

Empowering the Next Generation: Integrating AI Literacy into Modern Education

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Abstract – Today's students frequently engage with AI daily, yet many still need to learn the underlying principles. With AI becoming an integral part of modern society, the importance of AI literacy in schools is ever-increasing. This paper discusses the essence of AI literacy, emphasizing the understanding of algorithms, data processing, and machine learning while considering their ethical implications. Schools should integrate AI concepts across various subjects to foster AI literacy and utilize platforms that offer practical AI experience. Istanbul Metropolitan Municipality's weekend technology workshop serves as a case study, shedding light on its curriculum and pedagogical approach toward AI literacy. Feedback from trainers and students offers insights into the program's effectiveness and areas of improvement. The curriculum's adaptability, combining theory with hands-on application, promotes a deeper understanding of AI among students. In conclusion, as AI reshapes society, comprehensive AI education becomes essential in equipping students to become informed contributors in an AI-driven world.

Keywords – AI literacy, Curriculum integration, Pedagogical approach, Hands-on AI experience, Practical versus theoretical AI education

I. INTRODUCTION

When today's students ask Siri a question or receive movie recommendations on Netflix, they already engage with AI. However, how many understand the principles behind these technologies? In an era where AI is no longer a futuristic speculation but a tangible part of our everyday lives, the pressing need for AI literacy in schools has never been more apparent.

McKinsey Global Institute [5] indicated an unsettling forecast: By 2030, automation might displace up to 800 million global workers. The demand for AI knowledge will permeate numerous professions, emphasizing that all professionals must have at least a foundational understanding of AI. Moreover, with AI's increasing influence on both public and private sectors, as illustrated by Brynjolfsson and McAfee [2], citizens need a clear grasp of AI's intricacies to participate meaningfully in democratic processes shaped by AI's influence. Zhou and Lin [10] further emphasized the pervasive nature of AI in our daily lives, from movie recommendations to banking algorithms, underscoring its role in everyday interactions.

II. AI LITERACY

Nevertheless, what does AI literacy entail? At its core, AI literacy involves understanding fundamental AI concepts like algorithms, data processing, and, as some might not know, machine learning. It also means using and interacting with AI tools and systems while fully aware of AI's ethical, societal, and economic ramifications.

Schools are the starting point. Introducing AI literacy into school curriculums is about more than just preparing students for AI-dominated professions. It is about ensuring they understand the AI-driven world around them. From interacting with personal assistants on smartphones to navigating

recommendation systems on streaming platforms, understanding AI equips students to use these tools effectively and responsibly.

III. SCHOOL INTEGRATION

One strategy incorporates AI concepts into existing subjects like math, science, and computer science, drawing from frameworks like the Computer Science Teachers Association's standards [4]. Students might learn about algorithms within their math lessons or explore machine learning in science.

Dedicated AI courses can also be beneficial, complemented by platforms like Scratch, which can enhance understanding and foster creativity [7]. Platforms like Teachable Machine and Machine Learning for Kids can also bridge the gap between theory and practical application.

Ethical discussions surrounding AI, as posited by Mittelstadt et al. [6], ensure students not only grasp the "how" but also understand the "should." With educators at the frontline of this initiative, their ongoing professional development, as Webb et al. [9] indicate, becomes crucial to impart AI concepts effectively.

IV. INSIGHTS FROM AN AI PROGRAM

Istanbul Metropolitan Municipality introduced a detailed weekend technology workshop for students from the 4th to 10th academic grades beginning in the fall of 2021. Within this program, 6th- to 10th-grade students engage in a 36-hour module dedicated to Artificial Intelligence (AI). This module highlights AI's role in daily life and offers hands-on experience through platforms such as Teachable Machine and Machine Learning for Kids. Moreover, students delve into fundamental AI constructs like neural networks and deep learning methodologies.

A critical aspect of the program's design is the role and expectations set for the trainers. These trainers, often senior or

graduate students from computer science disciplines, are not just expected to instruct; they also have a mandate to spark rich academic dialogues among the students. The intention is to facilitate a more profound comprehension of AI concepts, such as machine learning, neural networks, and deep learning. This pedagogical approach aims to solidify students' foundational understanding of AI mechanisms through collaborative discourse.

Regrettably, these expectations have fallen short. While the curriculum prescribes a dynamic, discussion-led learning mode, feedback indicates a potential gap between this ideal and the current implementation. A pressing concern is the students' perception of these workshops. Instead of viewing them as interactive workshops, many students feel they are extensions of their regular school classes. This perception, unfortunately, influences their behavior, making them approach the workshops with the same mindset they have in their typical school setting. When students and trainers maintain their daily schooling, achieving this dynamic, discussion-led learning mode becomes challenging.

The following feedback emanates from the trainers who oversaw the 2022-2023 AI module, explicitly conducted for grades 6-7 and 9-10. The activities at the workshop generally found favor among students, particularly the hands-on tasks that utilized platforms like Machine Learning for Kids and Teachable Machine. However, there was a clear need for content depth and engagement adjustments. Activities needed to be age-appropriate; at the time, some seemed too rudimentary for high schoolers, while others were too advanced for younger students. Trainers preferred practical tasks over sessions to trigger a dialog. Lastly, introducing more AI sample applications for grades 9-10, especially those focusing on algorithms and coding, would have been beneficial. While the curriculum's foundation was robust, it demanded strategic enhancements for optimal student engagement and enrichment.

Student feedback on the AI activities showed overwhelming appreciation, with the Teachable Machine platform standing out as a favorite. They expressed enthusiasm for various applications, particularly the AI of Spotify, YouTube, and the Scratch Pokemon activity. These tangible outcomes and hands-on AI experiences overshadowed discussion-based sessions, underscoring a preference for interactive, application-focused learning. However, while the overall sentiment was positive, the lean toward practical tasks was evident.

In delivering the module, trainers confronted challenges, from articulating complex AI concepts and engaging students in discussions to catering to non-English speaking students with automatically subtitled videos. These challenges, however, served as invaluable learning experiences in understanding practical teaching nuances. To combat these challenges, trainers leaned into verbal explanations, used relatable real-life examples, and introduced debating activities to enrich discussions. Recommendations for future modules include integrating advanced platforms such as Python and diversifying the curriculum to balance hands-on and theoretical content, ensuring a richer learning experience for students.

Based on the feedback, it was evident that AI content needed differentiation to cater to varying grade levels. Specifically, the curriculum should have been neither too rudimentary for grades 9-10 nor overly advanced for grades 6-7. While trainers

appreciated platforms like Teachable Machine and Machine Learning for Kids, incorporating more sophisticated platforms like Python for older students could have provided more profound insights into AI. A clear student preference leaned towards practical, hands-on tasks; thus, curating activities with tangible outcomes became essential. However, this did not diminish the importance of engaging in discussions or structured debates. Incorporating real-world AI applications also boosted engagement, highlighting real-world relevance. While the emphasis was on hands-on tasks, a balanced theoretical foundation remained pivotal. Lastly, establishing a robust feedback mechanism could help the curriculum remain adaptive.

The current curriculum provides comprehensive lesson plans, enabling trainers to tailor the pace to meet the unique needs of their classes while emphasizing specific areas of interest. This approach ensures that trainers are equipped with foundational AI concepts and engaging hands-on activities. By blending theory with practical application, the curriculum fosters a deeper understanding and a more interactive learning experience for students.

V. CONCLUSION

Bostrom [1] emphasized that AI does not merely represent another technology; it actively transforms every aspect of society. Decision-makers actively shape the future, and it becomes essential, not just progressive, to equip the next generation to navigate, lead, and excel in an AI-dominated world. In conclusion, the pervasiveness of AI in today's society mandates a profound understanding of it. As students today actively engage with AI-driven technologies, schools must ensure that these students use and deeply understand these tools. The feedback from trainers and students on the Greater Istanbul Municipality's AI module actively reflects both the curriculum's strengths and areas for enhancement. Striking a balance between solid theoretical foundations and practical, real-world applications becomes crucial. In preparing students for an AI-intertwined world, providing them with the appropriate knowledge, skills, and ethical insights is pivotal, turning them into informed participants and contributors to our AI-centric future. The path to AI literacy demands an ongoing adaptation of curricula, but this proactive approach is essential to mold informed citizens and professionals for our future.

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