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CONTRIBUTO TEORICO

L'Alfabetizzazione in Intelligenza Artificiale dei docenti nell'educazione degli adulti caratterizzata da superdiversità.

Teachers' Artificial Intelligence Literacy in Superdiverse Adult Education.

Enrico Vignando, University of Udine.

ABSTRACT ITALIANO

Con il diffondersi dell'Intelligenza Artificiale e il suo impatto in ogni ambito della vita quotidiana e professionale, la maggior parte delle persone non possiede alcun tipo di competenza di IA. Tuttavia, gli viene richiesto di adeguare rapidamente la propria preparazione per vivere e lavorare in una società imbevuta di IA. Il presente articolo esplora le definizioni di alfabetizzazione, competenze e capacità relative all'IA adottando la prospettiva dei docenti di apprendenti adulti con retroterra migratorio, che sono chiamati a rispondere alle sfide educative della formazione continua degli adulti contemporanea, caratterizzata dalla postdigitalità e dalla superdiversità. Infine, questo contributo delinea progetto di ricerca focalizzaato sulla formazione professionale dei docenti in tema di alfabetizzazione all'IA in contesti autentici, come quello dei Centri Provinciali per l'Istruzione degli Adulti (CPIA).

ENGLISH ABSTRACT

With the spread of Artificial Intelligence (AI) and its impacts in all professional fields and everyday life, most people find themselves without any expertise in AI. Yet, they are expected to rapidly become AI literate in order to live and work in a society permeated by AI. This article explores the definitions of AI literacy, competencies, and capabilities from the perspective of teachers of adult learners with migratory backgrounds, who must match the educational challenges deriving from the postdigital and superdiverse features of contemporary lifelong learning. Finally, the article outlines a research project to study teachers' professional development in AI literacy in authentic contexts, such as the Italian Provincial Centers for Adult Education (CPIA).

Introduction

Since Adult Education was recognized for its importance internationally (Milana, 2012), the term "lifelong learning" has become an umbrella term that comprehends different situations and meanings of LLL. As illustrated by Poquet & de Laat (2021), there has been a merger of the notion of LLL as an educational process, i.e. a process by which individuals make sense of and constitute their own lives, choices, and identities, and learning in adulthood as the ongoing acquisition of information, skills and social practices. With the predominance of the latter interpretation, the discussion about LLL has progressively focused on the economic dimension of adult education, with a contextual shift of responsibility for upskilling from institutions to individuals.

Autore per la Corrispondenza: Enrico Vignando, Department of Languages, Literature, Communication, Education and Society (DILL), University of Udine.
E-mail: enrico.vignando@unimore.it

The diffusion of AI and generative AI systems and models, publicly available at relatively cheap prices (if not for free), has spread the idea of the urgent upskilling of professional workers. At the same time, citizens are expected to acquire a set of AI competencies and become AI literate in order not to be overwhelmed, excluded, and manipulated in the era of AI.

The novelty of the field of research about AI Literacy brought a multiplication of terminology referring to the diverse concepts of literacy, competence, and capability. This article aims to contextualize LLL in the postdigital and superdiverse society and describe the state of the discussion about AI Literacy, AI competencies, and AI capabilities, trying to untangle overlapping definitions and terminological uses. Once these concepts are clarified, this article concludes by drawing the structure of a research project about teachers' continuous professional development in AI Literacy in superdiverse adult education contexts in Italy.

Adult learners in the postdigital society

Born Contemporary globalization has determined a global-local interconnectedness of people across time and space from the cultural, economic, ecological, political, and technological points of view (Milana, 2012). It deconstructed the traditional points of reference and rapidly altered the sociocultural, economic, and political balance in a way that can be grasped by following Pasta & Zoletto's (2023, pp. 27.28) re-reading of Appadurai's theory of global cultural flows:

> in the context of globalisation characterized by acceleration, the notion of "mobility" is more useful for understanding contemporary society than its stable structures and organisations. The social subject, in fact, must deal with two types of flows: human flows, i.e. transnational migrations, and symbolic flows, conveyed by equally transnational digital media. In both cases, the subject is materially or symbolically (onlife) transported, deterritorialised and traversed by a multiplicity of discourses […].

Adult learning and education, intended as "all forms of education and learning that aim to ensure that all adults participate in their societies and world of work" (UIL, 2016, retrieved from Milana & Tarozzi, 2021, p. 2), occur in this transnational context, in which individuals can access to a vast amount of information with relatively little effort, through omnipresent media and technological devices and smart objects that are connected to the internet. Similarly, intense and continuous migratory flows have allowed (or forced) an increasing number of people to be displaced, move, and eventually settle down almost anywhere. Thus, intercultural encounters between diverse communities have become more frequent, and the ethnic composition of once predominantly homogeneous social groups has diversified. These fast changes have influenced both technological and sociocultural aspects of teaching and learning.

Postdigitality

From the technological perspective, contemporaneity is characterized by the medialization of technologies and the concurrent disappearance of technology into everyday objects, including AI, in the form of software or algorithms. Postdigital media differs radically from the previous generations of media (Panciroli & Rivoltella, 2023; Rivoltella, 2020) because of the role of the users who interact with digital content. There is no clear distinction between producers and consumers of digital content; these roles merge into the figure of the prosumer, who can send and receive information and content from anywhere and anytime through the internet and social media platforms regulated by algorithms.

Since AI can organize and determine access and relevance of any piece of data available online, and especially because AI can mimic human communication with great success, performing very well in a series of cultural and cognitive activities traditionally associated with human intelligence (e.g., verbal and written text generation and manipulation, reasoning, and multimedia creations), it is urgent to develop a specific literacy for AI. AI generated hype and fears but also opened the possibility of enhancing human capabilities by adopting hybrid intelligent systems. However, AI literacy seems necessary to realize these hopes by enabling people to understand AI's possibilities and limits.

Superdiversity

From the sociocultural perspective, digital and transnational flows of information and people blurred the boundaries of pre-globalized society. Describing the features of human encounters in terms of 'cultural differences' results as either insufficient or incomplete. There is a "need to grasp relationships (and, indeed, "intersections") among a plurality of elements: age, gender, socio-economic aspects, linguistic repertoires, etc." (Pasta & Zoletto, 2023, p. 29). In this perspective, it seems useful to adopt the concept of "superdiversity" elaborated by Vertovec (2007, retrieved in Zoletto, 2023), which refers to the heterogeneous composition in terms of geographical and ethnic origins, education, languages, religions, culture, economic status, and technological competencies, of communities, resulted from the migratory flows. Aware of superdiversity, teachers and educators should not overlook the multiple variables (and their intersections) that influence the teaching and learning processes in educational contexts.

Multiliteracies

In a world where multimodal technology is ubiquitous, lifelong learning entails that teachers and educators must bear in mind that technology mediates both cognitive and meaning-making processes of learning (Poquet & de Laat, 2021). Since "all meaning-making is Multimodal" (New London Group, 2000, p. 29), to match the contemporary educational challenges, teachers and educators must also consider all the possible modes of meaning that adult learners could rely on in their meaning-making, including technology-mediated learning activities. Teaching and learning in contemporary society (characterized by postdigitality and superdiversity) cannot follow the traditional

monocultural and predominantly textual model of pedagogy, but embrace all diverse and overlapping modes of meaning-making (visual, audio, gestural, spatial, and also digital) and the intersections of diverse cultures. More literacies can be identified as more modes of meaning-making are included in education. Among these new literacies necessary to understand the fast-paced changes in society (Rosa, 2010), AI literacy is a fundamental literacy for contemporary citizens and workers. As non-AI experts, citizens and professionals must be equipped with AI literacy to better understand their present, prepare for the future, adapt to changes, and actively contribute to the future of their communities.

In the next paragraph, AI Literacy is approached from the perspective of teachers' professional development, particularly of those teachers who operate in complex education contexts with adults with migratory backgrounds, because these educational contexts condense a broad spectrum of challenges related to both superdiversity and postdigitality.

AI Literacy in Superdiverse Adult Education Contexts

According to the Multiliteracies perspective, there has been a change in the definition of literacy itself. As explained by Markauskaite et al. (2022), the notion of literacy "associated with one's ability to read and write […] has been replaced with the functional notion of literacy as the ability to use technical skills to pursue personal goals" (Markauskaite et al., 2022, p. 2). The debate around literacy defined it as either a set of cognitive abilities or situated practice (Cuomo et al., 2022). AI literacy can be conceived as situated practice.

For adult learning and education, the research on AI literacy (Cetindamar et al., 2024; Kasinidou, 2024; Knoth et al., 2024; Milana et. al., 2024; Sperling et al., 2023; Cuomo et al., 2022; Laupichler et al., 2022; Markauskaite et al. 2022) agrees to adopt the definition elaborated by Long & Magerko (2020, p. 598): "a set of competencies that enables individuals to evaluate AI technologies critically; communicate and collaborate effectively with AI; and use AI as a tool online, at home and in the workplace". For articulating AI literacy, the research formulated a set of questions as guidance for designing educational curricula for teaching and learning AI to the generic audience. Nevertheless, a distinction is needed between two different curricula, corresponding to two conceptualizations of AI literacy (Knoth et al., 2024), one for a general audience of citizens interacting with AI systems in their everyday lives and one for specific profiles of professionals that aims to take into consideration the features of contemporary work contexts and their tasks, situations and types of AI technologies and interactions with AI systems. A similar distinction has been made in policy documents with the conceptualization of distinctive frameworks for context-independent digital competencies for all citizens (Vuorikari et al., 2022), on the one hand, and the detailed description of digital competence for teachers and educators (Redecker & Punie, 2017).

Generic and Domain-specific AI Literacies

With Knoth et al. (2024), we can distinguish between a "generic [concept of] AI literacy" that interests every citizen living in a society permeated by omnipresent AI systems and

algorithms that are not visible objects but organize and determine the information on which people make their choices, make sense of their experiences, and build their identities. Generic AI literacy refers to "a basic understanding of AI and thus the ability, knowledge, and skills to understand, monitor, effectively interact with, and critically reflect on AI-based technologies for basic daily and work purposes in a way that allows citizens to participate and act with confidence in an AI-driven world" (Knoth et al., 2024, p. 3).

On the other hand, the concept of "domain-specific AI literacy" describes "the ability to bridge the understanding of AI with an understanding of the needs for its application within […] specific professional domain". Such a specific form of AI literacy is deemed necessary to address the needs and challenges of each "field or discipline in which AI is implemented or used" (Knoth et al., 2024, p. 4). Domain-specific AI literacy should include the descriptions of the potential use cases of AI in a particular domain, the knowledge of the most common type of data that could be processed, and the awareness of the ethical, legal, and social implications of using AI in that field or discipline.

Therefore, for adult learning and education in superdiverse and postdigital contexts, teachers' professional development in domain-specific AI literacy should deal with the AI-powered tools that could facilitate and enhance teachers' workflows and present recommendations and descriptions of successful uses and interactions of AI systems in educational contexts. Most importantly, teachers must become aware of the implications of AI and, in particular, of the non-neutral nature of data in contexts where intercultural differences are an essential feature. Considering AI under the scope of superdiversity requires high levels of critical thinking and intercultural mediation competence. Moreover, teachers need to engage with a plurality of literacies that, in fact, are interconnected with AI literacy: for instance, the understanding and critical reflection on the media and digital competencies of adult students with migratory backgrounds could enhance their AI literacy as engaged prosumers and promote forms of active citizenship online and offline (i.e., *onlife*).

All the studies above describe a mix of competencies and capabilities that constitute AI literacy. Some researchers use both these terms without discerning one from the other. Only Markauskaite et al. (2022) clarify methodically the terminology used in their paper, rejecting the use of 'skills' and preferring 'capability' over 'competency'. Both terms 'competency' and 'capability' can be considered valid when dealing with AI literacy. The choice to use one instead of the other should be made according to the perspective adopted by the researcher: from the learning standpoint, 'competence' is a more suitable concept for the daily practices of teaching and learning, including the assessment of observable attitudes, behaviors and cognitive activities; on the contrary, when considering the potential of expanding the individual's qualities and opportunities to seek a better future life, it seems more appropriate to use the term 'capabilities'.

AI Competencies

The term 'competency', according to OECD (2019, retrieved from Markauskaite et al., 2022, p. 2), refers to "the application and use of knowledge and skills in common life

situations as opposed to the mastery of a body of knowledge or a repertoire of techniques". When dealing with competencies, the focus is on the application, in real (or realistic) life scenarios, of the knowledge, skills and attitudes that an individual has been developing in formal, informal and non-formal contexts. By observing their practical application, it is possible to assess a level of competence on a scale defined by descriptors specified in a framework of reference.

Researchers in AI literacy have detected a progressively bigger number of AI competencies. Long & Magerko (2020) were the first to establish a list of 17 competencies related to people's knowledge about AI, considerations about how to use AI, and attitudes towards AI. However, Markauskaite et al. (2022) argue that such an AI-centered view of competencies runs short of comprehending "characteristics and competencies that have been critical for many previous generations but now take on new shapes, such as cooperation, creativity, complex problem-solving, flexibility and change" (Markauskaite et al., 2022, p. 2). Sperling et al. (2023) agree with this critique by pointing out that "the majority of literature primarily concentrates on […] "learning about AI" which emphasizes the technological aspects of AI literacy", neglecting the other two intersections between AI and education, i.e. learning with AI and using AI to learn about learning (Panciroli & Rivoltella, 2023; Holmes et al., 2022).

A less AI-centered approach can be found in the definition of AI competencies from UNESCO's AI Competency Framework for Teachers (AI CFT), published in September 2024 (Miao & Cukurova, 2024), which counts 35 competencies for teachers to make proper use of AI in education. Acknowledging that effective and ethical use of this technology also depends on multiple factors, UNESCO's AI CFT organizes the AI competencies on three levels of progressions (Acquire, Deepen, Create) and five aspects of competence related to AI: 1) Human-centered mindset; 2) ethics of AI; 3) AI foundations and applications; 4) AI pedagogy; 5) AI for professional development.

AI Capabilites

The shift from an AI-centered to a human-centered mindset promoted by UNESCO's AI CFT could be coupled with a change of rationale in the discussion around AI. Moving the focus from the economic return of learning to human development through education (Poquet & de Laat, 2021) is congruous with the terminological change from 'competence' to 'capability', switching "from the demonstrated behaviours to the potential, dispositions and opportunities within one's reach to pursue specific values and outcomes" (Markauskaite et al., 2022, p. 2). Focusing on human development, the notion of capability extends beyond the mere power or ability to do something. It includes the aspects of individual freedoms and choices that people can make within the structural and economic circumstances, integrating "individual power (or the lack of) and systemic constraints to undertake learning" (Poquet & de Laat, 2021, p. 6). The concept of AI capabilities can "help frame the use of technology, data, and AI tools towards supporting agency and eliminating systemic barriers" (Poquet & de Laat, 2021, p. 8). Including AI capabilities in LLL implies learners' self-regulation and freedom of choice in learning with AI, so that the increase in workers' efficiency cannot be disjunct from their "understanding

of how and if [human-AI] partnership" brings advantages and prevents deskilling (Poquet & de Laat, 2021, p. 8).

Cetindamar et al. (2022) provide a framework for workers' professional development in AI literacy and capabilities. Four core capabilities are identified: 1) Technology-related capabilities, that encompass data, technologies and technical skills; 2) Work-related capabilities, i.e. the complementary "AI-thinking skills" (How and Hung, 2019, retrieved in Cetindamar et al., 2022, p. 817) needed to improve the efficient use of AI, like critical thinking, problem-solving, communication, teamwork, emotional intelligence, judgment, service orientation, negotiating, cognitive flexibility; 3) Human-Machine-related capabilities, i.e. those skills involved in human-AI systems cooperation, which span from geometric reasoning to situation assessment based on perspective taking and affordance analysis, acquisition and representation of knowledge models, situated, natural and multimodal dialogue, human-aware task planning, and human-machine joint task achievement; 4) Learning-related capabilities, that embrace self-learning skills for LLL and skills related to social, emotion and cognition.

From a different perspective, Markauskaite et al. (2022) propose a conceptualization of AI capabilities according to the social space where AI capabilities are realized or displayed: 1) individually, there are the capability to self-regulate one's own learning, the capability to produce creative solutions beyond AI and the capability to work with knowledge at the intersection of human and artificial systems 2) as individuals operating in collectives, there are the individual capability to make free choices regarding AI, the capability to design human-centered AI, and the capability to embrace AI supported by institutional capability; at the level of collective practices, there are the capability to understand multiple perspectives that are mediated by AI, the capability to facilitate collective sense-making using visual representations, and the capability to learn in networks of humans and non-human intelligent systems.

AI capabilities can enable teachers to engage with AI technologies more actively, critically and with particular purposes, in resistance to the asymmetric condition of postdigital society, where citizens risk being passive consumers of information and content selected by intangible algorithms and no longer able to make free choices. By equipping teachers with solid AI literacy, it is more likely to reach a high standard of education in AI literacies for citizens and workers who are living in contemporary society: AI literate teachers and educators can provide adult and young students with the capabilities to design better social futures where AI is not feared, nor dystopic scenarios open the doors to social, political and economic manipulation, exclusion or exploitation.

Conclusion

We agree with Markauskaite et al. (2022), when they state that "such [AI] capabilities likely will need to be empirically studied and assessed in *authentic contexts*" (p. 13, emphasis in original). Therefore, as a conclusion for this article, we intend to outline a research project with the declared aim to study AI capabilities as indicators of the level of AI literacy of teachers who operate in adult education contexts, such as the Italian

Provincial Centers for Adult Education (CPIA) which are essentially characterized by both superdiversity and postdigitality (Pasta & Zoletto, 2023, pp. 155; Floreancig et al., 2018).

Considering that AI literacies should be intended in terms of situated practices, especially because the effects of AI technologies cannot be comprehended without considering the contexts in which AI systems are deployed and used, the study of AI literacies and AI capabilities should adopt the participatory design of a Research-Action project (Kasinidou, 2024; Floreancig et al., 2020; Zoletto & Zanon, 2019) which involves in-service teachers, for they double condition of adult students and professionals working with adult students, whose teaching could benefit from both generic and domain-specific AI literacy education. Questionnaires about teachers' level of AI literacy can be the starting point for collecting data about previous experience with AI and professional development in AI literacy. It would be interesting to collect this kind of quantitative data since it is likely that Italian teachers have attended courses on digital and AI-related topics sponsored by the Italian National Recovery and Resilience Plan, funded by the European Union. The answers from the questionnaire could provide some themes to prompt and start the process of "tailored educational interventions for AI based on learners' unique perceptions and needs" (Kasinidou, 2024). The expected outcome of multiple cycles of implementation and reflection about AI in the CPIAs is a set of qualitative data obtained from interviews and structured observations that could shed light on the processes of co-construction and acquisition of AI capabilities for matching the challenges of postdigital educational contexts characterized by superdiversity.

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