A New Era of Education: Incorporating Machine Teachers Into Education

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While browsing news on the internet a few years ago, I came across an article about Jill Watson, an AI (artificial intelligence) teaching assistant, which was developed for an online course at a university in the U.S. This AI teaching assistant was tasked to answer student questions in an online forum alongside human teaching assistants. As a communication technology scholar, I was intrigued by this new phenomenon. What fascinated me in particular was that very few students realized Jill was AI until the professor revealed it at the end of the semester.

The debut of an AI teaching assistant signaled to me that the realm of education has already begun to enter a new era. Educators could now consider incorporating nonhuman agents into a field which has been traditionally operated only by humans. From a broad perspective, I approach these nonhuman agents as *machine teachers*, "a technology that plays a meaningful role during an interaction with humans in helping them engage in affective, cognitive, and behavioral learning through various ways" (Kim et al., 2020, p. 1904). As an umbrella term, machine teachers can appear in a variety of forms (e.g., robots, chatbots, AI) and serve a wide range of roles (e.g., tutors, assistants, instructors).

Because of the unique features and characteristics of human teachers, it is highly unlikely that they will be completely replaced by machines. Clearly, however, machine teachers have a great potential to serve diverse roles in education. As Edwards and Edwards (2017) note, "social machines increasingly are being designed to teach and to learn through interaction and to be responsive to natural teaching and learning methods employed by their human partners" (p. 487). If education evolves in this direction, it is important to find ways to maximize potential for machine teachers to contribute to teaching and learning in positive and meaningful ways.

Machine teachers can assist or supplement human teachers' roles in facilitating student learning experiences at various levels. Therefore, many questions came to my mind. Wouldn't it be helpful if

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an AI teaching assistant helps complete some of the repetitive tasks such as answering syllabus-related questions and explaining the course policies and logistics, so that human teachers can use their time advising and mentoring students? Wouldn't it be helpful if an AI teaching assistant serves a role as a virtual audience when students practice their upcoming speech? If we want to incorporate machine teachers into our education system, then how can we help our students perceive positive aspects of these machine teachers in their learning? Fundamentally, how can we create effective and communicative machine teachers?

The Special Issue Section

Behn (1995) states that "scientists do not start with data or methods. Scientists start with questions" (p. 315). Based on the big questions I shared above, I began to design a series of research studies which I call "the machine teacher project" (e.g., Kim et al., 2020, 2021). At the same time, I wanted to create a space where scholars can share their views and approaches toward the idea of machine teachers, which can be demonstrated in a variety of ways. This is the story of how this special section was proposed.

This special section features three fascinating articles: two empirical research studies and one research-based instructional activity. One study examines how students would perceive human-robot teaming configuration in the classroom (Abendschein, C. Edwards, A. Edwards, Rijhwani, & Stahl). Specifically, the study examines how students perceive a co-teaching team that includes a human and a robot at different status (e.g., lead instructor, teaching assistant). Another study focuses on VR (Virtual Reality) for public speaking training (Kryston, Eden, & Goble). Through Study 1 and Study 2, the VR study provides meaningful implications for the potential adoption of VR, which could simulate a virtual audience and speaking environment for public speaking practices. The final study in this special section showcases a research-based instructional activity that highlights the importance of learning about metadata and machines (Iliadis, Liao, Pedersen, & Han). Through the novel instructional activity, the study provides meaningful implications for the emerging field of human-machine communication.

The articles in this special section represent different types and approaches of machine teachers from scholars with diverse backgrounds. Together, these articles help us better understand the role of "machines" in education and facilitate scholarly dialogues. My hope is that this special issue section serves as a meaningful starting point to continue our endeavor to better understand the utility of machine teachers in education.

References

Behn, R. (1995). The big questions of public management. *Public Administration Review, 55*(4), 313–324. https://doi.org/10.2307/977122

Edwards, A., & Edwards, C. (2017). The machines are coming: Future directions in instructional communication research. *Communication Education*, *66*(4), 487–488. https://doi.org/10.1080/03634523.2017.1349915

Kim, J., Merrill Jr., K., Xu, K., & Sellnow, D. D. (2020). My teacher is a machine: Understanding students' perceptions of AI teaching assistants in online education. *International Journal of Human-Computer Interaction, 36*, 1902–1911. https://doi.org/10.1080/10447318.2020.1801227

Kim, J., Merrill Jr., K., Xu, K., & Sellnow, D. D. (2021). I like my relational machine teacher: An AI instructor's communication styles and social presence in online education. *International Journal of Human-Computer Interaction.* https://doi.org/10.1080/10447318.2021.1908671