

Ai Specialist - A New Professional Figure For Higher Education

Andrea Tinterri^{1*}, Marilena di Padova², Angelo Basta² and Anna Dipace³

¹ Università Telematica IUL; a.tinterri@iuline.it

² Università di Foggia; marilena.dipadova@unifg.it; angelo.basta@unifg.it

³ Università Telematica Pegaso; anna.dipace@unipegaso.it

* Correspondence: a.tinterri@iuline.it

Abstract: Artificial Intelligence (AI)-based tools have the potential to revolutionize higher education (HE) by promoting radical transformations in teaching and learning: new teacher/student interfaces, such as chatbots and e-tutors, personalized learning paths, fast and individualized feedback, instructional support, etc. However, the use of AI in HE is subject to risks and limitations; those include lack of contextual understanding, potential bias in training data, lack of creativity, and of human interaction. To achieve the potential of AI, HE professionals require not only technical expertise, but rather a holistic perspective that includes cognitive, operational, critical, and ethical understanding of AI. To this aim, we introduce and define a competence profile for a new professional figure in HE, the AI Specialist. This figure would act as part of a multidisciplinary equipe supporting the quality of teaching and learning, working alongside teachers, e-tutors, instructional designers, and IT managers. AI Specialists should be able to use various AI tools to assist the teaching and learning activity, but also provide a constant update on innovations, new releases, scientific evidence, and new methodologies, training and support for effective integration of AI, and counseling on the ethical and responsible use of AI technologies.

Keywords: Artificial Intelligence; Higher Education; AI Literacy; AI Specialist

1. Introduction

1.1 Artificial Intelligence in Higher Education.

“Artificial Intelligence” (AI) refers to “any task performed by program or machine, which otherwise human needs to apply intelligence to accomplish it” (Harkut et al., 2019). In other words, the term AI describes the process of simulating human behaviour by computational processes, more or less directly inspired by human cognitive processes. The first computational models were able to elaborate information based on a set of rules defined *a priori* by the operator. Machine learning systems, developed in the back half of the 20th century, acquired the ability to autonomously extrapolate computational rules to achieve a certain result from a given initial dataset. Towards the end of the century, such models became more complex with the introduction of more and more “hidden” levels of computation, simulating, at least at surface level, the functioning of neuronal networks in the human brain. Such models were applied to three main areas of application: intelligent vision systems, natural language models, and robotics, leading to an increasing array of applications. In the field of natural language processing, the next paradigm shift occurred



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in 2017, with the invention of the Transformer model, which brought to current well-known tools like Bard and Chat GPT. These tools use machine learning mechanisms such as selective attention and self-attention to allow a better understanding of the text and the linguistic context. A large set of parameters, based on the extensive dataset on which they were pre-trained, is used to predict the next word in a sentence, thus generating output that resemble human natural language and allows context-sensitive back-and-forth interaction with humans. Such tools have also the ability to generate meaningful output through different modalities (for instance, generating an image from a textual prompt, or vice versa).

In higher education, AI tools allow radical transformation at many levels: from streamlining administrative processes, to personalized student tutoring, assisting research, up to the teaching and learning process (George & Wooden, 2023). Indeed, AI has been used in educational contexts (AIED) since the '70s (Southgate et al., 2019). However, the sudden increase in capabilities and popularity of AI-based tools brought to the general attention an entire set of questions concerning the potential, the associated risks, and the ethical and legal implication of such tools (Lo, 2023; Ruiz-Rojas et al., 2023; Yan et al., 2023). Even though empirical evidence is still limited, policy-makers and researchers agree that generative AI tools, when integrated into a pedagogical framework, could improve the effectiveness of the teaching and learning process. (Bearman et al., 2023; UNESCO, 2019; Vargas-Murillo et al., 2023). AI tools can enhance the teachers' ability to discern each learner's unique strengths, weaknesses, and pace of learning, tailoring educational content to suit individual needs, rendering one-size-fits-all approaches obsolete (Bozkurt & Sharma, 2023; Tlili et al., 2023; Zirar, 2023). A recent systematic review by Yan and colleagues (Yan et al., 2023) identified 53 educational tasks that can be enhanced by AI, including new opportunities for methodological innovation in teaching and learning practices.

1.2 Leveraging AI in teaching and learning practices

Many authors have identified potential risks in the use of AI in teaching and learning (Adiguzel et al., 2023; Aldosari, 2020; Baidoo-Anu & Owusu Ansah, 2023); the most commonly reported include:

- **Preservation of teacher-student relationship:** Teaching and learning are fundamentally social activities, where knowledge is typically elicited through interaction among living entities. Currently, AI-based models such as virtual tutors are unable to provide the same level of human interaction as a real teacher or tutor, which can be a disadvantage for students who benefit from a personal connection with a teacher.
- **Limited understanding:** AI content generation is based on statistical patterns rather than a real understanding; this might prove problematic when it comes to providing students with personalized feedback or explanations for possible misunderstandings.
- **Biases in training data:** Bias is a systematic deviation between observations and ground truth, which causes a tendency to favour some ideas or entity over others” (Zhai & Nehm, 2023, p.1393). It is often suggested that current large language models might present historical, representational, evaluation, and other types of bias as a cascade effect of imbalance in training data, for instance, an overreliance on English language

(Caines et al., 2023). This, in turn, might hinder content generation and create inequity in evaluation practices (Li et al., 2023).

- Lack of creativity: AI systems can only generate responses based on the patterns they learnt during training, which can hinder the originality of the responses. This is exacerbated by the risk of recursion, that is, when AI starts getting trained based on AI-generated content.
- Dependency on data: AI models are strongly dependent on the quantity and quality of data they are trained on: if the data is not sufficient or relevant, the model will provide low-quality output (garbage in-garbage out effect).
- Lack of transparency: Most AI models are built like a “black box”: human users can see the output generated by the model but cannot access “how” this has been obtained. In most cases, it is practically impossible to understand how the model develops such outcome even if all the parameters are known, since the operation of the neural network depends on complicated interactions between hidden layers.
- Privacy and Security: AI tools have the potential to infer sensitive information, such as a person's location, preferences, and habits; this poses serious risks of unauthorized data dissemination, as well as risks connected to identity theft, authorship, and deepfakes (Nguyen et al., 2022).

One aspect that is systematically highlighted in these and other studies is that, in order to maximize AI advantages and prevent, or reduce, its negative aspects, educators at all levels of instruction need to combine the practical technical knowledge required to use AI tools with ethical considerations (Ng et al., 2021). Many studies define this competence as AI Literacy (Panciroli et al., 2023). In particular, Cuomo and colleagues (Cuomo et al., 2022) operated a systematic review of the literature on AI Literacy and defined four main dimensions. Those correspond to knowledge of the basic functions of AI and its applications, the ability to apply those functions in different contexts, the ability to critically evaluate practical applications of AI as well as the tools themselves, and finally the ability to assess aspects such as equity, responsibility, transparency, privacy, and security of AI implementations. This framework is similar to that of Ng and colleagues, who similarly derived a four-level definition of AI Literacy from a review of the literature through the lenses of Bloom's cognitive taxonomy (Ng et al., 2021).

In the context of Instructional design, Ch'ng identified two distinct approaches to AI implementation, assisted intelligence and autonomous intelligence (Ch'ng, 2023). Whereas the latter aims to automate instructional steps through AI, the former goal is to help humans perform the different tasks of design “faster and better”. The author adds that “Enabling designers to gain a practical understanding of what AI can achieve, this allowed designers to easily experiment with AI during the design ideation phase and facilitated their evaluation and adjustment based on the data input received from learners in order to create an adaptive and responsive design” (ibi, p. 36). According to the author, this approach will be responsible for the appearance of new roles in the AI-assisted learning ecosystem: whereas three of them (AI content strategist, content accessor, and learning experience designer) can be traced back to the evolution of existing roles (subject expert and learning designer), the fourth role

describes a completely new professional. The “AI Technology Specialist [...] would be able to use various AI tools in creating learning objects or assets for the educator and students in the teaching and learning activity” (Ch’ng, 2023, p. 38). The author distinguishes this figure from a more technical “prompt engineering” role by highlighting that this professional would serve three main roles:

- Creating learning objects or assets for the educator and students.
- Updating and counseling on innovations, scientific evidence, and new methodologies.
- Training and support for HE personnel for effective integration of AI tools in complex environments.

Ch’ng acknowledges that “The acquisition of the skills is quite diverse and demanding as the specialist should possess a high level of adaptability and be quick to learn new technologies” (*ibidem.*). The author, however, does not elaborate in more detail on such roles or the required competences that this figure would need to operate at those levels.

1.3 AI Specialist: a new professional figure to improve teaching and learning in HE

The new professional figure identified by Ch’ng takes advantage of the different dimensions of AI literacy to assist teaching and learning processes at multiple levels; in the context of higher education, this Specialist can play such support roles as a part of a multidisciplinary unit dedicated to providing quality and effective teaching and learning. Indeed, teaching and learning practices are a critical topic for the present and future of higher education (Aldosari, 2020; CERI, 2008) with the consideration that such processes require the synergistic action of different professionals, where disciplinary experts (teachers and researchers) work alongside instructional designers and IT managers to promote active participation and foster student engagement and sustained motivation. Within this context, the figure identified by Ch’ng could complement this multidisciplinary equipe by providing support in three key roles: the choice, fine-tuning, and creation of tools and contents based on AI aimed at teachers and students; supporting the upskilling of university personnel on technological, operational, and ethical aspects of AI use, in a faculty development (Hamilton & Brown, 2003) perspective; and keeping a constant update on innovations in the field of AI, including new tools, commercial opportunities, research evidence. With the aim of further defining this suggested new professional figure, the aim of this paper is to define a competence profile for the AI Specialist based on existing frameworks of AI Literacy. Furthermore, this study provides an example of the different roles that the AI Specialist can play in higher education instructional design process.

2. Materials and Methods

To define the competence profile of the AI Specialist, we crossed the different kind of knowledge concerning AI that the professional figure needs to possess with the different roles that they need to play in HE.

First, to define the different features that converge in the similar concepts of “AI Culture” or “AI Literacy” To this aim, we used the four dimensions of AI literacy

defined by Cuomo and colleagues (Cuomo et al., 2022) based on a literature review: Cognitive, Operational, Critical, and Ethical.

Second, we coupled them with the three main roles of the figure as described by Ch'ng (Ch'ng, 2023). The researcher described the different roles that AI can play in instructional design, on the basis of the well-known ADDIE model (Bonaiuti & Dipace, 2021) and focusing on the supporting role that AI can play for different professional figures. By crossing the three roles identified by the author with the four elements of AI Literacy, this paper defines a first competence profile for the AI Specialist figure.

3. Results.

The competence profile for the AI Specialist figure is detailed in Table 1.

Table 1. Competence profile for the AI Specialist.

	Cognitive	Operational	Critical	Ethical
Creating learning objects	Knowledge of AI assisted tools. Knowledge of prompting techniques. Basic knowledge of data literacy principles Understanding the principles of instructional design	Ability to use different AI tools for the creation of learning materials Ability to develop AI applications of various complexity	Reflect on opportunities and challenges for the use of AI-generated objects or assets in teaching and learning Consider critically the quality of AI-assisted learning objects or assets	Consider the ethical implications of employing AI in instruction, including the reinforcement of preexisting biases, authoriality, creativity, and educational relationship
Updating and counseling	Knowledge of the principles and functioning of AI technology Knowledge of bibliographic research principles	Ability to operate regular bibliographic analysis and update Ability to interact with different professional figures (teachers, tutors, IT man-	Being able to gauge benefits, opportunities and risks linked to the adoption of new instruments and methodologies for different	Understand the perception of AI and assess the impact of innovations in AI on different stakeholders (including uni-

	Knowledge of data analysis principles	agers, administrative staff, commercials) Being able to explore and test AI-assisted tools features and properties	professional figures. Consider the impact of AI use at different scales (micro, meso, and macro)	iversity personnel, students, and teachers) Understand the implications of AI use on higher education at large (e.g. privacy, data usage, biases, content quality, innovation, research)
Training and support	Knowledge of pedagogical frameworks and instructional principles Technical knowledge of AI tools functions	Ability to provide formal and informal assistance tailored to the needs of different professionals Ability to work in multidisciplinary teams of experts	Be able to reflect on the specific needs of different personnel to provide personalized solutions. Being able to promote the understanding of AI and the informed adoption of AI instruments	Be able to act as a consultant for ethical and responsible use of AI technology.

4. Discussion

Having defined the competence profile of the AI Specialist, the main question concerns the potential impact of introducing this new professional figure in higher education. This would happen at three levels: at the “micro” level of individual courses, this figure will enhance the quality of teaching and learning practices by leveraging the advantages of AI tools, while minimizing risks. At the “meso” level of University departments or faculties, the AI Specialist can help streamline administrative processes and promote teamwork and multidisciplinary collaboration among the different figures of HE institutions, raising knowledge and critically informed adop-

tion of AI-powered tools for different aims (tutoring, student orientation, evaluation of teaching and learning practices, etc.). At the “macro” level of the organization, this figure can help the definition and adoption of best practices related to the ethical use of AI in higher education, by supporting the collection, analysis, and communication of data acquired at micro and meso levels.

This competence profile also helps identify the different roles that the AI Specialist might play at a more granular level of detail. Thus, on the basis of the ADDIE instructional model, we can imagine the different ways in which the AI Specialist can improve the the process of designing and implementing an University Course, starting from the hypothetical case of a teacher who wants to implement a new methodology, namely flipped classroom, to enhance student motivation and learning achievements (Zainuddin, 2018). Lo et al. (2017) believe that AI has great potential in the flipped classroom approach, because it may enable the personalization and adaptation of the learning process to the students’ needs. Shan and Liu (2021) suggest a model of Hybrid Teaching of Artificial Intelligence and Flipped Classroom, which combines big data, cloud and online applications to implement comprehensive and individualized learning:

1. In the Analysis phase, the AI Specialist could use learning analytics to discuss with the teacher and instructional designer on the strategies to identify the formative needs of students.
2. During the Design phase, the AI Specialist could support the definition of learning goals in line with the expected outcomes of the degree course; successively, they might help defining the strategies for formative and summative assessment and course evaluation, identifying the processes in which AI could assist or automate procedures.
3. In the Development phase, the AI Specialist could assist the creation of learning materials and tools, including prompt development and the training of AI tools (for instance, by training chatbots to assist students with discipline-specific topics) to provide personalized learning paths to students.
4. In the Implementation phase, the AI Specialist could collaborate with teachers and tutors using AI-based tools for monitoring and feedback on the course progress.
5. In the Evaluation phase, the AI Specialist could help the process by facilitating data collection and using AI-based tools to identify tendencies and identifying opportunities for improving future iterations of the course.

5. Conclusions

We are still in an exploratory phase concerning the introduction of AI tools in higher education. The debate is still ongoing between AI enthusiasts and more sceptical positions, even though its practical advantages likely makes it a question of how, rather than if, artificial intelligence should be used in HE practices (Zhai & Nehm, 2023). AI is at the centre of a paradigm shift that is both technological, scientific, and cultural. For HE, the availability of tools that allow to enhance and revolutionize teaching and learning practices is a valuable resource that is hard to ignore. The known and potential downsides of AI tools require HE institutions not to be unprepared for this challenge; to this aim, it is critical to introduce AI Literacy competencies at all levels. The road we propose is that of training professional figures with

the competencies required to effectively interact with the different roles that contribute to teaching and learning practices in HE, from IT managers, to teachers, administrative personnel, instructional designers, and tutors. The figure of the AI Specialist answers the requirements of AI Literacy and can play a support role at all levels: from being part of a multidisciplinary team supporting teaching and learning quality, to promoting an informed approach to the introduction of new features and tools, to supporting normative and strategic decisions towards the use of AI. This figure promotes an informed and integrated perspective towards AI, raising quality standards all the while granting a critical and ethical point of view towards present and future AI developments.

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