

MAPPING AI LITERACY IN TEACHER EDUCATION

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ABSTRACT

Background and objectives

Artificial intelligence (AI) is often highlighted as a transformative technology that can “address some of the biggest challenges in education today”(UNESCO, [2019](#)). The introduction of data-driven AI in classrooms is however also raising pedagogical and ethical concerns related to students’, teachers’ and teacher educators’ understanding of how AI works in theory and practice (Holmes, 2022; Sperling et al., 2022). This extended abstract presents initial findings from the first study conducted within the WASP-HS¹-funded research project: "AI Literacy for Swedish Teacher Education - A Participatory Design Approach". The project aims to establish a scientific foundation for teaching AI literacy in teacher education (TE) programs.

State of the art: AI Literacy in Swedish Teacher Education

Although AI literacy has received relatively limited attention within the Swedish research community thus far, there has been a proliferation of AI literacy initiatives worldwide, particularly in K-12 education (e.g, Miao et al., 2021; Touretzky et al., 2019). The key argument is that enhancing AI expertise is crucial not only for upcoming computer science specialists, but also for individuals who lack proficiency in computer science, mathematics, or engineering. While the inclusion of AI literacy in national curricula is in their early adoption in various countries, initiatives to introduce AI literacy in TE programs are scarce (Vazhayil et al., 2019). Hence, a crucial question relates to how TE can empower both pre-service and in-service teachers to become proficient in AI and effectively guide their students in a world increasingly affected by AI. To identify the key concepts, subject matter, and competencies that are deemed essential for AI literacy in TE programs, we consulted the scientific literature on how AI literacy is conceptualized in this context. While several literature reviews and syntheses have shed light on AI literacy in various domains, such as K-12 education (Eguchi et al., 2021; Ng et al., 2021) higher education (Laupichler et al., 2022) the workplace (Cetindamar et al., 2022), and the general public (Long et al., 2021, 2022; Schüller, 2022) there is currently no comprehensive review of AI literacy that specifically focuses on the competencies

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and pedagogical skills of teachers and educators relevant for TE. This knowledge gap serves as the impetus for the first study in this project, a scoping review.

Method: Scoping Review

Due to the limited scope of the initial attempts to locate relevant literature on AI literacy in TE, which yielded only a few available papers, we expanded our search to include papers and proceedings related to AI literacy and education, as well as the intersection of AI and TE. We followed the framework of scoping review (Arksey & O'Malley, 2005) to identify relevant studies, charting data and summarise the results. An initial search for literature on AI literacy in education and AI in teacher education between 2000 and 2023 in five major databases resulted in 651 records. After the removal of duplicates, 534 records were screened. At this stage, 69 articles are found to have a focus on teachers' AI literacy or teaching with or about AI and are subject to quantitative descriptive analysis of article characteristics and qualitative thematic analysis.

Preliminary findings

Teachers and pre-service teachers are being introduced to AI as a subject matter and technology mainly in the context of Computer Science and Computational Thinking. Consequently, most of the disciplines involved in AI literacy in education come from Computer Science and STEM. The majority of the papers were published in the past three years and almost 2/3 of the articles aimed to identify appropriate content and pedagogical methods for teaching the technological dimension of AI literacy. Most of the papers did not reflect theoretical foundations and did not report on relevant learning theories. Nevertheless, two studies did invoke TPACK as an analytical framework (Celik, 2023; Druga et al., 2022). Furthermore, only a handful of papers provided a comprehensive definition of AI literacy that pertains to specific educational contexts, particularly for different target groups like teachers and students. Instead, the term was primarily utilized to support various AI interventions in K-12 education.

Tentative findings from the analysis indicate that the conceptualization around AI literacy is still in its infancy, and there is a need for more methodological rigour and empirical work to support AI literacy as a content and pedagogical domain in TE. Moreover, the overwhelming majority of literature primarily concentrates on what Holmes (2022) labels as "learning about AI" which emphasizes the technological aspects of AI literacy. This underscores the need of emphasizing the human dimensions focusing on the possible impacts of AI. AI in education, for example, raises concerns about the potential impact of EdTech companies' accumulation of data and issues related to democracy, and equity. Within education, the human dimension of AI includes the understanding of how AI is employed both in educational management as well as to deliver teaching (Holmes, 2022). Before the adoption of AI literacy as a standard term within TE and education at large, we recommend further empirical educational research that supports its development in an ethical, sustainable, and scalable manner.

Keywords: AI in K-12, AI literacy, AI readiness, in-service teacher, pre-service teachers, teacher education

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