.

Other two aspects would be added to the AI CF for higher education students:

Figure 2: Aspects of the K12 AI framework for students



Source: UNESCO IESALC based on AI Competency Framework for students (UNESCO, 2024a)

Research and critical analysis in AI

This aspect should include research on AI and research using AI.

Research on AI: Study and critically evaluate existing AI research, exploring technical, ethical, and societal implications. Students in higher education should be capable of assessing existing AI research critically and contributing new insights or innovations.

Research using AI tools: Recognize the opportunities and limitations of AI tools in research, and understand ethical concerns related to AI-powered data analysis, automation, and predictive modelling.

Interdisciplinary and global perspectives in AI

This aspect should encourage students to approach AI from multiple disciplinary lenses, such as philosophy, ethics, public policy, and social sciences, understanding the global impacts and responsibilities of AI.

Higher education students should be enabled to propose or participate in projects or policy proposals that address global AI issues, contributing solutions that are culturally sensitive and globally equitable.

Table 3: Initial competency framework for students from K12 to HED

K12 (UNESCO 2024a)	Higher education
Human-centred mindset	Human-centred mindset
This aspect encourages students to adopt a mindset that considers the societal benefits and potential risks of AI. It aims to instil values like empathy, inclusivity, and sustainability.	In higher education, this aspect should deepen to include critical analysis of AI's societal, cultural, and global impacts. Students would not only consider the end-users but also examine broader implications, including ethical concerns about how AI influences labour markets, privacy rights, and digital inclusion across different populations. Students should be enabled to develop interdisciplinary projects or policies that leverage AI for social good, tackling complex issues like global inequality or climate action with AI solutions.
Ethics of AI	Ethics of AI
Covers foundational AI concepts and skills, providing students with knowledge about data, algorithms, and common AI tools.	Ethical training at this level should include in-depth exploration of AI policies, frameworks, and regulatory issues across disciplines. Higher education students would study and even develop AI ethics guidelines relevant to specific fields, addressing industry-specific ethical challenges (e.g., AI in medical diagnostics vs. financial risk assessment).
AI techniques and applications	AI techniques and applications
Covers foundational AI concepts and skills, providing students with knowledge about data, algorithms, and common AI tools.	This aspect would expand to cover advanced AI concepts, such as machine learning algorithms, neural networks, data analytics, and their applications across various disciplines. Higher education students should be equipped not only to use AI tools but also to understand their limitations, biases, and potential unintended consequences.
AI system design	AI system design
Principles of AI system development, including problem definition, system architecture, testing, and iterative improvement.	AI system design in higher education would incorporate a full project lifecycle approach, covering requirements gathering, system architecture, prototyping, testing, and deploying scalable AI solutions. Students should also learn to work in interdisciplinary teams, understanding how to collaborate across fields.

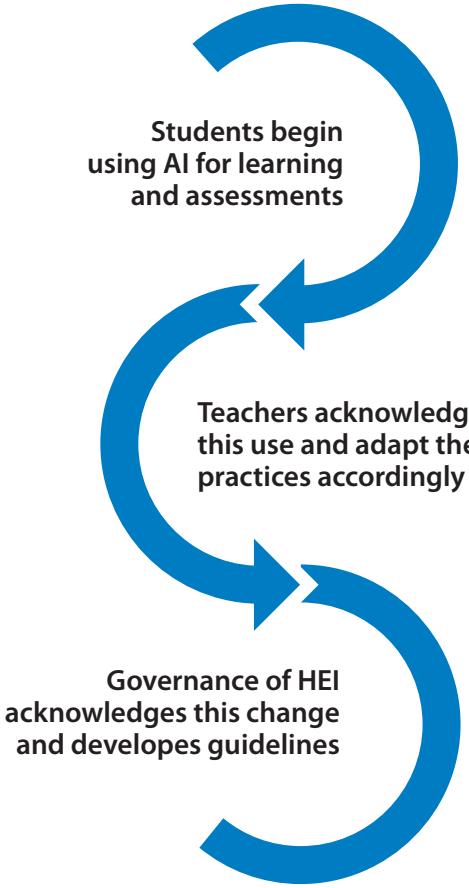
Challenges and barriers of AI competency frameworks in higher education

Developing an AI competency framework for higher education poses some challenges, primarily due to the limited number of existing models tailored specifically for this educational level. While numerous frameworks exist for K-12 education, higher education has not seen a similar development. Most of the available frameworks are either theoretical exercises or narrowly focused, which limits their general applicability across fields. Therefore, one of the most pressing issues is ensuring that AI literacy extends beyond STEM disciplines. While most research and existing initiatives are heavily centred on technical fields, there is a need for a framework that integrates AI competencies applicable across all areas, including the arts and humanities. This requires a shift in approach to make AI literacy universally relevant and interdisciplinary, which is vital for fostering well-rounded graduates.

At a structural level, the landscape of AI competency frameworks in higher education is inconsistent in its design and quality, which can hinder their effective integration into teacher education programs (Mikeladzee et al., 2024). Many educators report feeling inadequately prepared to incorporate AI into their teaching practices. The frameworks often stem from theoretical foundations or academic research, with limited grounding in the lived experiences and practical needs of educators (Mikeladzee et al., 2024). This disconnect between theory and practice serves as a significant barrier to the widespread adoption and meaningful application of AI in higher education. Additionally, evidence of AI's effectiveness in higher education, especially in teaching and learning, remains limited, leaving many institutions hesitant to invest in large-scale AI initiatives without clearer proof of their impact.

From IESALC's direct experience with more than 40 higher education institutions, the adoption of AI in teaching and learning practices in higher education has been a bottom-up process as explained in Figure 3. This suggests that a development of CF for teachers should also consider the already existing practical implementation of AI competencies.

Figure 3 – AI adoption in teaching and learning in HE



Source: UNESCO IESALC

The Commonwealth of Learning (2024) paints a sobering picture of institutional readiness. According to their findings, 58% of respondents from higher education institutions not yet using AI identified a lack of faculty knowledge as a major impediment. Even more surprisingly, 65% of institutions reported having no formal policies or strategies in place to guide AI integration into teaching and learning, and nearly 80% lacked any systematic capacity-building activities

around AI. This absence of foundational support undermines efforts to advance AI competencies across the sector. Without the necessary incentives, training, or policy frameworks, educators and administrators are left struggling to navigate AI's potential, while broader issues such as academic integrity and resource allocation remain unresolved (Commonwealth of Learning, 2024).

Furthermore, there are practical challenges that complicate the broader adoption of AI in education, particularly in contexts where infrastructure is limited. As Molina et al. (2024) observe, the digital divide remains a substantial obstacle, with equitable access to the digital infrastructure required for AI often unevenly distributed across institutions and regions. This highlights the importance of adapting the AI CF for students and teachers in HE according to the context of implementation.

These challenges must be addressed to ensure that AI competency frameworks are accessible, effective, and equitable. Only through coordinated efforts that bridge the gap between theory and practice can AI's transformative potential be fully realized within higher education.

Conclusions

The exploration of AI competency frameworks in higher education remains an emergent field, yet it has become increasingly evident that these frameworks are essential for navigating the complex and rapidly evolving role of AI in society. Existing research on AI in education, while expanding, reveals substantial gaps in both the theoretical and practical aspects of AI literacy. The fragmented landscape of current frameworks leaves educators, students, and institutions without cohesive guidance, making it difficult to align AI competencies with the needs of today's labour market, societal expectations and the public good. This disjointed approach risks reinforcing divides in knowledge and preparedness, limiting the potential of AI to be used responsibly and equitably within higher education contexts. The development of AI CFTs would provide a structured foundation for addressing these gaps. It is important to note that the development of AI competency frameworks must evolve continuously to keep pace with rapid technological advancements and address the emerging needs of higher education and the labour market.

To effectively adopt AI technologies, higher education institutions must prioritize upskilling and reskilling both students and faculty, equipping them with AI-specific competencies that align with the demands of modern workplaces and societal needs. Moreover, the ethical challenges posed by AI underscore the importance of a cohesive AI competency framework in higher education. The rapid integration of AI in various sectors has brought issues of academic integrity, intellectual property, and ethical governance. While HEIs have taken initial steps to address these concerns, there is a critical need for a dedicated set of competencies that equip students, educators and staff to navigate these complex issues. A comprehensive AI competency framework would help institutions proactively address ethical dilemmas associated with AI, supporting a responsible and inclusive approach to AI integration.

Nevertheless, it is paramount to keep in mind the different level of preparedness between regions for AI adoption. Some regions have limitations in digital infrastructure and access to technology can hinder the implementation of AI programs. Most existing competency frameworks have been developed with advanced educational environments in mind, creating a significant gap when applied to resource-limited contexts. Therefore, the adaptability of AI competency frameworks to diverse regional contexts is crucial to ensuring their effectiveness and relevance across different educational settings.

To address this disparity, competency frameworks should be designed with a flexible and scalable approach and considering the regional context. Including the regional context into the adaptation of frameworks can also enable cultural diversity and local needs. This can include integrating examples and case studies that reflect the socioeconomic and cultural realities of each region, fostering more contextualized and meaningful learning. Cultural relevance not only facilitates teaching and learning but also strengthens student engagement and interest by reflecting their own experiences in the educational content.

Lastly, scalability and adaptability should be considered as principles in the design of AI competency frameworks. These principles ensure that educational institutions can implement competencies progressively, starting with essential skills and advancing to more complex capabilities as their resources and capacities improve. Collaboration with local stakeholders, such as governments, non-governmental organizations, civil society, and the private sector, can support the implementation of these frameworks by providing resources and teacher training.

Adapting competency frameworks to regional contexts is essential for creating an inclusive and equitable approach to AI education, addressing a key gap in current models that often focus on more

developed settings. Integrating these principles of scalability and adaptability will help make the frameworks more effective and sustainable, enhancing learning and preparing students in all regions of the world.

Identifying areas for future research and development is essential for guiding the progression of these frameworks. Below are key future directions for research and updates to AI competency frameworks.

- **The impact of generative AI on higher education:** Research should explore what is the impact in teaching, learning and research of integrating generative AI throughout specialties. Moreover, it should explore which are the best ways to integrate generative AI effectively and ethically within the curricula to equip students and educators for responsible interaction with these technologies.
- **The continuous update of competencies:** Given the dynamic nature of AI, an essential future consideration is developing mechanisms for the regular updating of AI competencies. Competency frameworks must be adaptable to incorporate new knowledge and skills as AI technology evolves. This involves setting up processes for periodic reviews and updates, including input from experts, academics, and the educational community. Collaborative platforms or forums discussing AI advancements, and their educational implications can support these ongoing updates and ensure that frameworks remain relevant and practical.
- **Emphasis on ethics and social responsibility:** With the increasing use of AI in education, embedding ethics and social responsibility into AI competencies is crucial. Research should investigate effective methods for integrating these elements into both student and educator competencies, emphasizing the understanding of ethical principles such as transparency, fairness, and non-discrimination. As AI becomes more embedded in education, these ethical competencies must be seen as core pillars of any framework.
- **The integration with transversal skills:** Finally, future research should focus on how AI competencies intersect with broader transversal skills such as critical thinking, creativity, and problem-solving. These skills are essential for preparing students for a job market increasingly influenced by AI. Research should explore how AI competencies can complement and enhance these skills, equipping graduates to better navigate the challenges and opportunities of modern workplaces.

In sum, the coordinated development of AI competency frameworks in higher education is essential for fostering a workforce that is not only proficient in AI but also sensible to the ethical and societal responsibilities that accompany it. Investing in AI competency frameworks will position HEIs as leaders in shaping the future of education, ensuring that students, educators, and institutions alike can navigate the transformative potential of AI with integrity, inclusivity, and purpose.

Bibliography

A Framework for AI Literacy. (n.d.). EDUCAUSE Review. Retrieved November 4, 2024, from https://er.educause.edu/articles/2024/6/a-framework-for-ai-literacy

AI Faculty Shortages. (n.d.). *Center for Security and Emerging Technology*. Retrieved November 4, 2024, from https://cset.georgetown.edu/publication/ai-faculty-shortages/

Alamäki, A., Nyberg, C., Kimberley, A., & Salonen, A. O. (2024). Artificial intelligence literacy in sustainable development: A learning experiment in higher education. *Frontiers in Education*, *9*. https://doi.org/10.3389/feduc.2024.1343406

Bates, T., Cobo, C., Mariño, O., & Wheeler, S. (2020). Can artificial intelligence transform higher education? *International Journal of Educational Technology in Higher Education*, *17*. https://doi.org/10.1186/s41239-020-00218-x

Becker, K., Parker, J., & Richter, D. (2024). *Building AI Literacy in Higher Education*. Moxie. https://moxielearn.ai/wp-content/uploads/2024/06/Ai-literacies-white-paper.docx.pdf

Blok, S., Trudeau, J. & Cassidy, R. (2021). Artificial intelligence Competency Framework. A success pipeline from college to university and beyond. https://www.dawsoncollege.qc.ca/ai/wp-content/uploads/sites/180/Corrected-FINAL_PIA_ConcordiaDawson_AICompetencyFramework.pdf

Bruneault, F., Sabourine Laflamm, A., & Mondoux, A. (2022). *AI Ethics Training in Higher Education: Competency Framework*. https://poleia.quebec/wp-content/uploads/2022/04/C03_AIEthics.CompetencyFramework.pdf

Celik, I., Dindar, M., Muukkonen, H., & Järvelä, S. (2022). The Promises and Challenges of Artificial Intelligence for Teachers: A Systematic Review of Research. *TechTrends*, *66*(4), 616–630. https://doi.org/10.1007/s11528-022-00715-y

Chan, C. K. Y., & Tsi, L. H. Y. (2023, May 2). *The AI Revolution in Education: Will AI Replace or Assist Teachers in Higher Education?* arXiv.Org. https://arxiv.org/abs/2305.01185v1

Chan, C. K. Y., & Colloton, T. (2024). AI Literacy. In *Generative AI in Higher Education*. Routledge.

Chang, Q., Pan, X., Manikandan, N., & Ramesh, S. (2022). Artificial Intelligence Technologies for Teaching and Learning in Higher Education. *International Journal of Reliability, Quality and Safety Engineering*. https://doi.org/10.1142/S021853932240006X

Chu, H.-C., Hwang, G.-H., Tu, Y.-F., & Yang, K.-H. (2022). Roles and research trends of artificial intelligence in higher education: A systematic review of the top 50 most-cited articles. *Australasian Journal of Educational Technology*, *38*(3), Article 3. https://doi.org/10.14742/ajet.7526

Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education*, *20*(1), 22. https://doi.org/10.1186/s41239-023-00392-8

D'Agostino, S. (n.d.). *Why Does an AI Faculty Shortage Exist? It's Complicated.* Inside Higher Ed. Retrieved November 4, 2024, from https://www.insidehighered.com/news/2022/07/11/why-does-ai-faculty-shortage-exist-its-complicated

De Silva D, Jayatilleke S, El-Ayoubi M, Issadeen Z, Moraliyage H, Mills N. The Human-Centred Design of a Universal Module for Artificial Intelligence Literacy in Tertiary Education Institutions. Machine Learning and Knowledge Extraction. 2024; 6(2):1114-1125. https://doi.org/10.3390/make6020051

Dignum, V. (2019). Looking Further. In V. Dignum (Ed.), *Responsible Artificial Intelligence: How to Develop and Use AI in a Responsible Way* (pp. 107–120). Springer International Publishing. https://doi.org/10.1007/978-3-030-30371-6_7

Eager, B., & Brunton, R. (2023). Prompting Higher Education Towards AI-Augmented Teaching and Learning Practice. *Journal of University Teaching and Learning Practice*, *20*(5), Article 5. https://doi.org/10.53761/1.20.5.02

Farrely, T., & Baker, N. (2023). *Generative Artificial Intelligence: Implications and Considerations for Higher Education Practice*. https://www.mdpi.com/2227-7102/13/11/1109

Fernandes, H. V. J. (2021). From student to tutor: A journey in problem-based learning. *Currents in Pharmacy Teaching and Learning*, *13*(12), 1706–1709. https://doi.org/10.1016/j.cptl.2021.09.037

Georgieva (2024). AI Will Transform the Global Economy. Let's Make Sure It Benefits Humanity. Available at: https://www.imf.org/en/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity#:~:text=Research%20shows%20that%20AI%20can,will%20complement%20high%2Dincome%20workers

Georgieva, M., Kassorla, M., & Papini, A. (2024). *AI Literacy in Teaching and Learning: A Durable Framework for Higher Education*. EDUCAUSE. https://www.educause.edu/content/2024/ai-literacy-in-teaching-and-learning/staff-altl

Ghnemat, R., Shaout, A., & Al-Sowi, A. M. (2022). Higher Education Transformation for Artificial Intelligence Revolution: Transformation Framework. *International Journal of Emerging Technologies in Learning (iJET)*, *17*(19), Article 19. https://doi.org/10.3991/ijet.v17i19.33309

Holmes, A., Polman Tuin, M., & Turner, S. (2021). *[PDF] Competence and competency in higher education, simple terms yet with complex meanings: Theoretical and practical issues for university teachers and assessors implementing Competency-Based Education (CBE) | Semantic Scholar*. https://www.semanticscholar.org/paper/Competence-and-competency-in-higher-education%2C-yet-Holmes-Tuin/76d8e7704b3a5b0328b230b1e8b307052a10848d

Hornberger, M., Bewersdorff, A., & Nerdel, C. (2023). What do university students know about Artificial Intelligence? Development and validation of an AI literacy test. *Computers and Education Artificial Intelligence*, *5*, 100165. https://doi.org/10.1016/j.caeai.2023.100165

IESALC. (2023). *Harnessing the era of artificial intelligence in higher education: A primer for higher education stakeholders—UNESCO Digital Library*. https://unesdoc.unesco.org/ark:/48223/pf0000386670

IMF (2024). AI Preparedness Index (AIPI). Available at: https://www.imf.org/external/datamapper/datasets/AIPI

Kakhkharova, M., & Tuychieva, S. (2024). *AI-Enhanced Pedagogy in Higher Education: Redefining Teaching-Learning Paradigms*. 1–6. https://doi.org/10.1109/ICKECS61492.2024.10616893

Kong, S.-C., Cheung, W. M.-Y., & Zhang, G. (2021). Evaluation of an artificial intelligence literacy course for university students with diverse study backgrounds. *Computers and Education: Artificial Intelligence*, *2*, 100026. https://doi.org/10.1016/j.caeai.2021.100026

Lee, D., Arnold, M., Srivastava, A., Plastow, K., Strelan, P., Ploeckl, F., Lekkas, D., & Palmer, E. (2024). The impact of generative AI on higher education learning and teaching: A study of educators' perspectives. *Computers and Education: Artificial Intelligence*, *6*, 100221. https://doi.org/10.1016/j.caeai.2024.100221

Marengo, A., & Pange, P. (2024). *Envisioning General AI in Higher Education: Transforming Learning Paradigms and Pedagogies* (pp. 330–344). https://doi.org/10.1007/978-3-031-72430-5_28

Michalon, B., & Camacho-Zuñiga, C. (2023). ChatGPT, a brand-new tool to strengthen timeless competencies. *Frontiers in Education*, *8*. https://doi.org/10.3389/feduc.2023.1251163

Mikeladze, T., Meijer, P., & Verhoeff, R. P. (2024). A comprehensive exploration of artificial intelligence competence frameworks for educators: A critical review. *European Journal of Education*, *59*. https://doi.org/10.1111/ejed.12663

Ng, D. T. K., Lee, M., Tan, R., Hu, X., Downie, J., & Chu, S. (2022). A review of AI teaching and learning from 2000 to 2020. *Education and Information Technologies*, *28*. https://doi.org/10.1007/s10639-022-11491-w

Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*, *2*, 100041. https://doi.org/10.1016/j.caeai.2021.100041

OECD (2023), *OECD Employment Outlook 2023: Artificial Intelligence and the Labour Market*, OECD Publishing, Paris, https://doi.org/10.1787/08785bba-en.

Popenici, S. A. D., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning*, *12*(1), 22. https://doi.org/10.1186/s41039-017-0062-8

Pretorius, L., & Cahusac de Caux, B. (2024). *The AI Literacy Framework for Higher Education: A Grounded Theory Exploration of the Foundational, Social, Conceptual, Ethical, and Affective Domains of AI Literacy*. https://doi.org/10.26180/25965178.v4

tyton_press. (2023, June 20). *Time for Class 2023: Bridging Student and Faculty Perspectives on Digital Learning*. Tyton Partners. https://tytonpartners.com/time-for-class-2023-bridging-student-and-faculty-perspectives-on-digital-learning/

Riordan A., Echeverria, V., Jin, J., Yan, L., Swiecki,Z., Gašević, D., and Martinez-Maldonado, R. (2024). Human-centred learning analytics and AI in education: A systematic literature review. Computers and Education: Artificial Intelligence, Volume 6. https://doi.org/10.1016/j.caeai.2024.100215.

Santana, M., & Diaz-Fernandez, M. (2022). Competencies for the artificial intelligence age: Visualisation of the state of the art and future perspectives. *Review of Managerial Science*, *17*. https://doi.org/10.1007/s11846-022-00613-w

Semeniuk, R., Holovnia, Y., Huda, O., & Savastru, N. (2024). Innovative Methodologies and Approaches to Teaching with Artificial Intelligence in Ukrainian Higher Education. *Futurity Education*, *4*(1), Article 1. https://doi.org/10.57125/FED.2024.03.25.02

Siau, K., & Wang, W. (2020). Artificial Intelligence (AI) Ethics: Ethics of AI and Ethical AI. *Journal of Database Management*, *31*, 74–87. https://doi.org/10.4018/JDM.2020040105

Southworth, J., Migliaccio, K., Glover, J., Glover, J., Reed, D., McCarty, C., Brendemuhl, J., & Thomas, A. (2023). Developing a model for *AI Across the curriculum*: Transforming the higher education landscape via innovation in AI literacy. *Computers and Education: Artificial Intelligence*, *4*, 100127. https://doi.org/10.1016/j.caeai.2023.100127

Steinbauer, G., Kandlhofer, M., Chklovski, T., Heintz, F., & Koenig, S. (2021). A Differentiated Discussion About AI Education K-12. *KI - Künstliche Intelligenz*, *35*(2), 131–137. https://doi.org/10.1007/s13218-021-00724-8

The Future of Jobs Report 2023 | World Economic Forum. (n.d.). Retrieved October 16, 2024, from https://www.weforum.org/publications/the-future-of-jobs-report-2023/

UNESCO. (2022). *Recommendation on the Ethics of Artificial Intelligence*. https://unesdoc.unesco.org/ark:/48223/pf0000381137

UNESCO. (2024a). *AI competency framework for students*. https://unesdoc.unesco.org/ark:/48223/pf0000391105

UNESCO. (2024b). *AI competency framework for teachers—UNESCO Digital Library*. https://unesdoc.unesco.org/ark:/48223/pf0000391104

Walter, Y. (2024). Embracing the future of Artificial Intelligence in the classroom: The relevance of AI literacy, prompt engineering, and critical thinking in modern education. *International Journal of Educational Technology in Higher Education*, *21*(1), 15. https://doi.org/10.1186/s41239-024-00448-3

What Students Want: Key Results from DEC Global AI Student Survey 2024. (n.d.). Retrieved November 5, 2024, from https://www.digitaleducationcouncil.com/post/what-students-want-key-results-from-dec-global-ai-student-survey-2024

White Paper - Building an AI Literacy Framework: Perspectives from Instruction Librarians and Current Information Literacy Tools. (2023, November 10). *Choice 360*. https://www.choice360.org/research/white-paper-building-an-ai-literacy-framework-perspectives-from-instruction-librarians-and-current-information-literacy-tools/

World Economic Forum - WEF (2023). Future of jobs. Available at: https://www.weforum.org/publications/the-future-of-jobs-report-2023/

Yi, Y. (2021). Establishing the concept of AI literacy. *JAHR*, *12*, 353–368. https://doi.org/10.21860/j.12.2.8

Zawacki-Richter, O., Bai, J. Y. H., Lee, K., Slagter van Tryon, P. J., & Prinsloo, P. (2024). New advances in artificial intelligence applications in higher education? *International Journal of Educational Technology in Higher Education*, *21*(1), 32. https://doi.org/10.1186/s41239-024-00464-3

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education*, *16*(1), 39. https://doi.org/10.1186/s41239-019-0171-0

Zhou, X., & Schofield, L. (2024). Developing a conceptual framework for Artificial Intelligence (AI) literacy in higher education. *Journal of Learning Development in Higher Education*, *31*, Article 31. https://doi.org/10.47408/jldhe.vi31.1354

Zwetsloot, R., & Corrigan, J. (2022). *AI Faculty Shortages: Are U.S. Universities Meeting the Growing Demand for AI Skills?* Center for Security and Emerging Technology. https://doi.org/10.51593/20190049

Annex

Annex 1 – Universities initiatives to support the use of AI

Country	HEI	Type of HEI	Resource
Ireland	University College Cork	Public	Toolkit for the Ethical Use of Generative Artificial Intelligence in Learning & Teaching
Mexico	Tec de Monterrey	Private	11 guidelines for the use of AI
Chile	Pontificia Universidad Católica de Chile	Public	AI recommendations for students
			AI recommendations for professors
Chile	Pontificia Universidad Católica de Valparaíso	Private	How to integrate the regenerative AI in the teaching activity?
Finland	Aalto University	Public	Guidance for the use of AI in teaching and learning at Aalto University
Canada	Carleton University	Public	AI in teaching at Carleton: Opportunities and Challenges
United States	University of California	Public	Guiding Principles for Responsible Use of AI
United States	Stanford University	Private	Artificial Intelligence Teaching Guide
South Africa	University of Capetown	Public	Artificial Intelligence for Teaching and Learning
South Africa	University of Pretoria	Public	Student's Guide: Leveraging Generative Artificial Intelligence for Teaching and Learning Enhancement at the University of Pretoria
			Guide for ChatGPT usage in teaching and learning.
China	The Hong Kong University of Science and Technology	Public	Guidelines and principles on using generative AI for Higher Education (*specific Policies for GenAI integration in teaching and learning are accessible for HKUST members only)*
Singapore	National University of Singapore	Public	Policy for Use of AI in Teaching and Learning
Australia	University of Melbourne	Public	Artificial intelligence at the University of Melbourne: Key resources
Australia	Monash University	Public	Student Academic Success: Using AI
			Learning and Teaching: Responsible use of AI
Switzerland	ETH Zurich	Public	Generative AI in Teaching and Learning
Mexico	Universidad Nacional Autónoma de México	Public	Recommendations for the use of the generative AI in teaching

Annex 2 – Competency frameworks identified in the literature review

Author	Component	Subcomponent
Bruneault, et al., 2022 *The framework focuses on ethics*	Ethical sensibility (Being in an ethical situation)	Technical aspects of AIS, moral dilemmas related to AIS, complementary normative frameworks, socio-technical context of AIS
	Reflective skills (Knowing how to act in an ethical situation)	Technical aspects of AIS, moral dilemmas related to AIS, complementary normative frameworks, socio-technical context of AIS
	Dialogical skills (Interacting in an ethical situation)	Technical aspects of AIS, moral dilemmas related to AIS, complementary normative frameworks, socio-technical context of AIS
Southworth et al., 2023 *University of Florida AI Literacy Model*	Knowing and understanding AI	Know the basic functions of AI and to use AI applications
	Using and applying AI	Applying AI knowledge, concepts and applications in different scenarios
	Evaluating and creating AI	Higher-order thinking skills (e.g., evaluate, appraise, predict, design) with AI applications
	AI ethics	Human-centred considerations (e.g., fairness, accountability, transparency, ethics, safety)
	Enabling AI	Support AI through related knowledge and skill development (e.g., programming, statistics) and/or contain a lower total AI content of one of the four core AI iteracy topics.
Blok, Trudeau and Cassidy, 2021 *University of Concordia and Dawson College*	Technical domain - data	Understanding data
		Legal and ethical implications
		Data handling and manipulation
		Data representation
	Technical domain - Mathematics and Statistics	Probability and statistics
		Tensors
		Calculus
		Numerical methods
	Technical domain - programming	Core language skills
		Software development
		Databases
		Data preprocessing
	Technical domain - machine learning	Supervised learning
		Unsupervised learning
	Technical domain - deep learning	AI ecosystems
		Artificial neural networks
		Data storage
		Parallel computing
	Technical domain - infrastructure	Cloud computing
	Technical domain - libraries and frameworks	Tools
	Business domain - AI project planning	Data and AI project scoping
		Data and AI project execution
		Business development
	Business domain - AI project scaling	Partnership development
		AI fundamentals
	Business domain -AI technologies	AI projects and technologies budget
	Human domain - innovation	Empathetic approach
		Problem definition
		Ideation process
		Prototyping and testing
	Human domain - teamwork	Communication
		Collaboration
		Lifelong learning
	Human domain - professionalism	Goal setting

Author	Component	Subcomponent
Becker et al., 2024	Functional	Understanding the core mechanisms of how AI works
		Identify the capabilities and limitations of various AI technologies
		Become familiar with standard AI interfaces and platforms
		Interact with AI-driven tools and applications through effective prompting
	Critical	Question and evaluate the credibility and trustworthiness of AI systems and applications
		Recognize potential biases in AI interactions and outputs
		Mitigate GIGO (Garbage In, Garbage Out)
		Consider the ethical implications of AI use
	Rhetorical	Understand the role of rhetoric in communication
		Synthesize prompt + outputs synergies to shape communication
		Identify and analyse rhetorical patterns in AI-generated text
		Analyse the style, tone, and voice of AI-generated content
		Compare and contrast AI vs human-generated content
Zhou and Schofield, 2024	Know and understand AI	Know and understand the basic functions of AI tools to support learning
	Use and apply AI	Applying AI knowledge, concepts and applications to support learning (e.g. research paper, literature review, information search, problem-solving, data visualisation).
	Evaluate and create with AI	Evaluating AI-generated content enabling higher-order thinking skills development
	AI Ethics	Comprehending the moral and ethical consequences of AI and making informed decisions regarding its use in various contexts.
Pretorious and Cahusa de Caux, 2024	Foundational	Deploying specific functionalities of the Generative AI Platforms
		Familiarising our students with the capabilities of the platform
		Familiarising ourselves with capabilities of the platform
		Selecting appropriate generative AI Platforms
		Understanding the collaborative role of generative AI
	Conceptual	Locating information
		Organising information
		Evaluating information
		Using information
		Repurposing Information
	Social	Dialogues with customised generative AI for research insights
		Generative AI as a co-creator of artistic creations
		Generative AI as partner in the learning process
		Using Generative AI as an interlocutor
	Ethical	Acknowledging AI contributions
		Addressing artistic integrity and environmental impact
		Ensuring data privacy and informed consent
		Transparency and limitations of Generative AI
	Emotional	Emotional aspects of evaluating Generative AI Output
		Evaluating reactions to Generative AI data analysis
		Emotional reactions to Generative AI feedback
		Reflection on biases and stereotypes

Author	Component	Subcomponent
Farelly and Baker, 2023	Evaluate and create AI	Integrate cultural competence into AI ethics discussions with colleagues; emphasize the importance of diverse perspectives in responsible AI usage.
		Encourage students to explore, evaluate, and create AI solutions addressing cultural and language diversity issues, showcasing the power of AI in fostering inclusivity.
		Evaluate the ethical implications of AI solutions.
		Critically analyse emerging AI solutions for potential biases and ethical concerns
		Recognize and articulate your own positionality and biases with respect to AI.
	Use and apply AI	Locate and offer content and resources in multiple languages to support non-English speaking students.
		Identify AI's role in preserving and promoting cultural heritage and language diversity.
		Ensure that AI applications are accessible to students with varying devices, languages, and connection speeds.
		Explore how AI applications can be tailored to respect cultural norms and preferences for language proficiencies.
		Recognize that some AI models and AI companies have a stronger focus on equity, sustainability, and reducing potential harms.
	Know and understand AI	Develop awareness of the global impact of AI, including foundational terminology, who has access and who does not, and the environmental and social impacts of model training.
		Familiarize yourself with cultural contexts and concerns regarding AI, such as bias and fairness in algorithms
		Recognize how AI intersects with diverse cultural values and beliefs.
		Appraise yourself of successful AI applications in non-English-speaking regions, fostering inclusivity.

Author	Component	Subcomponent
Georgieva et al., 2024	Technical understanding	Fundamentals of AI
		Applications of AI tools
		Hands-on experience
	Evaluative Skills	Critical evaluation of AI tools
		Assessment of AI impact /impact analysis (staff)
		Ethical evaluation
	Practical application	Integration into learning /Integration into teaching/Integration into administrative process
		Research enhancement /Support for academic AI initiatives (Staff)
		Project-based learning /Course design and development (Faculty) / Policy guideline development (staff)
	Ethical considerations	Responsible use of AI
		Development of personal AI policies (student) /development of course AI policies (Faculty) /Addressing AI challenges (Staff)
		Vigilance in AI application /Promoting positive AI use (staff)
Hibbert et al., 2024 *Barnard College*	Understand AI	Be able to define the terms "artificial intelligence," "machine learning," "large language model," and "neural network"
		Recognize the benefits and limitations of AI tools
		Identify and explain the differences between various types of AI, as defined by their capabilities and computational mechanisms
	Use and apply AI	Successfully utilize generative AI tools for desired responses
		Experiment with prompting techniques and iterate on prompt language to improve AI-generated output
		Review AI-generated content with an eye toward potential "hallucinations," incorrect reasoning, and bias
	Analyse and Evaluate AI	Examine AI in a broader context, bringing in knowledge from one's discipline or interests
		Critique AI tools and offer arguments in support of or against their creation, use, and application
		Analyse ethical considerations in the development and deployment of AI
	Create AI	Synthesize learning to conceptualize or create new ideas, technologies, or structures that relate to AI. Reaching this level of literacy could include the following: Conceive of novel uses for AI; Build software that leverages AI technology; Propose theories about AI

Author	Component	Subcomponent
Chan and Colloton, 2024	AI Concepts	Familiarity with basic terminology (e.g., artificial narrow/general/super intelligence, machine learning, machine intelligence and machine consciousness) to facilitate comprehension of how AI systems function
	AI application	Awareness of common AI tools and applications in everyday life across diverse domains, such as virtual assistants, recommendation systems, and facial recognition.
	AI effectiveness for human emotions	Understanding how AI systems recognise and respond to human emotions, including the impacts and values of using AI systems
	AI safety and security	Awareness of potential security risks associated with AI applications, including possible threats to personal data and misuse of technology
	Responsible AI usage	Developing a sense of responsibility when using AI applications, understanding that AI systems may have limitations including incorrect information (thus requiring fact- checking), considering ethical implications, and questioning the reliability of AI- generated content.
	Pedagogical innovation	Integrating AI within curriculum design and delivery.
		Employing AI for automated assessment and feedback.
		Leveraging AI to foster personalised and adaptive learning experiences
	Ethical, social and policy awareness	Teaching and promoting ethical AI practices.
		Understanding the social and policy implications of implementing AI in education.
		Engaging in discussions about issues of biases, privacy, and inclusivity in AI
	AI for social good	Utilising AI to address real- world challenges through social impact projects.
		Advocating for responsible AI policies and practices.
		Fostering community outreach and global engagement through AI
	Career and industry alignment	Aligning curriculum with emerging industry trends and AI applications.
		Preparing students for AI- related careers.
		Building partnerships with industry professionals to bridge gaps between academia and industry
	Continuous professional development	Engaging in lifelong learning to stay updated on evolving AI technologies
		Participating in professional development opportunities related to AI in education.
		Encouraging a culture of professional growth among colleagues and students
	Research and scholarly engagement	Employing AI in academic research and scholarly activities.
		Exploring interdisciplinary collaborations to drive AI innovation in academia.
		Contributing to the growing body of knowledge on the intersection of AI and education.
	Responsible AI usage and development	Developing a sense of responsibility when interacting with AI.
		Encouraging responsible AI usage among students and colleagues.

unesco

International Institute for Higher Education in Latin America and the Caribbean

Applied Research and Analysis

Working Papers

The UNESCO International Institute for Higher Education in Latin America and the Caribbean (IESALC) undertakes applied research on priority higher education issues and translates findings into policymaking-relevant evidence and training opportunities as well as into diverse products for dissemination.

Research modalities include desk-based reviews, international surveys, country case studies and comparative analysis, as well as foresight research on higher education.

The Working Paper series is part of this research and analysis programme to make this knowledge available to Latin American and Caribbean countries with a global perspective.

info-IESALC@unesco.org

iesalc.unesco.org

@unesco_iesalc

UNESCO IESALC

@unesco_iesalc

@unesco.iesalc

4 QUALITY EDUCATION

Sustainable Development Goals