Co-Creation and Inclusive Design: Developing a Machine Ethics Curriculum through Collaborative Pedagogy

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Abstract

There is a lack of access to critical knowledge on machine ethics and the impacts of technology on individuals and communities in everyday life. This project pioneers an inclusive curriculum design process to broaden accessibility to machine ethics education. Our approach uses a 'source" course to develop materials for seven "target" courses. The source course is a machine ethics curriculum development course in which students and faculty collaboratively build curricular materials for integration into non-computer science courses. Here we describe the development of the "source" course using a curriculum co-creation process that leverages student and faculty expertise. The process emphasizes an inclusive design approach, rooted in continuous stakeholder feedback and consistent, transparent communication. The products of this process include course materials that incorporate underrepresented ethical frameworks. Additionally, it features peer-reviewed journal assignments that promote reflective learning and sharing of diverse perspectives, as well as a final module project in which students collaborate with faculty to co-create curricular materials. Our approach aims to broaden a culturally relevant understanding of ethical challenges in technology while ensuring that the curriculum resonates with diverse student backgrounds.

1 Introduction

In an age where technology, machines, and AI profoundly influence our daily lives, transforming learning, interaction, and societal norms, understanding the ethical implications of these tools is crucial. Despite its significance, machine ethics, a field dedicated to ensuring the application of moral behavior in machines [12], remains largely inaccessible, particularly in disciplines outside of STEM where its relevance might seem less apparent. This study proposes integrating fundamental machine ethics concepts into seven target courses at Franklin & Marshall College, utilizing a co-creation and inclusive design approach. By embedding ethics material in courses in public health, environmental studies, psychology, economics, creative writing, and sociology, we aim to make machine ethics knowledge accessible to students in disciplines across science and the humanities.

Our general approach expands on prior work in developing machine ethics curriculum [8] by developing a course that designs curricular materials for other courses. In contrast to prior work, we focus on incorporating machine ethics into courses outside of computer science to broaden access to this critical knowledge. Our "source" course develops curricular materials that will be integrated into non-computer science "target" courses. In this paper, we describe the design process for this course, how we apply curriculum co-creation and inclusive design principles, and give a few highlights from our curriculum design process.

2 Background and Related Work

Many universities are recognizing the importance of machine ethics education and are incorporating full-length courses or modules into their curricula. One approach has been to integrate machine ethics content across many courses within the computer science curriculum [11]. Others have introduced standalone courses that specifically address the ethical and societal impacts of machine learning (e.g. [19]).

Our work aligns most closely with efforts by Dean & Nourbakhsh [8] who designed a computer science course that created ethics modules for other computer science courses. To make machine ethics knowledge accessible to students from diverse academic backgrounds, we develop modules for courses outside of computer science. Although there are other interdisciplinary approaches, namely courses in engineering ethics or science, technology, & society [20], our approach is designed to reach a broader set of students.

3 Approach and Uniqueness

3.1 Co-creation

"Co-creation" describes measures to include students as partners in a wide range of educational practices [3]. Because co-creation is founded on respect, reciprocity, and shared responsibility, it disrupts a hierarchical positioning of faculty as knowers and agents, and students as passive recipients of knowledge, resulting in particularly meaningful growth for students from minorized backgrounds related to recognition of themselves as knowers, and the development of confidence in sharing their views in academic contexts [7], [5]. In this project, students are co-creators of curricula – units on Machine Ethics – that contribute to target courses in fields outside of Computer Science. This positioning emphasizes both their expertise as students, including the experience of being a student from a minoritized background, as well as the facility with Machine Ethics they develop in the Machine Ethics course itself.

3.2 Inclusive Design

Inclusive design manifests in the design project processes, resulting in the creation of products, services, and/or environments that are accessible and usable by a wide range of people, irrespective of age, gender, or abilities [6]. More importantly, it seeks to address factors such as ethnicity, economic resources, education, and culture [6].

To achieve this, we must adopt a structured design process that goes beyond usability and considers social and practical considerations [6]. The seven-level approach [14] provides a framework that guarantees that inclusivity is woven into the fabric of the curriculum development itself and not just the end product, starting with defining the user needs and moving through stages such as concept generation, validation, and user testing.

For example, in the seven-level approach, levels five and six, which entail testing, feedback, and application, are pivotal in ensuring that the curriculum is refined to address pain points and the diverse needs of students using stakeholder input. It's important to note that these steps are iterative, and the feedback collected in levels five and six can be utilized to make modifications or develop new concepts.

Going beyond usability, serves as the vehicle that drives us toward true accessibility, ensuring that the needs of all are met inclusively and equitably [6].

4 Results and Contributions

4.1 The Process

4.1.1 Continuous Stakeholder Feedback. Inclusive design was integral to our co-creation model, particularly through establishing continuous stakeholder feedback. Our stakeholders were partnering faculty, prospective students, and subject matter experts. This mechanism combined the stakeholder element of inclusive design [18],[17] and the continuous feedback element of co-creation [10], [1] enabling us to collaboratively refine and integrate diverse perspectives. This ensured that the course content was relevant and responsive to the varied needs of our demographic. For instance, after proposing the "Hiring By Machine" simulation, we underwent multiple iterations. This involved collaborative feedback between us, the course co-creators, and various faculty and students. This process led to a simulation design that accurately reflects real-life hiring practices, particularly highlighting the ethical reasoning — or lack thereof — often involved in hiring decisions. Iterating over these course elements refined our approach and fostered a sense of ownership among co-creators.

4.1.2 Presentations. We had 10 presentations that served as a crucial aspect of our inclusive design process, ensuring transparency with student and faculty stakeholders. These exchanges on pedagogy and course content led to creative refinements, such as reorganizing the source course's learning objectives to better align with its pedagogical and ethical components. Additionally, we collaborated on strategies to ensure the student-faculty relationship during the course reflected the core co-creation principle of sharing power, where both students and faculty support each other throughout their co-creation process. This is key to addressing potential power imbalances in conventional student-faculty relationships [4].

4.2 The Products

4.2.1 Ethical Frameworks. The integration of diverse ethical frameworks is a defining characteristic of our inclusive design approach. By incorporating underrepresented perspectives like Feminist ethics [16] and non-western perspectives like Ubuntu [13] and Confucianism [15], we diversified the range of ethical discourse in machine ethics and ensured that the ethical frameworks reflected the intended diversity of our class. This approach empowers students to engage in these discussions in a way that reflects their lived experiences while pushing them to interrogate views that may be unfamiliar or opposed to their own. Ubuntu ethics, for instance, could provide a framework for implementing universal AI ethics principles that prioritize the cultural contexts of historically marginalized populations.

4.3 Assignments

4.3.1 Journal Entries . We decided to use journaling as a formative assessment to encourage students to consolidate their learning, emotions, and designs, helping them process these complex ideas on technology and AI and connect them to their experiences [9]. Each journal entry will be submitted twice. The first submission, for peer review, will encourage students to engage with each other's work and gain exposure to diverse views. Through constructive critique and affirmations, students will develop trust in their voice, an important skill that will facilitate successful student-faculty partnerships later in the course [4]. Additionally, this two-step process will allow for an iterative feedback and refinement process that mirrors the feedback mechanism highlighted earlier.

4.3.2 Module Project. The final project serves as a culmination of the course, allowing students to apply their ethical and pedagogical understanding practically. Students and partnering faculty will collaborate as equals to develop units of curricula that will be added to seven target courses. These co-creation partnerships will allow students and faculty in their differently positioned capacities "to gain from the process of learning and working together" [2].

5 Discussion

The experience of co-creating a course focused on co-creation was exhilarating. Our approach got us closer to promoting accessibility based on the needs of the students and faculty that will collaborate in this course.

Continuous stakeholder feedback was instrumental in facilitating shared responsibility and continuous refinement, echoing core co-creation and inclusive design principles. The process exposed our work to constructive critique that allowed us to iterate and refine the curriculum. This led to refining learning objectives and reshaping assignments and assessments to promote a collaborative, peer-to-peer dynamic between students and faculty. Moreover, as co-creators, we were also empowered to ideate and propose new approaches during the feedback-driven curriculum refinement process.

Our products, such as the integrated ethical frameworks, and the related readings further exemplify how inclusive design was central to the curriculum design. We considered the context in which our learners live, and how the materials would be able to affirm or contest their values and beliefs. We introduced Ubuntu and Confucian ethics to the curriculum, ensuring the materials resonated with students' diverse experiences and expanded their worldviews.

Ultimately, the students are given the agency to decide how these learning activities will take shape as they work together with their faculty creators.

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