Developing an interdisciplinary educational program for higher education students on Artificial Intelligence (AI) literacy: methodological dilemmas and challenges

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Purpose

To reflect upon the **role of teachers/educators** in the development of an Artificial Intelligence (AI) literacy MOOC for higher education students

INTRODUCTION

-Since AI is finding its way into more and more areas of everyday life, *fostering AI literacy* of higher education students (who are already citizens and future professionals) is very important.

-The most cited definition of AI literacy by Long & Magerko (2020: 2):

"a set of competencies that enables individuals to **critically evaluate** AI technologies, **communicate and collaborate** effectively with AI, and **use** AI as a tool online, at home and in the workplace".

At the UoC we decided to create a MOOC course for all students in order for developing their AI literacy, having formed this purpose an interdisciplinary team.

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Why design a course for AI literacy for Higher Education?

For ethical reasons.

This course can provoke ethical and moral reflections on technology's role in human development, human relations and activities.

If AI literacy is not promoted, ethical problems might arise. There is a need of understanding AI resources, functioning, agency, and outcomes to ensure an the ethical application (Hermann, 2022: 1).

Focus on transparency, explainability, comprehensibility (Jiang et al., 2022)in a human-centered AI design (Shneiderman, 2020).

Tensions and Challenges

- **rare resources**: a) research on AI literacy is still in its infancy and literature on the topic scarce, b) few AI literacy courses for Higher Education around the world and most of them in USA and Asia, even fewer in Europe (Laupichler et al., 2022), none in Greece.

- the **technocratic orientation** of the existing resources (relevant research and courses): dominance of the computer sciences in the area. We are seeking for a more humanistic approach.

- **need for contextualization** of the course: a university in the periphery of Greece, some students (especially SSH students) are coming from vulnerable social groups (very low grades).

- **need for finding a common code** to communicate in our interdisciplinary team.

- **need for (re)defining AI literacy**

The main goal of our presentation

To discuss the challenges and dilemmas we face during the production of the AI literacy course for all higher education students at the UoC. While trying to answer the following questions:

- What **competencies** are at the core of AI literacy? OR what skills a HE students needs to acquire to be AI literate?

- What **content** can be taught in such a course?

- Which **teaching methods** and pedagogical principles are relevant?

- What could be the **structure** of such a course?

The purpose of our team while designing and producing the course

Our purpose was to design and produce a course on AI literacy that

on the one hand contains all the necessary knowledge for the students of diverse study backgrounds to understand the concepts of ML, like supervised learning, regression, classification, unsupervised learning, and clustering.

and on the other hand resists the dominant technocratic orientation, by giving emphasis on societal issues
- following a critical and ethical approach
- thus being aligned with the Nordic curricula concerning digital competences (Godhe, 2019).
- Following this critical, ethical approach to AI literacy we adapt digital bildung definitions (Krumsvik, 2008, 2011, 2014; Purina-Bieza, 2021) related to transformative agency manifestations and transformative digital competence (Aagard & Lund, 2020).
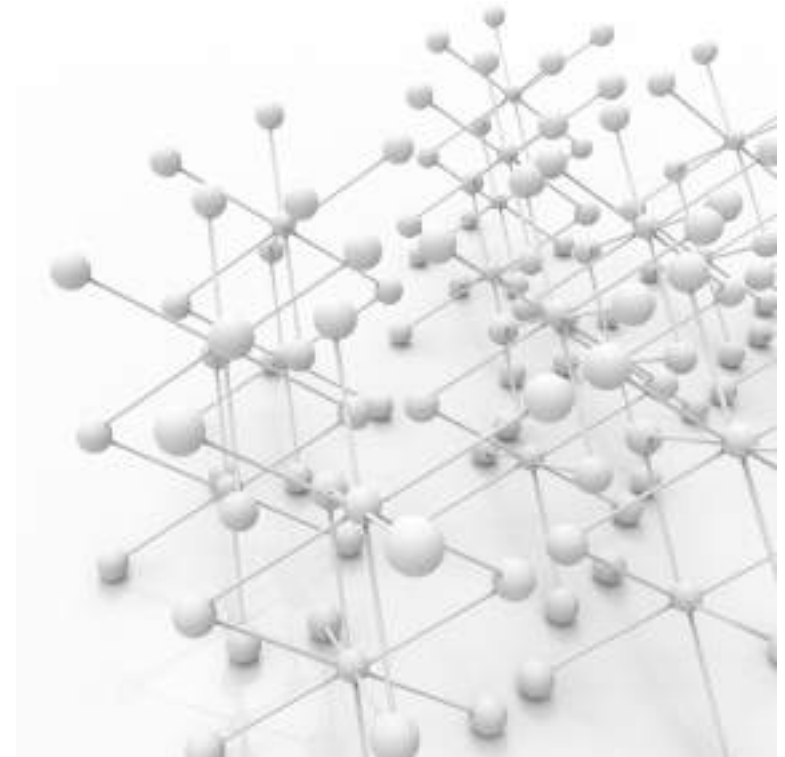
AI literacy:
a complex concept

AI: a technical notion coming from mathematics & computer science **vs**

Literacy: a socio-cultural theory and practice (Street, 1984)

The two main questions we have to answer as course designers :

- How can we combine such different worlds? Based on which common grounds?

- Which literacy model could be most appropriate for our endeavor?

Our first choice: the Multiliteracy Program

Situated learning (experiencing): learning begins when the insights and the experiences of the participants (learners) are entering the educational settings (e.g. use of Instagram or Tik Tok).

Overt instruction (conceptualizing): In this phase the instructor or the educational material or a MOOC course leads the participants to connect their experiences with the new tools or/and the terms, or the grammar that is used (e.g., drag and drop, making subtitles for blogs, making memes, etc).

Critical framing (analyzing): In this phase the tools/ terms/ grammar taught are connected with the social impact and the participants interrogate themselves how these tools construct a specific social world and of what kind.

Transformed practice (new learning): Now the participants with the tools and skills acquired design their own texts (oral, written, visual, audial or multimodal) and these new texts become the sources for new designs in future.

Adjusting Multiliteracy theory to Artificial Intelligence

1. **Situated learning:** In this step the goal is to connect students' existing knowledge with the AI basic concepts that have been inserted in our everyday life (e.g. the ways AI affects their interaction with social media).

2. **Overt instruction:** Here the goal is to connect users' input with the app's output, through the use of specific AI concepts and easy to handle algorithms (e.g. how google finds the proper job depending on the user's gender).

3. **Critical framing:** In this step the learner will connect AI concepts and practices (e.g. Input – Output) with how it creates prejudice and reproduce stereotypes about specific social groups (e.g. google translations show strong preference towards male defaults). Algorithmic biases…

4. **Transformative practice.** Now the students are expected to modify their behavior and their online habits, reducing bias, and enhancing AI accountability and risk management. Embedding ethics at every stage of the AI process. Making citizens/ future professionals mindful of the potential implications of solving problems with AI.

Lesson 1 (Situated learning and Over Instruction): around 6 hours
Students will become familiar with basic AI concepts while embedding them in their experience

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The lesson will be structured as follows:

For every concept, the students will be presented with an example (in a game-based format) where an AI system makes a choice. The examples are designed to fit their common and everyday experiences with AI systems (e.g., classify an email as spam, predict the average time a user will spend on an app).

Concepts will then be taught commenting on these examples.

At the end of each module, the students will be presented with a quiz that tests their understanding of the concepts taught.

1.Classification and Regression	2.Supervised and Unsupervised learning	3.Reinforcement learning
4.Types of algorithmic errors	**5.Linear Regression**	**6.Non-linear methods (decision trees, random forests, neural networks)**

Main concepts from AI (and ML)

Lesson 2 (Critical Framing): around 3 hours

- We will discuss the main concepts of fairness and bias in AI, and discuss different scenarios where AI choices can have a negative impact on peoples' lives.

- We will then present a case study of algorithmic bias. In this example, an AI health system assigned lower health risks to black patients than to equally sick white patients. Bias occurred because the algorithm used health costs as a proxy for health needs. Less money is spent on black patients who have the same level of need, and the algorithm thus falsely concludes that black patients are healthier than equally sick white patients. This way, the AI system perpetuates the systematic bias of the data it is trained on.

After the lesson, the students will be presented with more cases where they will be given a description of the AI task (e.g., recommend a job to a job seeker), the data (e.g., gender, work experience, and salaries of other job-seekers), and the output of the AI system to different samples (e.g., a man and a woman with similar skills).

Lesson 3 (Transformative practice): around 3 hours.

In the final part, the students will experiment and see that changing their behaviors can change the outputs of an AI system designed to recommend news products.

We will use a recommendation system based on a benchmark version of the MovieLens dataset (Maxwell Harper & Konstant, 2016), which includes 100,000 ratings (1-5) from 943 users on 1682 movies, as well as the demographic information of users. The users will then have the option to rate 10 movies and pick different demographic information, and then they will be presented with a recommendation. The students will then be allowed to change their ratings and their demographic information and try again.

This will enable the students to (a) understand how modifying their behavior affects the input and therefore the output of the algorithms and (b) how information, like age and gender, can change the output of the methods based on patterns or potential biases in the data.
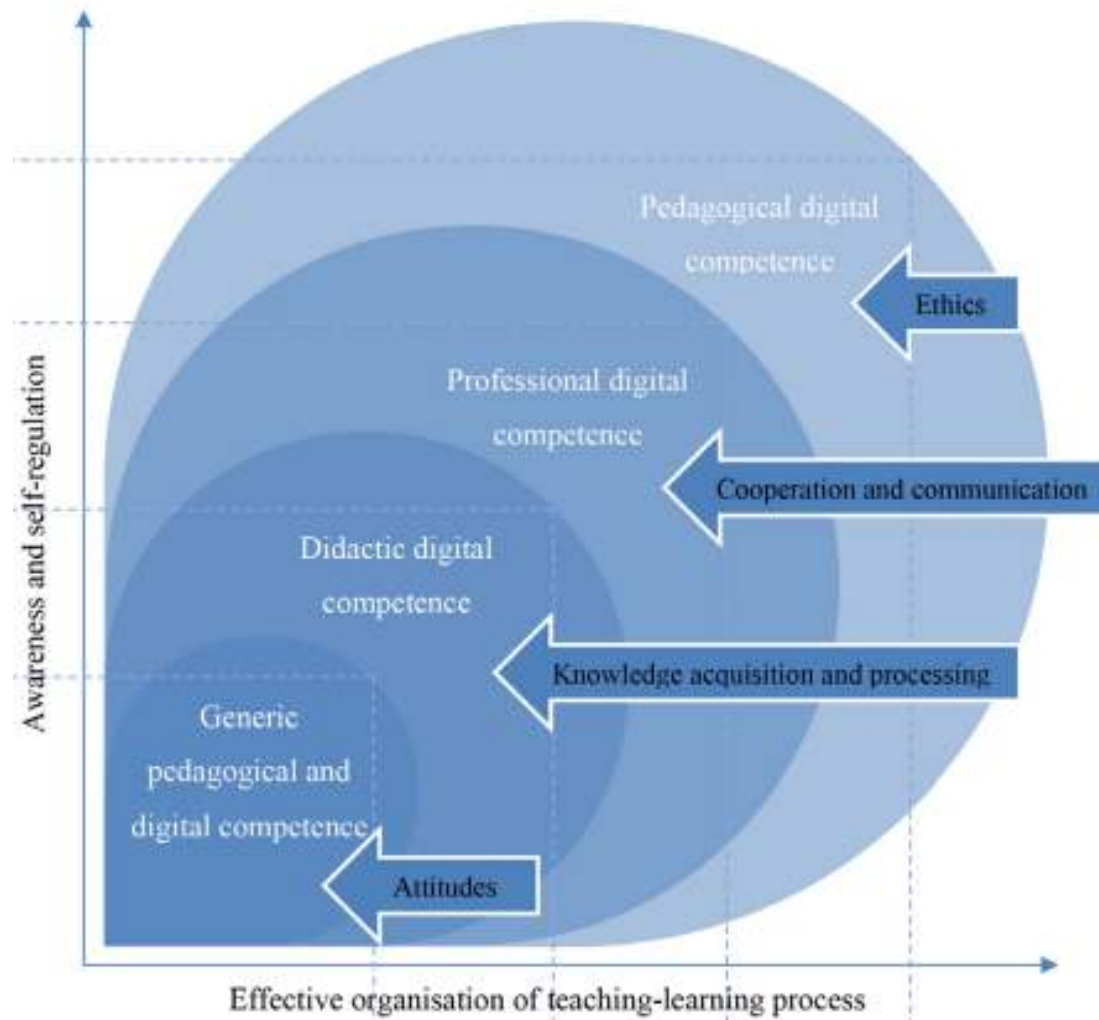
Where are we now?

At the introduction of the main concepts of AI and ML-

Many difficulties as it concerns

the introduction of these concepts in the course and

the finding of a common code to communicate in our team (experts on AI, mathematicians, pedagogists)

Purina-Bieza, K. E. (2021).

Gudmundsdottir, G. B., & Hatlevik, O. E. (2018).

1. **Generic digital competence** cuts across subject disciplines and specifies the general digital competence that teachers, teacher educators and student teachers need to function as educators in digital contexts.	-very complex mathematical and digital skill terms such as supervised/unsupervised learning, regression -teachers' attitudes towards digital tools in education
2. **Didactic digital competence** captures how academic subjects are affected and afforded by digitalisation: representations, knowledge practices, communicative ecologies, etc.	-the need for recontextualization (e.g. are certain groups affected? Which are these groups, what are their main features? With which specific pedagogical actions and stances can we empower them?)
3. **Professionally oriented digital competence is connected to our professional enactment of Professional digital competence**: how we design the course and its units, approach students' assessment, communicate with colleagues and other relevant parties…	Under research – main goal of this project: at which level the educators (our team) acquire a metaperspective with regards to the first three components? (Krumsvik, 2011: 47)
4. **Transformative digital agency captures** teachers' competence in taking initiatives and transforming their practices by selecting and using relevant digital tools.	-it seems that the multiliteracy approach offers us a solid base to construct effective educational practices, but also leaves unanswered questions (like the meaning of agency, design…)

Rethinking the challenges, we face

(**the dominant technocratic orientation**). In the course we propose, the emphasis is on developing ethical competences in the critical use of sources, as well as an ethical awareness of the social implications of living in a digitalized society and not on the technical terms/ concepts and competences.

(**the need for contextualization**). Our proposed project don't follow the easy way to present in short, easily digestible modules. Recontextualization of scientific knowledge doesn't mean simplification. For us it means connection of scientific knowledge with learners' experience, critical thinking on social implications and ethical issues that emerge, procedures necessary for building digital bildung. AI complicated terms need to be aligned within and between lessons and assessment.

(**need for finding a common code**). Through continuous dialogue between the members of our interdisciplinary team we build bridges for digital bildung → transformative agency towards innovation

(**need for (re)defining AI literacy**). Through the appropriate adjustments to multiliteracies program in order to achieve Digital Bildung. Our research goes on.

Conclusions

AI literacy courses for Higher Education and the relevant research need to flourish the following years all over the world . They both are necessary for an ethical use of AI of citizens and professionals in the future

- ◦ Identification of the (minimum) knowledge the students/ future citizens and professionals that need to develop.

An AI literacy course needs to combine technical knowledge/ text with socio-cultural context

- ◦ Identification of particular social groups that are facing difficulties. Practices, competencies that will empower them

AI and teachers' professional development

- ◦ Identification of the skills, stances, practices and the knowledge the teachers should acquire in the Big Data era.

AI and literacy compatibility

- ◦ For the sake of this combination some terms of literacy literature need new meaning / new definition (e.g. the terms agency, design, empowerment…)
- ◦ New literacy education models need to be invented

Thank you!