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Lessons Learned from Co-Designing Phenomena Driven Student Centered AI Curriculum with Teachers New to AI

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Abstract: This poster describes the collaborative design process between researchers and teachers to create student centered phenomena driven middle school artificial intelligence content. The co-design process is based on the CT-Integration Cycle which has been successfully used to co-design CT-integrated science units. The initial findings highlight the successes and challenges in our current design process and outline how others can uptake components of the PL model to co-design their own AI-integrated units.

Introduction

There is a big push for artificial intelligence (AI) in education (Touretzky, et al., 2019). Students frequently interact with AI both inside and outside of the classroom, and need to develop a literacy around AI and understand how to critically think about how AI interacts with the world around them (Zimmerman, 2018).

While there are many different curriculum design techniques that engage teachers at different levels in the design process, collaboratively designing (co-designing) curriculum has been shown to be a productive tool for creating robust science curriculum (Penuel, et al, 2007). While there is some recent existing work that explores co-designing AI curriculum with K-12 teachers (Carvalho, et al., 2022), challenges remain in how to engage teachers who mostly have little to no experience with AI. Researchers can look to co-design strategies for creating general computer science curricula since teachers often lack expertise in general computer science content as well (Peel, et al. 2020).

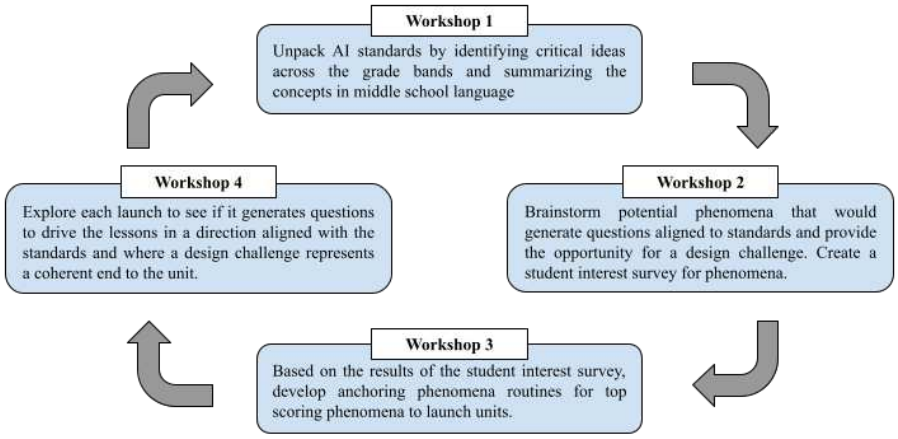
This poster outlines a model of creating materials for AI education that centers authentic student questions while promoting standards-aligned learning and teacher agency in the design process. To support the co-design process, researchers and teachers engage in the CT-Integration Cycle, a professional learning model that supports the co-design of middle school science and STEM units that integrate computational thinking and basic computer science concepts using programmable sensors (Biddy, et al., 2021). This poster addresses the research question: When working with teachers who are new AI, what adaptations need to be made to professional learning strategies that focus on co-designing student centered phenomenon based curriculum?

Design workshops

These design workshops exist as part of a larger project that aims to integrate AI into the classroom. During Spring 2022, 5 middle school teachers (4 STEM/CS, 1 science) familiar with the technology (Gendreau Chakarov, et al., 2021) engaged in four 2 hour long co-design workshops facilitated by researchers.

Figure 1

Short Descriptions of the Four Workshops used to Co-Design a new AI-Integrated Unit



The tandards are based on the Big AI Ideas (Touretzky, et al., 2019).

Methods

Data collected included video (and transcriptions) from each of the four workshops, post workshop reflective surveys, and artifacts from the workshops. The team first examined the five open-ended survey questions given after each workshop addressing teacher experiences in the workshop and how they feel about engaging with their students around AI. Each author examined the survey responses, and then the authors reviewed the videos from the workshop together. The main goal was to understand how the structure of the workshops supported teachers new to AI to engage in co-design of AI integrated curriculum.

Discussion

This work demonstrates a proof of concept that working with teachers new to AI still leads units that are aligned to interests that are relevant to their students with robust connections to the standards. The initial analysis revealed both successes and challenges of adapting the CT-Integration Cycle to co-design AI integrated units.

Three tools stood out as remaining particularly useful in their current form: the phenomena survey, the practice launches, and engaging with the material in the student hat/teacher hat role (Biddy, et al., 2021). The results of the phenomena survey set the stage for the discussion between teachers of balancing their competing goals when it came to the unit. The teachers found the practice launches particularly useful with most of them mentioning how helpful they were in the post-survey for Workshop 4. In addition, teachers found it especially helpful to engage in activities during the PL as students (e.g., brainstorming student questions/explanation).

The biggest challenges involved unpacking standards and phenomena development with teachers who are new to AI. Some teachers directly called out how the unpacking process helped them understand more about AI. However, when it came time to develop anchoring phenomena, it was challenging for teachers (especially those with less experience with AI) to explore how students would engage with AI beyond sensing (data collection). Since the teachers had little or no experience working with AI in their classrooms, they depended more on researchers to develop concrete phenomena that support student questions. The lack of specificity was something early co-designers of phenomena based science curriculum encountered as well.

To address these challenges, more student hat/teacher hat activities during the unpacking process could support teachers to delve into the intricacies of the standards and start to think about how their students will engage with the ideas. This also aligns with teachers expressing how thinking in both student hat and teacher hat helps them prepare for implementing these activities in the classroom.

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