



**Zimmerman, M. (2018) *Teaching AI: Exploring new frontiers for learning*.
Portland, OR: International Society for Technology in Education.**

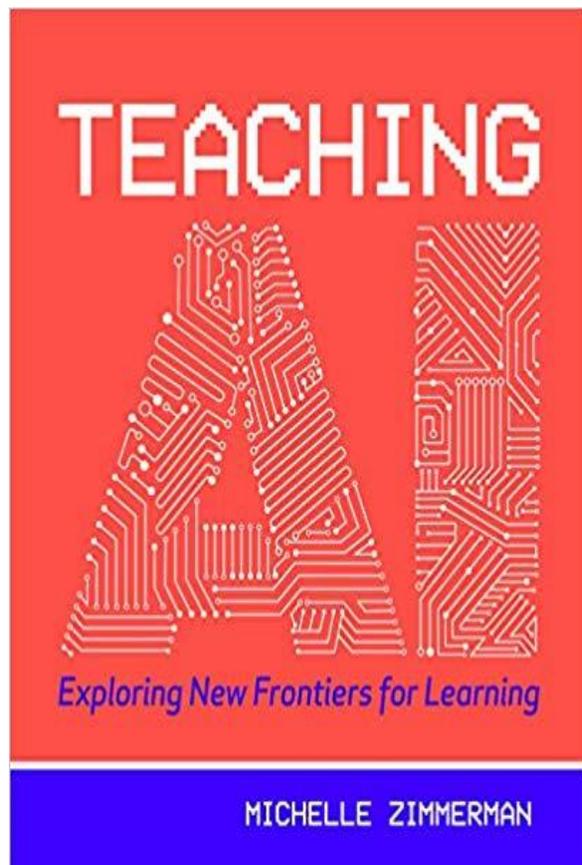
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Michelle Zimmerman, Ph.D, is a former K-12 teacher and current Executive Director at Renton Prep, which was recognized as one of Microsoft's first Flagship Schools in 2018. Zimmerman's book *Teaching AI: Exploring New Frontiers for Learning* (2018) is written for anyone with an interest in artificial intelligence (AI) and other emerging technologies as they relate to current issues in education. K-12 teachers and administrators may be especially interested in this book, as readers are provided with numerous resources and lesson ideas which can be implemented with relatively little preparation. This book is a welcome arrival, as AI, technology integration, and 21st century skills are popular topics in education today.

Today's students must be prepared to live and thrive in a world that is increasingly impacted by the use of AI. Educators must respond to this challenge by helping students cultivate skills required to carve out successful careers working directly with AI and other related technologies. Zimmerman argues that students must also take special care to strengthen those uniquely human abilities that machines will not easily replicate: empathy,



creativity, critical thinking, collaborative problem solving, transference of knowledge across disparate domains, and storytelling. With these and other skills in hand, today's students will be better prepared to lead us into the future, and to respond effectively as AI and related technologies rapidly replace whole sectors of the job market.

But what exactly is AI? Zimmerman's writing suggests that this question deserves greater scrutiny than it ordinarily receives. After all, the majority of readers are probably familiar with either Siri, Alexa, Cortana or Google assistant. We may have seen news stories about drivers of semi-autonomous Teslas sleeping on the highway. We have spoken to chatbots, received credit card fraud alerts, and seen personalized advertisements magically appear on our mobile devices. Yet, despite the apparent widespread use of these technologies, we cannot find a universally accepted conception of AI. Zimmerman notes that there exist long-standing controversies in academia and elsewhere as to what constitutes *human* intelligence. Therefore, it should not surprise readers that they are offered no single, concise definition of AI. Zimmerman does, however, touch on various would-be components of a comprehensive definition: Machine learning, neural networks, computer vision, and natural language processing, to name a few. According to Zimmerman, current AI technologies are highly accurate in performing specific complex tasks that would have previously relied on high-level human cognition, if they were possible at all. However, Zimmerman reminds readers that general artificial intelligence remains a distant dream of futurists and science fiction writers. In this regard, human intelligence still reigns supreme.

Zimmerman provides readers with a short and relevant history of AI. Starting with the pioneering work of Alan Turing during the 1940s, she traces AI development through military research conducted in the 1960s to the

rise of related sub-fields such as neural networks and machine learning. Alternating periods of increased and decreased interest in the possibilities of AI, Zimmerman documents the creation of powerful industry applications such as IBM's Watson, and concludes with modern advances in security, medicine, education and a host of other fields.

The author also addresses certain ethical implications of utilizing AI in school settings. With machine learning, we can gain valuable real-time insights into student performance. With the help of AI, educators can use large data sets to identify students at risk for academic failure and rapidly implement appropriate interventions. However, Zimmerman asks us to consider: what kinds of risk are associated with collecting and storing vast amounts of personal student data? What if these data fall into the hands of bad actors? Another ethically troubling question revolves around the impact of biases in the development of AI technologies. If creators of AI are mostly men from majority cultural backgrounds or possess some other kind of privilege, what are the implications for individuals from minority groups or less-privileged backgrounds? While Zimmerman fails to provide convincing resolutions to such ethical questions, she does remind readers of the necessity to grapple with these difficult topics as we attempt to prepare *all* students for an AI-saturated future. Zimmerman skillfully weaves these concerns throughout the book and devotes the entirety of Chapter 6 to "Ethical Considerations".

Zimmerman also tackles the question of how educators can increase efficiency and productivity with the use of AI behind the scenes. AI powered chatbots can be used to help field student questions in online and traditional courses. Existing AI technologies can help teachers grade assignments and tests, even those that include handwritten responses or illustrations. Teachers can use adaptive instructional tools to create targeted,

personalized learning opportunities for their students. According to Zimmerman, educators can use such AI powered tools to liberate themselves from routine and basic tasks. This would allow them to focus on other important functions not easily performed by machines, such as making empathic connections with students, promoting social-emotional skill acquisition, facilitating learner independence, or developing effective questioning techniques to encourage deeper learning. Zimmerman writes that “it makes sense... AI would help boost autonomy and competence, but a human connection is needed to build a sense of relatedness” (p.123).

The International Society for Technology in Education (ISTE) Standards for Students serves as a framework to organize much of the content in this book. The ISTE Standards call for students to become “Empowered Learners,” “Digital Citizens,” “Knowledge Constructors,” “Innovative Designers,” “Computational Thinkers,” “Creative Communicators,” and “Global Collaborators.” At several junctures, Zimmerman showcases her own students’ learning and work as it

relates to these seven domains. For example, she has facilitated technology mediated cross-cultural collaboration between her students in the Pacific Northwest and primary students in Japan. She has also co-presented with her students at national educational conferences. She has facilitated students’ application of knowledge across domains through Project Based Learning (PBL) and STEAM (Science, Technology, Engineering, Arts and Mathematics) instructional approaches.

Many readers will find inspiration in Zimmerman’s own work in the classroom and the subsequent student successes which are highlighted in this book. Teachers will also find a host of suggested resources and tools that may be of value as they begin exploring STEAM and PBL with their students. While this book is neither a curriculum nor a comprehensive guide to teaching with AI in K-12 settings, Zimmerman has compiled a well-rounded point of departure for educators interested in deepening their own involvement with AI to create positive outcomes for students.

About the Reviewer

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