# Towards AI literacy: A proposal of a framework based on the Episodes of Situated Learning

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Abstract

Recent Artificial Intelligence innovations have renewed the challenge for education actors who, as always, have to promote innovation that can exploit the potential while minimising the risks offered by new technologies. This contribution addresses the proper integration of AI in education by situating AI with the frameworks offered by the different literacies that have emerged over the last few years. At the same time, the contribution presents a proposal for a framework to develop an AI curriculum in the school. The proposed framework exploits the well-known Episode of Situated Learning instrument (ESL) as a teaching device useful for developing AI competencies at different levels.

**Keywords**

AI and Education, AIEd, Episode of Situated Learning, ESL, Generative Artificial Intelligence,

## 1. Introduction

The use of AI in education is an emerging area of research and practise, and it presents a unique set of challenges and opportunities for educators [1]. On the one hand, AI has the potential to revolutionise the way we teach and learn by providing personalised learning experiences, automating administrative tasks, and even developing new educational content. On the other hand, there are concerns about AI's ethical, social, and psychological implications, such as privacy, bias, and job displacement. Educators must proactively integrate AI into their curricula to address these challenges rather than merely reacting to technological changes. One way to do this is by situating AI within the broader frameworks of literacy that have emerged in recent years. Literacy, in this context, refers to the ability to read, write, and understand different forms of media, such as text, images, and video. However, literacy also encompasses critical thinking, creativity, and collaboration, essential skills for navigating the complex and dynamic world outlined by the AI revolution. By incorporating AI into existing literacy frameworks, educators can ensure that students develop the necessary skills and competencies to engage with AI responsibly and ethically. Moreover, this approach can help bridge the gap between technical and non-technical disciplines by emphasising the interdisciplinary nature of AI. A framework for developing an AI curriculum is presented to support the integration of AI into education.This framework builds upon the Episode of Situated Learning (ESL) instrument, a teaching tool emphasising real-world problem-solving and experiential learning. By using ESL, educators can create a context for relevant and engaging learning while also developing AI competencies at different levels. Overall, integrating AI into education requires a holistic and collaborative approach involving all stakeholders, including educators, students, parents, policymakers, and industry leaders. In the following paragraphs, after presenting the landscape of different literacies promoted by technological evolution, we outline a proposed curriculum by proposing a version of the framework of situated learning episodes enhanced by AI.

## 2. From Literacy to New Literacies

### 2.1. A walkthrough among the terms in play

With the advent of the Media and Communication Society [2] and then the Data [3] and the code [4] Society, the concept of Literacy has been calling for a redefinition in at least two directions. The first direction is an extension of its scope beyond that of traditional school Literacy, which can be traced back to the classic "reading, writing and counting". The work of the New London Group moves in this direction and leads to the development of the Multiliteracy framework [5]. We are in the mid-1990s, and this group of applied linguists (including,

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in addition to Bill Cope and Mary Kalantzis, James Paul Gee and Gunther Kress) finds that the challenges of the new socio-cultural system call for a 'plural' articulation of the school competence system, to include at least the multicultural and media literacies. The second direction suggests that not only should the scope of the Literacy concept be extended but that it should be articulated in the sense of 'any' Literacies, each one with its specificities. In this regard, the debate [4, 6, 7] has confronted two positions: those who believe that Media Literacy absorbs into this concept all the other Literacies that have been introduced in the literature in correspondence with the advent of new media realities (fake news, Big Data, and most recently AI); those who, on the other hand, believe that these new Literacies enjoy such specificities that they cannot be attributed under the general umbrella of the Media Literacy concept. According to this second point of view, it is possible to identify at least four Literacies, each one with its specificity. Dutta and Ray [8] define Media Literacy as "an aptitude towards media message comprehension in a proper way with an aim to promote free, fair, and impartial access to information and knowledge". It involves the development of responsibility and resilience [9] and requires a skill set that includes the ability to construct, deconstruct, analyse and produce media messages [10]. Information Literacy, on the other hand, has to do with finding, analysing, using and sharing information. It is a critical competence in our post-truth characterised by simulacra images and a general loss of the referent [11]. Data Literacy is about the reality of data and the competence to identify it, understand it, use it, develop reflexivity about it and prepare tactics of resistance and critical interaction. A specific instance is the Personal Data Literacy Framework [12]. Finally, AI Literacy — the focus of this article — consists of knowing and understanding, using and applying, and evaluating and creating Artificial Intelligence [13].

## 2.2. Artificial Intelligence competence frameworks

Concerning AI Literacy, let us investigate the concept of competence for Artificial Intelligence by referring to some European frameworks. The European Union's Digital Education Action Plan (2021-2027) [14] for schools identifies as one of its strategic priorities the development of digital skills necessary for «literacy, including combating misinformation, teaching computer literacy, knowledge and understanding of data-intensive technologies». To this set of competencies, we also have to add the «advanced digital skills that produce digital specialists and ensure that girls and young women are equally represented in digital studies and careers».

Furthermore, the document delivered by K4A Trustees for UNESCO entitled Report on Education, Training

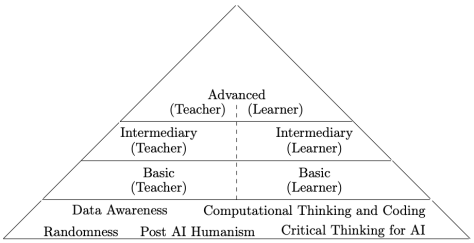


**Figure 1:** The fundamental pillars of an IA curriculum. Figure by de la Higuera [15].

Teachers and Learning Artificial Intelligence [15] identifies five fundamental pillars for building an AI curriculum that can be summarised as follows:

- Data Awareness. Data play a significant role in AI, specifically its collection, preparation and organisation. It follows data education (Data Science Education) requires a teaching and learning activity in which data itself is collected and visualised, manipulated and analysed.
- Uncertainty and Randomness. While it is true that AI works on data, it must be taken into account that data are not consistent, meaning that the same data, if not consistent, can lead to incorrect analysis, decision-making, and outcomes. Dealing with this inherent non-determinism requires awareness of the stochastic nature of most modelled processes and the probabilistic reasoning and statistics skills that pushes one to make the best use of data imperfections.
- Coding and Computational Thinking. Coding and computational thinking traces present in the curricula of many countries in the field of AI refer to the use of libraries for programming languages that allow the management of large amounts of data with very few instructions. Correct use of these techniques involves coding skills and an understanding of algorithms to know when not to trust the ML's decision.
- Critical Thinking. This is an important aspect requiring a deep understanding of how technology works to be achieved through a combination of understanding digital literacy concepts and the ability to use algorithms to construct one's own beliefs.
- Post-AI Humanism. The key idea is that the progress of AI is causing some fundamental truths to be reconsidered. Interaction with AI is impacting several areas of the human being: Truth, Experience, Creativity and Intelligence.

A final reference is to DigComp, the roadmap of the Italian Digital Agency (AgID). The latest version of 2022 - the DigComp 2.2 [16] - refers to new and emerging Artificial Intelligence technologies, including:

- data related to internet services and apps (e.g. focus on how personal data is used);
- interaction with Artificial Intelligence systems (including data skills, data protection and privacy, but also ethical considerations),
- Internet of Things (IoT);
- environmental sustainability (e.g. resources consumed by Information and Communication Technologies);
- new forms of work (remote and hybrid);
- virtual and augmented reality;
- robotisation.

# 3. Towards AI literacy using ESL

Introducing AI in the educational sector leads to the need to manage AI as a new competence. At the same time, it offers opportunities for innovation in all disciplines. This is why AI in education can be managed at two levels.

The first level, which we call direct didactics [17, 18] of AI, is aimed at fostering knowledge of the definition, vocabulary, fields of application and modes of operation. These dimensions are elements of AI literacy [19], aimed at getting to know these technologies to use them consciously. An example of this first level relates to the teaching activities developed by the teacher so that the student can learn, for example, how machine learning works, how artificial intelligence is trained, and how data is used.

The second level, which we refer to as indirect teaching [17] of AI, aims to lead students to recognise and reflect on the meaning, applications and impacts of AI without addressing these aspects explicitly but by accompanying them in an activity that is first experiential and then meta reflexive. An example of this level is the teaching activity that uses a chatbot to support students in exploring a discipline. For example, while studying history the student can interact with a chatbot system understanding the operating phases of this "intelligent application":

1. the chatbot is trained on the data of his school progress (e.g. grades, class attendance, and so on so forth);
2. through a feedback system it supports him through exercises prepared ad hoc [20];
3. regulatory feedback is activated to assess the achievement of objectives.

Both the first and second levels are part of the educational modes of Explainability, in which an explanation, a teaching activity is designed within a soliciting educational environment, centred on social interactions, to give rise to the confrontation and participation of the school community, thus initiating a process of AI culture [21].

Both levels can lead the teacher and student to approach AI using its applications to solve a problem or achieve a goal and learn how to collaborate with AI to improve the teaching/learning process.

## 3.1. ESL and Instructional Design, between macro and micro

An Episode of Situated Learning (ESL[1]) is an active teaching instrument built on three verbs that can work at the micro level for lesson planning and at the macro level for curriculum construction [22, 23, 24, 25, 26, 27].

The proposal we make here is to decline these two levels for the development of an AI Education curriculum in the school. The three verbs are: anticipate, produce, and reflect. We first look at their relationship with the teaching logic underlying ESL, and then, we will recover them as a basis on which to build the curriculum.

The ESL, which in its articulation must be circumscribed both temporally and in terms of content (in this lies its nature as an "episode", according to the logic of microlearning), begins with a preparatory work phase, the purpose of which is twofold:

1. to allow cognitive anticipation [28] on the part of the student, that is, to make him or her elaborate an initial a-thematic pre-knowledge of the content to be dealt with in class;
2. to give him or her the possibility of asking questions and elaborating hypotheses for solutions autonomously.

The teacher typically proposes a stimulus situation to start off this phase, and a job aid can support it by guiding the student through the cognitive work that is necessary for him/her in accordance with problem-solving logic.

Based on this preparatory work, in class, teacher starts the lesson employing a conceptual framework whose task is to recall the salient features of the preparatory activity and/or to provide concepts and tools that may be useful for carrying out, later, an activity in the small group. This activity is at the heart of the operational phase of ESL. Introduced by a stimulus (video, text, problem, etc.), it involves the students, organised into small groups, to produce an artefact from it. The presentation and discussion of the artefacts in the large group close this phase

[1] In Italian language the acronym for episode of situated learning is EAS, Episodio di Apprendimento Situato

which is decidedly learning by doing and characterised by the contextualisation of learning (ESL is 'situated').

Here begins the restructuring phase, the third and final phase of ESL. In this phase, the teacher first identifies and discusses errors and misconceptions that may have arisen during the previous phases of work. Then, he points out the concepts through what with Freinet can be defined as a posteriori lesson. There are two moments in which this phase of work is articulated: the debriefing, i.e. the retrospective analysis of what has happened in order to bring it to awareness; the tracing of the experiential gains back to theory, according to a flipped logic that first puts the students in the situation and only later, through discussion and problematization, introduces the theoretical frameworks. Throughout this phase - the most difficult for teachers - the working logic is clearly metacognitive and oriented towards developing meaningful learning. This aim entails fostering not only the application of known patterns of action to the new information learnt (assimilation) but also (above all) the development of new patterns of action according to a heuristic logic (accommodation).

### 3.2. Revisiting the steps of ESL with the support of AI

The three verbs of ESL — anticipate, produce, reflect — that as we have seen work in the three phases of the instrument, can also operate as curriculum organisers. In the case of AI, starting from the Data Citizenship Framework (DCF) of Pawluczuk et al. [29], it is possible to think about a new framework in the light of ESL. Table 1 provides a representation of this ESL-based AI framework (ESLAI).

| Phase | Logic | Goal | Curriculum |
|---|---|---|---|
| Anticipation | Heuristic | Language skills | Transversal and disciplinary |
| Production | Pragmatics | Technical and content competences | Transversal and disciplinary |
| Reflection | Cultural | Citizenship | Transversal |

**Table 1**
The ESLAI Framework

*Anticipation with AI.* Anticipating, in the era of AI, means using AI-based applications to explore in advance the topic focused by generating a provisional summary and producing visual representations of phenomena in different forms. When the focus is a process, anticipating could lead to simulating scenarios and making predictions. A classic example could be chatGPT or any other dialog system based on broad language models that can generate content on the learner's demand. The coding ability of these same systems could be used to create formal representations of a knowledge domain, for instance, in an ontological format. Alternatively, ad-hoc tools such as Algor could be used to create conceptual maps of the domain under investigation. The logic involved is decidedly heuristic and aims to develop language skills. In the curriculum, this logic is thematically specific to particular disciplines but also cross-curricular.

*Producing with AI.* Doing and producing mainly involves using AI-based applications to support the creation of the artefacts as a task for students during the operational phase of an ESL. This can mean producing texts in different languages, generating images, or creating videos and music. Nevertheless, on a technical level, 'producing with AI' also means developing programming skills, building a dataset, and knowing how to train an algorithm. Here, the logic is pragmatic and aims at developing technical and content skills. In the curriculum, this dimension is transversal to the individual disciplines and thematic to the technical ones.

*Reflecting with AI.* The reflection phase invites students to activate metacognitive processes on what was done in the first two phases. In this case, students are called upon to critically analyse the results produced by themselves with the support of AI. Reflecting could support the development of critical awareness of how AI works: reasoning about data, how it is collected and used, identifying bias, and recognising business logic and underlying policy implications. The logic involved is cultural and aims at constructing correct citizenship behaviour. This dimension cuts across the different disciplines of the curriculum.

## 4. Conclusions

This paper addresses the issue of integrating AI in education, placing the new knowledge related to it within the framework offered by the various literacies that have emerged in recent years. The proposed framework (ESLAI) lays its foundation on the educational instrument provided by the Episode of Situated Learning (ESL). As described in the contribution, the typical phases of an ESL naturally lend themselves to their use supported by AI technologies, particularly those offered by generative AI. Moreover, the focus on the metacognitive reflection phase inherent in an ESL also allows the student to address the "didactic" level of AI experientially. Through reflection on the use of AI tools, students can analyze the technical aspects underlying the operation of these tools and become fully aware of their advantages and limitations. Ultimately, this contribution represents a first step toward defining a tangible framework for integrating AI into educational processes, the validation of which requires an extended course of field experimentation.

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