

AI In Early Childhood – *Six Things Teachers Need to Know*



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Whether we like it or not, artificial intelligence is almost certainly an inevitability in the future of education. Attempts to design artificially intelligent curriculums for early childhood already exist, such as the MIT-developed “PopBots,” meant to help preschool children interact with social robots to learn AI concepts. However, as research into AI and its application to the education sector expands, we need to consider the readiness of current teachers, and prepare future teachers, for this new reality.

In the recent past, AI in education may have seemed like a daunting, albeit distant, possibility, but turbulent times have

catapulted us into the future. The time to prepare our teachers to understand, monitor, analyze, and select appropriate AI applications to use in early childhood education is NOW.

Teaching young children about what computers or social robots can do is not enough. Teachers will also need to guide children in their understanding about what these machines cannot do. For example, **machines are not humans and they are not good at ethical decision making, making moral choices, or applying social-emotional intelligence. These are skills teachers must nurture in children as they will be especially important as children begin to interface more with AI.**



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1

Learn to Monitor the Use Of Machine Learning in Early Childhood Education.

AI is everywhere, from speech and facial recognition, diagnostic healthcare, machine automation, video games, handwriting analysis, and in many other areas of our lives. Though there are many kinds of AI, teachers should particularly focus on machine learning.

What is machine learning?

Machine learning is an application of AI where systems automatically learn and improve themselves from experience

without needing additional programming. You give the machine data, and the system uses that data to learn.

How can machine learning be applied in early childhood education?

Let's consider a possible application of this in early childhood education, which we will call the iTeddy, an intelligent teddy bear that builds a profile of the child to provide personalized education, implementing AI based on developmentally appropriate practice (DAP). The National Association for the Education of Young Children (NAEYC)'s position statement on DAP states that *“every child, from birth to 8, has the right to equitable learning opportunities—in centers, family child care homes, or schools—that fully support their optimal development and learning across all domains and content areas.”* One of the core considerations of DAP is that learning experiences should be unique to each child. Educators need to spend time getting to know the child, understanding their family and community, observing them, examining their work, and using authentic, valid, and reliable assessment methods to know their interests, strengths, personalities, and motivations.

This consideration is also in line with Lev Vygotsky's Zone of Proximal Development theory: finding the “sweet spot” where learning experiences are challenging but achievable. Some believe that something like an iTeddy could help meet this standard, by monitoring the child and providing 1-to-1 tutoring based on the child's needs. Imagine if iTeddy observed the child over a period of time and found that he or she has a keen interest in math and only a moderate interest in art. Recognizing this “sweet spot,” iTeddy's AI provides the child with more and more math activities, while limiting the art-related ones. In one sense, iTeddy would allow better scaffolding for the child, exposing ideas at a personalized pace and implementing a developmentally

appropriate math curriculum to ensure the child is engaged and challenged.

The concern, however, is that the iTeddy might make an incorrect assumption about the psychological profile of the child by comparing the hundreds of thousands of other children with a similar age, developmental stage, and profile. It may also underestimate how humans and their interests change over time, potentially depriving the child of art-related activities in favor of an increase in math activities. This problem is not unique to AI applications, however, as students often get left behind in current learning settings. Their talents and interests may not be properly assessed by parents or teachers or a hesitance to try something new may prevent the child from blossoming in a certain area. The question remains, would an AI application like iTeddy open more possibilities for children or limit them?

The iTeddy is just one example of teachers needing to prepare themselves for various applications of AI within education. **Teachers will need to become data scientists; able to understand assessment data generated by AI and monitor its decisions. More than ever, teachers will need to be ready to comment on the developmentally appropriate use of AI applications.**

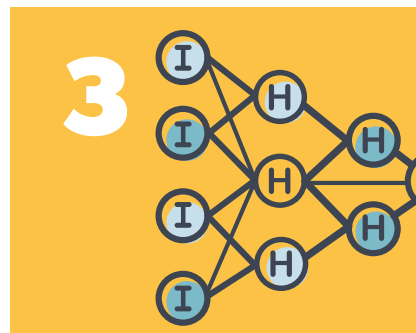
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2

Act as Advisors to Programmers.

Though difficult to believe, computer scientists developing AI may very well consult teachers and other child development experts for their knowledge and advice. This is because children's development is a crucial part of artificial intelligence. In 1950, Alan Turing said, “Instead of trying to produce a program to simulate the adult mind, why not rather try to produce one which simulates the child's.” Turing believed that the key to true artificial intelligence would be to design a machine with the ability to learn like a human child. Far from the “tabula rasa” traditions, children are a blank slate, the complexity of a baby's brain and its ability to innately know and to learn still shocks and awes most neuroscientists.

Roboticists and computer scientists are trying to figure out how to design a machine that has similar learning abilities, but we are still far from such a development. As the pursuit of machine learning continues, computer scientists will undoubtedly turn to experts in the learning process of a child's incredible mind. In this case, the experts are the educators.



Understand the Dark Side of Neural Networks

As with many cases in technology, including in AI, advances made with positive intentions also often have unforeseen risks. Teachers need to understand the potential dangers that arise from neural networks and how children and adults interact with them in our everyday lives.

What are neural networks?

Neural networks are systems in which a programmer aggregates data for a specific set of objectives, and then the network analyzes the information to reach the best conclusion. For example, the app TikTok uses a neural network algorithm with the objective to keep you engaged and make you spend the maximum amount of time on the app. The app feeds you selected posts on a “For You” Page that this neural network believes will maximize the likelihood of achieving its objective.

However, neural networks work to achieve their objectives without considering broader consequences. For example, the AI of a social media platform could discover a person is attracted to angry, hateful, negative messages. The AI responds by sending that person more angry, hateful messages as they will be more inclined to react and spend even more time on the

platform, thereby achieving the goals of the AI program. However, the algorithm does not weigh the consequences of continually providing someone with anti-social or angry, hateful messages. There are no moral or ethical monitors for the AI program.

Similar corruptions of goals and detrimental effects can arise in neural networks used for education, so we must be careful to actively monitor our own and our children’s engagement level, proactively making choices about what we watch and what we share with others.



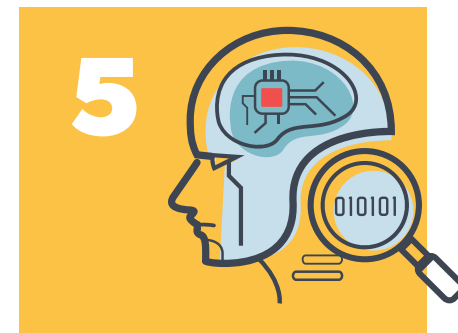
Collaborate in Advocating for Responsible and Ethical use of AI in Education

The Social Dilemma, a recent Netflix documentary-drama, revealed how technology companies have manipulated human psychology and explored some of the dangers of AI in social media. While this is an important topic, discussion about the repercussions of AI use in other contexts, especially education, is vital, and thus far has been sorely lacking. We—the professionals, caregivers, advocates, and policymakers—are not talking about this enough and we must become more engaged in these critical conversations.

We need to hold events, invite all the stakeholders involved, and have open

discussions. We can’t let computer scientists be the only ones coming up with ‘metrics’ or objectives for their hidden neural networks that could do harm or potentially destroy our future generations.

We can’t do this alone. There must be a cross-disciplinary collaboration between computer scientists, statisticians, ethicists, teachers, early childhood experts, and social scientists all working together to solve these problems.



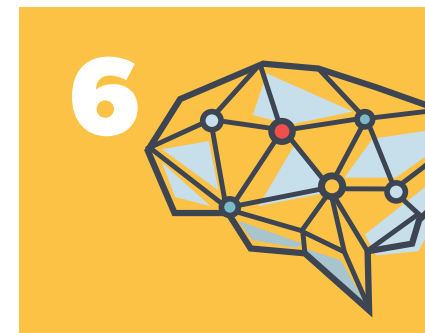
Ensure that any AI that is Used Follows Acceptable Standards

Through collaborative action and public discussions, we need to establish standards and ethical guidelines on the use of AI in education, particularly when it comes to use with young children. Young children are vulnerable, and even small experiences can drastically change the trajectory of their development.

We need to be asking questions like: Who has ownership of the data collected by AI? Who has access to the data? What measures are in place to monitor and protect it? How are AI systems trained? Who trains them? What went into their algorithms? What are the objectives?

We need to call for:

- EXPLAINABILITY**
New tech, including AI, must be made transparent & be able to be explained
- FAIRNESS**
Properly calibrated, AI can assist humans in making fairer, more equitable choices.
- ROBUSTNESS**
As systems are employed to make crucial decisions, AI must be secure and robust
- TRANSPARENCY**
Transparency reinforces trust, and the best way to promote transparency is through disclosure
- PRIVACY**
AI systems must prioritize and safeguard consumers’ privacy and data rights.



Remember Our Priorities as Early Childhood Educators

As the result of an increasingly technologically connected world, citizens are finding it difficult to effectively exercise civic responsibilities in relation to global issues such as climate change, poverty, conflict, and warfare.

Human capabilities such as ethical reasoning, persuasion, social understanding, and empathy will become more and more prized over the next decade. These functions will become differentiators as artificial intelligence and machine learning start to assume roles that were previously human tasks. Skills in emotional intelligence will become essential to anyone who wants to stay relevant in their field as automated systems proliferate.

We may not want our world to change. We may not be comfortable

holding conversations about artificial intelligence. However, if we ignore AI we will not be able to respond appropriately as AI conversations and application in education increase. Artificial intelligence, neural networks, and machine learning could be extremely powerful and effective tools for educators and students alike, but without diligent commitment to ensuring these systems are explainable, fair, robust, transparent, and protective of privacy, the harm they could cause may very easily outweigh the good. We must get engaged and proactive on these topics immediately as educational AI is just starting to take its first steps.

Much like teaching a young child, the choices we make now at the start will have vast repercussions down the line. It’s our duty to ensure those choices are wise, measured, and point us towards a better and more secure future.

RECOMMENDED RESOURCES

“What do babies think?”
TEDx Talk by Alison Gopnik
Professor of Psychology and Affiliate Professor of Philosophy at the Tolman Hall University of California at Berkeley
https://www.ted.com/talks/alison_gopnik_what_do_babies_think

“An Imminent Threat from Artificial Intelligence”
TEDx Talk by Aidan Gomez
Doctoral student of machine learning at the University of Oxford
https://www.ted.com/talks/aidan_gomez_an_imminent_threat_from_artificial_intelligence