

Imagine a More Ethical AI: Using Stories to Develop Teens' Awareness and Understanding of Artificial Intelligence and its Societal Impacts

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Abstract— Artificial intelligence (AI) tools and technologies are increasingly prevalent in society. Many teens interact with AI devices on a daily basis but often have a limited understanding of how AI works, as well as how it impacts society more broadly. It is critical to develop youths' understanding of AI, cultivate ethical awareness, and support diverse youth in pursuing computer science to help ensure future development of more equitable AI technologies. Here, we share our experiences developing and remotely facilitating an interdisciplinary AI ethics program for secondary students designed to increase teens' awareness and understanding of AI and its societal impacts. Students discussed stories with embedded ethical dilemmas, engaged with AI media and simulations, and created digital products to express their stance on an AI ethics issue. Across four iterations in formal and informal settings, we found students to be engaged in AI stories and invested in learning about AI and its societal impacts. Short stories were effective in raising awareness, focusing discussion and supporting students in developing a more nuanced understanding of AI ethics issues, such as fairness, bias and privacy.

Keywords—artificial intelligence (AI), machine learning, ethics

I. INTRODUCTION

Artificial intelligence (AI) tools and technologies are increasingly prevalent in our lives. Many youth interact with AI-powered devices on a daily basis, but despite this frequent interaction, often don't recognize when they're interacting with AI or understand how it works [1,2]. Given the widespread impacts of AI technologies, as well as the recognition that AI algorithms can perpetuate gender and racial biases [3,4], it is critical to develop youth as AI literate citizens who can make informed decisions about their use of these technologies, and to motivate and prepare a diverse population of AI developers [5].

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There is a pressing need for educational materials that enable youth to learn about AI and explore related ethical issues [5,6]. Several organizations (e.g., MIT Media Lab, ISTE, AI4All, etc.) have recently developed K-12 curricular materials to address this need [e.g., 7,8]. Given the broad societal impacts of AI, however, it is important that AI curricula reach beyond computer science (CS) to integrate with the humanities and arts as well [2,5]. Here, we introduce *Imagine AI*, an NSF-funded project designed to increase teens' awareness and understanding of ethical issues related to AI, and share our experience facilitating four iterations of the program in formal and informal settings. The program uses short stories, computer-based AI activities and multimedia design projects to develop participants' awareness and understanding of AI ethics issues, such as fairness, bias, privacy and transparency.

II. PROJECT DESCRIPTION

A. Program Design

We designed an interdisciplinary, modular AI ethics curriculum aligned with computer science and English Language Arts (ELA) standards that could be informative and impactful in different learning settings. *Imagine AI* modules combine literacy (short stories), computer science (online AI simulations) and multimedia design (comics, videos, and chatbots) to explore how AI works and its societal impacts and relevance to teens. Using CSTA and AI4K12 guidelines, as well as information from the research literature and popular press, we identified relevant AI ethics issues and wrote several original short stories, including dystopian and realistic fiction, to spark discussion about potential AI impacts while also highlighting current examples of AI in our daily lives. The stories, each of which features teen protagonists facing an ethical dilemma related to AI, include: *Your Own Song* (recommendation algorithms, machine learning, data privacy); *Imperfect Match* (recommendation algorithms, machine learning, algorithmic bias); *UnDone* (algorithmic bias, data privacy); *ZapCar* (self-

driving cars, computer vision, decision making in AI) and *Code Orange* (data privacy and security, cell phone tracking; surveillance).

To deepen participants' understanding of the AI technologies and ethical issues in each story, we developed a series of lessons using online tools, including Google's Teachable Machine, MIT's Moral Machine and Jugi chatbot. We also led a series of workshops to support students in using design software to create multimodal products, such as a driverless car ad. Class activities focused on the following themes: 1) How AI works; 2) How machines learn from data (including fairness, bias and inequity); 3) How machines make decisions (with a focus on self-driving cars); 4) Data privacy, including social media, cell phone tracking and trade-offs between safety and privacy; and 5) Considerations for designing more ethical AI systems.

B. Implementation in Formal & Informal Settings

We tested *Imagine AI* stories and curriculum in two week-long summer camps (10 contact hours), one for middle school students (grades 7-9) and one for high school students (grades 10-12), as well as in two 9th grade English Language Arts (ELA) classes (6 weeks; 24 contact hours). We delivered all programs online, due to the COVID-19 pandemic. We recruited summer camp participants through an on-campus STEM education partner. Sixteen middle school students and 17 high school students participated in the two summer camps; 39 students participated in the ELA classes. Half of all participants were female. We acquired IRB research approval and received IRB permission for 11 middle school and 12 high school campers, and 32 high school ELA students. Summer camp students were more likely than ELA students to report themselves as being technical and interested in AI (67% of summer camp students vs. 38% of ELA students), whereas ELA students showed greater variability in terms of their technical experience and knowledge of and interest in AI.

We used the same core curriculum in the camp and ELA settings, although the ELA class included about twice as much contact time. These extra hours provided students with more time and support to practice using the design tools and create their multimedia products. Two team members led the camp sessions and co-taught the ELA classes with the class teacher. Throughout each unit, we used the AI short stories in combination with online AI activities and multimedia design projects to explore critical AI ethics issues. The stories, which sparked an emotional connection to the different issues, were complemented by non-fiction texts and videos to ground the experience in current events. Online activities enabled participants to tinker with AI in order to deepen their technical understanding. To further explore each theme of the class, participants used digital tools to create multimedia products (e.g., comic, marketing flyer/video, chatbot) that expressed their stance on different AI ethics issues.

C. Findings

We used pre-/post-surveys, observations and analysis of student artifacts to evaluate the program's effectiveness and in particular, the use of short stories in heightening students' awareness and understanding of AI. The stories played a key role in efficiently and powerfully connecting students with AI ethics issues, regardless of their prior knowledge of or

experience with AI. A majority (84%) of participants expressed that stories played an important role in helping them make sense of the issues related to AI. In some cases, stories helped students develop a more critical understanding of AI ethics and contributed to a shift in their perspectives. As one student explained, "*It [Code Orange] deepened my understanding of how sometimes it's good to give up safety for privacy. I was mostly about privacy than safety. I changed my mind.*" Some stories moved students to action. In response to *Your Own Song*, one student took action: "*I turned off my suggestions on YouTube because I didn't want it suggesting stuff that I was watching.*" Students found dystopian/speculative fiction stories (e.g., *Undone*) engaging, but more realistic stories (e.g., *Your Own Song*) helped emphasize that these technologies are prevalent in society now, and are not just something of the future. As one student stated, "*This technology is actually used, like right now, today. It was really impactful for me. It's kind of a reality.*"

III. CONCLUSIONS

Given the widespread and often disproportionate impacts of AI, it is critical to increase teens' awareness and understanding of these technologies, regardless of their interest in or pursuit of computer science. Our experience facilitating *Imagine AI* in both formal and informal learning settings suggests the feasibility and effectiveness of incorporating AI education in non-computer science classes, including ELA classes. Stories and activities developed for the *Imagine AI* project can provide support for educators interested in incorporating AI in their classroom, even if their prior experience with computer science or AI is limited. Similarly, CS educators can productively integrate stories to provide a meaningful context for considering the ethics of AI. We are continuing to develop and study the *Imagine AI* curriculum, adding new stories and AI activities, and expanding to new contexts, including CS classes. These open education resources are available for educators to use and customize for their own contexts (<https://www.colorado.edu/project/imagine-ai>). Our work thus far suggests that stories can play a powerful role in students' learning, heightening the personal relevance and emotional impact of AI in society.

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