

# Introducing the Competence Imitation Game: A Research and Teaching Tool for Context-Specific AI Literacy

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## Abstract

This is a work-in-progress paper, in which we outline the challenge of supporting context-specific AI literacy and present the Competence Imitation Game aimed at addressing this challenge. The Competence Imitation Game is a co-designed educational approach and practical tool inspired by the Turing Test. The way in which AI technology is adopted, and its impact, varies depending on the domain, meaning that AI literacy may comprise different competences depending on the context. Domain experts possess the tacit knowledge and insider perspectives required to recognize and evaluate these context-specific competences. The work addresses the question on how to harness the experience of practitioners to promote context-specific AI literacy by centering the learning process on collegial exploration of the boundary between human and machine competence. Through collective efforts to identify peers from Large Language Models imitating them, the Competence Imitation Game offers a new model for promoting AI literacy rooted in situated judgment and domain-specific expertise.

## Keywords

AI literacy, Imitation game, K-12 education, Human-AI interaction, Educational Technology

## 1. Introduction

The following excerpt is taken from an imitation game experiment between professional programmers and a large language model (LLM). The format is inspired by the Turing Test: a programmer (the Judge) attempts to distinguish between a human programmer (Respondent 2) and a LLM prompted to imitate one (Respondent 1) through typed questions and answers.

### Judge's Question

If you're stuck with a programming task, how do you go about solving it?

### Respondent 1

I start by understanding the problem, checking the error messages, breaking the problem into smaller parts, looking for help in the documentation or online, and if necessary, asking colleagues or the community for advice.

### Respondent 2

It depends on the problem. I always try to solve it by looking for information first, for example from existing code or through a search engine. If I'm really stuck, I ask a colleague whom I think knows about the topic.

### Judge's Assessment

Answer 2 is more convincing. The answer points out that problems can be of many different kinds, so the response is not straightforward either. The writing style of Answer 1, with its commas, is very list-like, which would suggest it was written by an AI.

The dialogue illustrates how the judge draws on programming-specific experience to distinguish between a fellow programmer and a machine. In this article we propose that the game invites participants

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to collegially reflect upon, and discover the knowledge, skill and experience that remain uniquely human in the age of AI.

We begin by discussing the concept of AI literacy, outline key challenges in its development, and show how the Competence Imitation Game can help address these challenges. We also present the co-design of an accessible browser-based application initiated to support this goal.

## 2. AI Literacy

Artificial intelligence (AI) is one of the fastest growing sub-fields of computer science (CS) with direct impact on society and our daily lives. AI in education is a nascent field, with no clear guidelines on what to teach or how to pedagogically benefit from AI in classrooms [1]. While much of the current discourse on AI in education focuses on generative AI, it is crucial to adopt a broader perspective. This is highlighted by UNESCO [2] as the need to learn *about*, learn *with* and learn to *work and live with* AI, competences commonly framed as AI literacy [3, 4, 5, 6]. AI literacy is also highlighted as a citizen competence in Article 4 of the EU AI Act [7] and in May 2025, the OECD and European Commission presented a joint framework for AI literacy [8].

An influential framework posited by Long and Magerko [3] defines AI literacy as “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” (p. 2). Their framework builds on five themes framed as questions in relation to AI: What is AI?; What can AI do?; How does AI work?; How should AI be used?; and How do people perceive AI?

Promoting AI literacy as a citizen competence across society presents several challenges. These include: (i) the complexity and unfamiliarity of AI technologies for many people, (ii) the lack of hands-on activities beyond direct content teaching resources, and (iii) the variation in the type of AI literacy required across different domains of practice where AI systems are used.

The first challenge, the complexity and unfamiliarity of AI, echoes the difficulties faced when programming was added to K-12 curricula. At that time, many teachers lacked programming experience [9, 10], highlighting the need for easy-to-use teaching resources. Second, based on our experience with co-designing AI literacy resources together with educators [11, 12], we have identified the need for pedagogical approaches that go beyond direct content teaching to include more hands-on activities, such as Teachable Machine, where learners get experience in training an AI model based on their own data [13].

Third, the use and impact of AI technologies and, therefore, the type of AI literacy required varies depending on the context. In sociological terms, modern society is divided into a multitude of increasingly specialized *social worlds*, sometimes referred to as forms of life, cultures, speech communities, communities of practice, and so on (see [14, 15, 16, 17]). Social worlds are groups of individuals engaged in a shared activity along with specific knowledge, skills, conventions, and role distributions. Citizens, teachers, pupils, therapists, parents, programmers, students, and policymakers—each group with its unique domain of experience and competence, face specific challenges and questions regarding how AI technology can and should be used, as well as how it affects their shared practice and daily lives. Echoing these concerns, recent research on teacher education has emphasized the need to include teacher knowledge and experience in conceptualizing AI literacy for teachers [18]. The differentiated integration of AI systems across society highlights the need to expand standardized, one-size-fits-all instruction in AI concepts rooted in computer science to include practitioner-centered approaches to develop context-specific AI literacy.

This project addresses these needs by developing the **Competence Imitation Game** (henceforth, COMIG), inspired by the now classical Turing Test [19]. In the COMIG, members of a social world explore the limits and capabilities of AI within their own unique domain of practice. The purpose of the COMIG is to establish a platform for peer learning, which harnesses the shared context-specific knowledge and experience of participants to promote exploration and reflection around the role and impact of AI technologies on their lives. Our goal is to develop the COMIG into an accessible educational

resource that supports the exploration and advancement of AI literacy across K–12 education, higher education, and professional contexts. In what follows, we describe the COMIG in more detail, its underlying theoretical framework, and outline its potential to explore and enhance AI literacy. We then turn to the ongoing co-design process through which the game is being collaboratively developed into a publicly accessible web-based application.

### 3. The Competence Imitation Game

The Competence Imitation Game is a method of researching and developing AI literacy, taking human diversity and societal specialization as a starting point. In this activity, members of a chosen social group are tasked with distinguishing and identifying a group member from a Large Language Model (LLM), prompted to imitate a fellow member, through typed question-answer-assessment dialogues. The game itself, combined with a facilitated review and discussion of the results, creates a space for peer-to-peer exchange and context-specific reflection on the key themes raised by Long and Magerko [3]: What is AI and how does it work? What competences do we share that are not replicable by AI? How should AI be implemented in our practice? What role and responsibility do we have in the use of AI technologies?

#### 3.1. Origins of the Imitation Game

Originally, the Imitation Game was a Victorian parlor game in which a judge, through written dialogue, had to determine which of two players was genuine and which was the imitator; for example, which player was a woman and which was a man pretending to be a woman. The game became famous through Alan Turing [19], who used it as a thought experiment, later known as the Turing test, to examine the ability of machines to mimic human intelligence. Turing proposed that if a human interrogator, after a five-minute interview, could not distinguish a machine from a human, the machine has achieved a human level of intelligence.

#### 3.2. A Game of Social Relations

During the past two decades, sociologists have adapted the Imitation Game as a method to investigate the distribution of knowledge in society and promote mutual understanding between different social groups [20, 21, 22, 23]. The core idea of the game is simple: instead of a human trying to identify a machine, a member of a social group is tasked with identifying a genuine group member from an imitating nonmember; for example, Scots identifying fellow Scots from English people pretending to be Scottish. Educational applications show that the method promotes insight into shared knowledge and experience, identity construction, and mutual understanding within a group by encouraging participants to express and evaluate competences that the other party does not have access to [24, 25]. A key strength of the method is that, by positioning participants as proxy researchers who conceive the questions and evaluate the answers from their perspective, it harnesses the experience of domain experts to define what constitutes relevant knowledge.

#### 3.3. A Game of Human-Machine Competence

The COMIG combines the legacy of Alan Turing’s test on machines’ ability to mimic human behavior with the sociological imitation game paradigm, which views social groups as loci of knowledge and expertise. It is essentially a role-playing game involving three roles: the *Judge*, the *Non-Pretender*, and the *Pretender*. Both the Judge and the Non-Pretender are experienced in a selected domain, while the Pretender is played by an LLM. The Judge’s task is to ask questions they believe will help reveal the true identity of the respondents. The Non-Pretender answers sincerely, based on their real experience, while the LLM is prompted to respond as if it were a domain expert. For each question, the Judge

receives both answers, without knowing which is which, and must decide which response comes from the human expert, indicate their level of confidence, and explain their reasoning.

In a pilot study where rock climbers were tasked with identifying whether a response came from a human rock climber, or ChatGPT imitating a climber, results showed that while the model could convincingly reproduce climbing jargon and domain-specific knowledge, it lacked competencies related to embodied and emotional experiences, such as fear and training discipline [26]. The method not only showed how climbers perceived the difference between human- and machine-generated responses, but also revealed the actual differences in capabilities. The research thus explored the boundaries between human and machine competence of the social world of rock climbing.

### **3.4. A Game to promote AI literacy**

While the study on rock climbing showed the value of the COMIG for research on context-specific human-machine difference, the potential of the method for promoting AI literacy remains largely unexplored. This is the aim of the current project: we develop and test the Competence Imitation Game app as a pedagogical tool that engages participants, ranging from pupils, students, educators and professionals, in context-specific exploration and reflection on the nature and difference between human and machine competences. By embedding the game into specific domains of practice and spaces of learning, the project seeks to generate an understanding of what AI can and cannot do in relation to specific tasks and to invite learners to consider why those distinctions matter for their own practices and everyday lives.

## **4. Co-Designing the Competence Imitation Game App (COMIG)**

Competence Imitation Games are arranged based on specific topics, selected to reflect domains of insider knowledge and experience shared by the participants. These could include high school mathematics, school life, friendship, parenting, or professional fields such as teaching, journalism, therapy, or social work – any context characterized by a specific competence domain. While the game typically focuses on such domain-specific expertise, it can also be played as a classical Turing Test, addressing what it means to be human in general. The organizer can select the topic and develop the prompt according to their own context and needs, making the game adaptable to a wide range of learning environments. The goal is to support participants in developing AI literacy through a collaborative exploration of the limits and capabilities of AI in relation to the competences shared among peers both during the game, and post-game group discussions.

While the core structure of the game remains relatively fixed, its practical implementation can take many forms. Variations include playing individually or in groups, experimenting with different game topics, incorporating specific educational themes in post-game discussions, and integrating the game into classroom settings or professional contexts. These elements are explored and developed through a co-design process. In what follows, we present the rationale, design philosophy, and initial plans for the co-design process of the COMIG app and educational approach aimed at developing AI literacy through role-based, human-machine interaction.

### **4.1. Background and Distinction from Established Models**

Unlike existing educational interactive tools for AI literacy, such as GenAI Teachable Machine [27] and Somekone [28], which focus on learning outcomes related to specific and well-defined AI topics (e.g., training and deploying classifiers, recommendation algorithms), the COMIG does not seek to convey a predetermined body of knowledge. Instead, by inviting participants to distinguish between human and AI-generated responses based on their own domain-specific understanding, each game-dialogue represents the unique features of the group at play, and the learning outcome is emergent and open-ended. In fact, each game is an opportunity for the participants to act as proxy researchers and collectively discover the limits of AI capabilities in their own particular social world. This shift

from propositional to procedural learning has important implications for both design and evaluation. In contrast to tools where success is measured by task completion or correct application of predetermined concepts, our app is designed to support learning that is emergent, collective, and grounded in dialogue among peers. Success is not determined by whether a participant “learned the principles of machine learning” but by whether they are able to articulate, reflect on, and question the nature of intelligence, competence, and machine integration in their specific domain.

The design of the COMIG is guided by a set of assumptions: 1) there are a multitude of social worlds, characterized by distinct shared activities and competences, including tacit knowledge, which is hard to explicate and transmit through text; 2) those fluent in these practices are considered experts within their domains; 3) AI literacy may involve a varied set of competences from one social world to another; 4) experts within these contexts possess insider perspectives that external AI literacy educators may lack; 5) a central component of AI literacy is exploring the boundaries of human and machine competence in relation to specific practices; 6) peer interaction, group membership, and shared identity are essential for surfacing context-specific AI literacy.

Thus, the app is envisioned not merely as a game, but as a learning environment that supports participants to collectively articulate the contours of their own expertise, explore what is uniquely human, and reflect on the role of AI in their lives.

## **4.2. Co-design process**

The COMIG is being developed through a co-design process which began in March, 2025. So far, the process has included a seven-day design sprint with a team of researchers from sociology, education, and computer science, as well as educators, programmers, designers, and domain-experts (e.g., educators and learners across K-12 and higher education) who act as both testers and informants. Currently, we work through iterative cycles of feedback and prototyping. Prototypes of the app have already been tested among teacher education students, linguistics students, and in-service programmers at the University of Helsinki, Finland. Each session produced distinct game-dialogues, validating the method’s potential while also informing further development. Upcoming classroom trials will involve pupils (aged 13–16 years ) in social studies and religion.

We adopt an emergent framework that combines qualitative and quantitative dimensions for evaluating the app and its use. The analysis focuses on how, and how accurately, participants identify each other during the game, reported new insights and experiences of learning, quality and content of post-game discussions and affective engagement. Data will include surveys, game dialogues, recordings of group interactions during the game and post-game discussions, including selected interviews. The results will inform the design process for further refinement before introducing the app for larger-scale testing. The final app will have functionality for easy and flexible use in group settings, and for data collection to support continuous research.

## **5. Conclusion**

By centering the learning process on collegial exploration of the difference between human and machine competence, emerging through collective efforts by domain experts to identify their peers from LLMs imitating them, the COMIG offers a new model for researching and promoting context-specific AI literacy rooted in situated judgment and domain-specific knowledge. Rather than focusing on predetermining the content of AI literacy, we create a space in which the complexities of machine participation in human life can be explored contextually and collaboratively by domain experts.

## **Declaration on Generative AI**

The author(s) used ChatGPT-5 for proofreading, including spelling checks and suggestions to improve the writing. After using this tool, the author(s) reviewed and edited the content as needed and take full

responsibility for the publication's content.

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