# Empowering Graduate Students as Co-Designers: Developing an AI Ethics Micro-Credential through Cooperative Learning

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# Work in Progress: Empowering Graduate Students as Co-Designers of an AI Ethics Microcredential


## ABSTRACT

The rapid expansion of Artificial Intelligence (AI) into multiple fields has intensified the need for educational models that equip students to handle complex ethical challenges. This Work-in-Progress paper presents an initiative at a Hispanic-Serving Institution (HSI) in which graduate students act as co-designers of an AI Ethics Microcredential. Created as part of Artificial Intelligence for Arid Land Agriculture (AIALA), the project promotes interdisciplinary understanding by integrating viewpoints from computer science, agriculture, and communication. Drawing on Constructivist Learning Theory (CLT), five graduate students collaboratively developed micro-modules organized around five ethical pillars: Data, Context, Responsibility, Human Control, and Access. Instead of learning through traditional, lecture-based instruction, the students participated in iterative peer review and collaborative problem-solving to build curriculum materials on topics such as algorithmic bias in healthcare and the ethics of autonomous vehicles. Through this process, they were required to develop their own interpretations of the ethical pillars in order to teach them effectively to others. Preliminary findings indicate that this student-driven model strengthens ethical reasoning and builds confidence in working across disciplines. To assess the initiative, the study uses qualitative interviews and reflective surveys to examine students' experiences with co-design. This work contributes to emerging research by offering a transferable framework for engaging students as co-creators and by illuminating how peer-led curriculum development can advance inclusive, ethically grounded AI education.


## INTRODUCTION

The growing integration of Artificial Intelligence (AI) across fields ranging from agriculture and healthcare to communication and engineering has made it imperative for higher education institutions to prepare graduates not only with technical skills but also with strong ethical reasoning. As AI systems increasingly shape students' decision-making skills, ethical concerns about data privacy, algorithmic bias, and human oversight have increasingly grown more intricate and far-reaching. Nonetheless, conventional approaches to teaching ethics in engineering and computer science (CS) are often left as standalone modules or isolated case examples. This leads to students being cast as passive learners rather than active participants in developing their ethical perspectives. To bridge this gap, new educational models are needed to enable students to critically engage with and influence the ethical aspects of the technologies they create and implement.

One solution to the aforementioned challenges is the use of microcredentials. Microcredentials provide flexible, targeted learning opportunities that allow institutions to respond quickly to industry needs and empower learners to personalize their professional development. Within the context of AI, microcredentials can serve as a key mechanism for fostering interdisciplinary literacy, thus bridging the knowledge gap between technical developers and domain-specific users. However, microcredentials are particularly appropriate for this purpose; it should also be emphasized that the way they are designed presents a distinctive pedagogical opportunity.

This Work-in-Progress (WIP) paper describes an innovative initiative at New Mexico State University (NMSU) a Hispanic-Serving Institution (HSI) that utilizes these principles through student-led design of an AI Ethics Microcredential. Developed under Artificial Intelligence for Arid Land Agriculture (AIALA), a National Research Traineeship (NRT) program, this initiative worked with a cohort of graduate students in computer science and agriculture to design ethical learning modules. Rather than simply working on assignments, these trainees fully developed microcredential lessons.

This work is grounded in Constructivist Learning Theory (CLT), which views learning as an active, socially situated, and context-dependent endeavor, as opposed to a one-way transfer or passive intake of information [1]. By engaging students as co-creators in the educational process, the initiative leverages collaborative knowledge construction to nurture deeper and more sophisticated forms of ethical reasoning. In this study, we report on and interpret early pilot findings, exploring in detail how the co-design methodology shapes students' ethical awareness, influences their reflective judgment, and enhances their capacity to work and communicate effectively across disciplinary boundaries.

## BACKGROUND AND RELATED WORK

This program initiative offered students a structured chance to design and implement a curriculum, serving as a key professional development experience for those interested in pursuing faculty roles after graduation. Through this process, trainees were able to build and refine valuable competencies, particularly in rapidly evolving domains such as artificial intelligence (AI), positioning them to better navigate and contribute to an ever-changing academic and technological landscape.

Traditional curriculum frameworks typically position students as the main recipients of instruction, while faculty retain full authority over how courses are designed and taught. In contrast, more recent scholarship advocates for "pedagogical partnership," a collaborative approach in which students and instructors work together to co-create the learning experience [2]. Instead of simply collecting student feedback after decisions have already been made, this approach treats students as active partners who share responsibility for shaping course goals, selecting and organizing materials, and determining assessment and evaluation strategies. In this way, pedagogical partnership redistributes aspects of instructional control and reframes students not just as learners, but as co-designers of their educational environment.

Bovill et al. [3] suggest that student involvement in curriculum design can range from limited consultation to full partnership, with the latter offering significant benefits, including enhanced student engagement and a greater sense of ownership of learning. When roles are "flipped," and students shift from passive recipients to active designers, they must work more deeply with the material to be able to teach it to others effectively [4]. Thomson further argues that this will reinforce their subject knowledge and foster their professional identity.

As higher education adapts to the disruptions caused by AI, microcredentials have become an important mechanism for modular, competency-based learning. Delgado Kloos et al. [5] argue that they provide a flexible route to address the "AI skills gap," enabling learners to gain targeted competencies, such as ethical reasoning or data literacy, without completing a full degree. These brief credentials can also empower learners through recognized "digital badges" that communicate

specific achievements to employers and peers [6].

## METHODS

This study was conducted within the AIALA Program at a public, land-grant Hispanic-Serving Institution (HSI). The participant group consisted of five graduate students, three Master's and two doctoral students, with academic training in Computer Science and Agriculture/Molecular Biology. As members of an interdisciplinary National Research Traineeship (NRT) cohort, these students had no prerequisites beyond enrollment in the program, and they entered with varying degrees of confidence about AI and ethics. While some had not previously taken formal ethics courses, this project served as their primary opportunity for professional development and for building an ethical foundation.

This initiative took the form of a semester-long, project-driven course in which students served as co-designers of a university-wide AI Ethics microcredential. The instructional team offered a multidisciplinary support framework:

- CS Faculty: Specialists in Generative AI with substantial experience in the ethical dimensions of AI.
- Agriculture Faculty: Scholars in Landscape Hydrology and Molecular Biology who conduct research incorporating AI tools.
- Program Coordinator (PC): Oversaw the curriculum setup in Canvas, supported the accessibility of content for non-expert learners, and liaised with the university's Global Campus to align with microcredentialing requirements.

### Learning Objectives for Co-Designers

To ensure clearly defined and rigorous learning outcomes, the course adopted the following learning objectives to specify what the five graduate students were expected to accomplish through the co-design process.

| Learning Dimension | Student Learning Objective | Assessment Method |
|---|---|---|
| Foundational Knowledge | **Analyze** core ethical pillars (Data, Context, Responsibility, Human Control, Access) to build instructional content. | Iterative syllabus drafts and slide deck creation. |
| Application | **Develop** 30–45 minute modules | Peer-review cycles and final module delivery on Canvas. |
| Integration | **Synthesize** select a research-relevant topical area and elaborate on its ethical complexities to develop a comprehensive standalone MC module | Cross-disciplinary feedback loops and interdisciplinary module topics. |
| Human Dimension | **Assume** the professional identity of a curriculum designer and lead collaborative peer-critique sessions. | Qualitative interviews and reflective surveys. |

Figure 1: Learning Objectives and Assessment Methods for Graduate Students Developing AI Ethics Micro-Modules

The intervention took place over a semester as a project-based course focused on developing an AI Ethics microcredential curriculum. Instead of a traditional lecture format, it functioned as a collaborative co-design workshop. Students designed seven learning modules aligned with key ethical pillars: Data, Context, Responsibility, Human Control, and Access. The MC course began with an Introduction Module, followed by Module 1, which presented the concepts of Attribution and Moral Responsibility. The next five modules were chosen individually by each student; these topics included: Autonomous Vehicles, Environmental Ethics in AI, AI in Healthcare, Ethical Communication in AI, and AI and the Ethics of Human Representation. Students were given the flexibility to choose a topic, so they had a vested interest rather than being assigned topics. Each student had to address the following topics in their curriculum: Introduction, where they addressed the topic and provided background information; and each of the five ethical pillars within their lessons, including learning assessments at the conclusion of each pillar. These learning assessments consisted of self-graded quizzes featuring multiple-choice, True/False, matching, and fill-in-the-blank questions. These types of assessments were done purposefully to be self-graded to avoid additional grading outside of the already established assessment.

To support effective cross-disciplinary collaboration, the project adopted a structured cooperative learning framework organized into three phases:

- *Phase 1:* Students were individually tasked with developing the curriculum for one of the five core pillars. This involved creating instructional slide decks that defined the ethical concept using foundational examples, as well as designing formative assessments and quizzes to evaluate learner comprehension.
- *Phase 2:* Once the core pillars were finalized, students developed independent modules based on their specific research interests (e.g., AI and Climate Change). In this phase, students were required to apply the five-pillar framework to their chosen topic, demonstrating how each ethical dimension manifests in real-world scenarios.
- *Feedback Loop.* Throughout the semester, the cohort took part in ongoing review cycles. Each week, students shared drafts and received structured feedback from peers, faculty advisors, and the PC, then made weekly revisions to maintain technical accuracy and interdisciplinary clarity.

During the first few weeks of the semester, faculty and staff worked closely with students to lay the groundwork for the course, introducing the five ethical pillars. Each student was assigned one of these pillars and tasked with creating a slide deck. Weekly class time was devoted to peer review, during which students offered suggestions to help improve the content. Simultaneously, faculty and the PC provided feedback on both the clarity of the material and its presentation. Every week, students reported on the revisions they had made in response to the prior week's feedback, leading to new iterations of their work. Through this ongoing process, students advanced to the stage in the semester where they were required to design a curriculum around their assigned topics. By then, they had developed a solid grasp of the five ethical pillars and gained experience in building curriculum materials for their specific areas. Feedback from peers, faculty, and the PC continued throughout this phase and remained a regular part of the process until all the modules were finalized. By the conclusion of the semester, students had finished the full curriculum. The PC then started working with New Mexico State University's (NMSU) Global Campus to upload the materials to Canvas and creating user-facing instructional content. The microcredential is currently

undergoing internal institutional approval and review before it is made available to the public.

The resulting microcredential will be delivered as a fully online, asynchronous course lasting approximately four to five hours, hosted exclusively through the NMSU Global Campus platform. It is intended for a wide range of learners, including current university students and members of the general public, with particular focus on individuals interested in CS, AI, and Machine Learning who want to shape their professional development. NMSU's Global Campus microcredentials are provided either free of charge or, in some instances, for a small fee. Once a course is released, anyone who is interested may enroll and complete that microcredential. One objective of the AIALA Program is to make completion of this microcredential a formal requirement for future AIALA participants, who would then earn a Digital Badge as documented proof of their accomplishment.

As part of their role as curriculum co-creators, the graduate students were responsible for developing Learning Objectives for the MC. The following Learning Objectives were identified by the students as central to the MC:

1. Learners will be able to define Artificial Intelligence (AI) and provide examples of everyday use.
2. Learners will be able to recognize the importance of AI Literacy.
3. Learners will be able to explain five ethics topics as they pertain to AI: Data, Context, Responsibility, Human Control, and Access.
4. Learners will be able to identify and analyze the misuse of AI across different domains and propose educated ethical responses to mitigate harm.
5. Learners will be able to identify beneficial applications of AI across various domains and propose educated, ethically-informed uses of AI.

To support topic mastery, each of the seven modules ends with a quiz that requires a minimum score of 80% to pass. Learners who successfully complete all MC modules receive a Digital Badge through the Global Campus platform. This badge serves as a portable credential that demonstrates their ethical AI literacy to external stakeholders and can be shared on professional networking sites such as LinkedIn.

**Evaluation**

An external evaluation firm ran a comprehensive mixed-methods study to examine how this co-design initiative shaped student learning and professional development. Their evaluation combined quantitative measures of shifts in student confidence with in-depth, qualitative accounts of students' experiences. Data collection involved a post-program survey administered to all trainees at the end of the semester (100% response rate), using Likert-scale items to measure satisfaction, perceived academic relevance, and self-reported confidence in AI ethics. To complement these results, semi-structured telephone and Zoom interviews were conducted, enabling students to offer more detailed reflections on the program structure and the challenges of the co-design process. Quantitative survey data were analyzed to identify trends in student confidence and skill acquisition. Qualitative data from observations and interviews were coded to identify emerging themes related to the "co-creator" experience, specifically looking for evidence of increased ownership of learning and improved ability to communicate complex ethical ideas across disciplines.

## RESULTS

The initial evaluation of the co-design initiative provides promising evidence regarding the efficacy of the student-led model. Data collected from the Fall 2025 semester ($n = 5$) reveal high levels of confidence in ethical reasoning and strong engagement with the interdisciplinary nature of the project.

Post-program surveys show that the co-design process greatly increased students' self-rated skills in the program's main learning goals. All trainees (100%) reported high confidence ("Quite a bit" or "A great deal") in their understanding of both general AI concepts and specific Ethical AI frameworks. The interviews carried out by the external evaluator further highlight the developmental impact of the co-design experience. Student interviews revealed recurring themes of professional development and interdisciplinary literacy. The reflections below show how the co-design process transformed trainees from passive recipients into active curriculum co-creators:

> "I have learned planning and good structure of a microcredential course," "how to present material in a professional format, and how to explain technical concepts in a way that people will understand"
>
> "It does make me want to go into academia, or at least a field where I can help people better understand science in an efficient and effective manner."
>
> "It will help me create presentations as this will be useful within my job."
>
> "It will help me with coworkers as I will have to engage with people from all technical backgrounds so I will be better at explaining tough concepts.

Beyond technical and ethical learning, the data suggest that the collaborative curriculum design process also strengthened students' professional skills. When asked about communicating AI research to non-expert audiences, a key competency for interdisciplinary work, 60% of trainees reported "A great deal" of confidence and 40% reported "Quite a bit". Likewise, 80% of the cohort expressed "A great deal" of confidence in applying AI concepts to research problems, suggesting that creating the modules (i.e., teaching) helped solidify their ability to use these concepts in practice. Despite the positive responses in the evaluation, it is worth noting that students ranked the microcredential course as the lowest-rated among the topics covered in class, with only 40% satisfaction. One student stated:

> "I felt the workload through the semester was a little heavy," "it's a fast-paced program," "I've had to learn quickly on the topics I'm less familiar with so that I can keep up with my colleagues"

Qualitative data from open-ended responses and observations support the quantitative findings, highlighting the benefits of the cross-disciplinary setting. Trainees reported strong satisfaction with the program's design, particularly the opportunities to bridge the gap between technical computer science with agricultural practice.

## DISCUSSION

The results of this pilot initiative suggest that engaging graduate students as co-designers of AI ethics curricula is an effective strategy for enhancing both ethical literacy and professional confidence. By shifting students from passive recipients to active "architects" of learning, the program fostered a deeper engagement with the material that aligns with the theoretical benefits of pedagogical partnership described by Bovill et al. [3].

The results show that all trainees (100%) reported strong confidence in their understanding of Ethical AI frameworks, which supports the claim that “flipping the roles” strengthens mastery of the material. As Thompson [4] argues, when learners design curricula, they advance from superficial familiarity to a deeper, structural grasp of the subject in order to teach it. In this study, condensing complex ethical pillars, such as Responsibility and Human Control, into clear micro-modules required trainees to internalize these ideas more thoroughly than traditional coursework likely would.

The success of the cross-disciplinary collaboration highlights the value of the co-creation model in overcoming the "siloed" nature of graduate education. Trainees reported that the process helped them develop a shared language between computer science and agriculture. This mirrors findings by McDonald et al. [7], who note that diverse student teams are uniquely positioned to create inclusive learning resources that resonate with a broader audience.

Although this pilot emerged from the distinct cultural and academic context of an HSI, the framework itself is intended to be widely scalable. For instance, at non-HSI institutions or larger research-intensive universities, this approach could be integrated into existing capstone courses. In undergraduate contexts, the "co-design" component can transition from full curriculum development to creating peer-led case studies or ethics playbooks tailored to specific departmental student organizations, helping ensure that the material aligns with students’ emerging professional identities. Furthermore, this “co-design” strategy is suitable for both technical and foundational courses. Small groups of students in any class can contribute to designing or refining the curriculum for future cohorts who will take the course. While creating an entire MC is a substantial undertaking, partnering with instructors to enhance course materials is a model that can be reproduced in virtually any classroom setting.

As Barner et al. [8] demonstrates, students can be effectively involved in creating curricular materials to explain statistics concepts they previously found challenging, for use by future cohorts. This indicates that, regardless of whether attention is placed on overarching ethical principles or on detailed engineering techniques, having learners “flip the roles” compels them to integrate and absorb the material more deeply than conventional teaching methods do. Previous work on this topic has mostly used relatively small cohorts. Barner et al. contend that the “student-led curriculum development” project was viable largely due to the limited class size. Smaller classes enable the instructor to oversee and direct the project more effectively while also providing close mentorship to students. The core focus of this study is to investigate how engaging students as co-designers of the curriculum, specifically by having them create lessons intended for their classmates, enhances and deepens their own grasp of the subject matter. The scope of the study is limited to the learning benefits for the student designers themselves; it does not address or evaluate how the produced curriculum (MC) influences the students who later receive and use it.

Finally, designing a microcredential gave students a concrete, professional product to show for their efforts. Instead of turning in homework that vanished after grading, they created work that, once published on NMSU's Global website, could be showcased as a verified skill on their resumes and professional profiles. In place of short-lived, throwaway assignments, students built a lasting educational resource that continues to have value for future learners and for their own career development. This aligns with Elliott et al.'s [6] observation that digital badges and credentials can serve as powerful motivators for learning. Furthermore, as Delgado Kloos et al. [5] suggest, flexible microcredentials are essential for keeping pace with the rapid evolution of AI.

## CONCLUSION

This Work-in-Progress paper contributes to ongoing initiatives to integrate ethics into Artificial Intelligence by demonstrating that it is beneficial for graduate students to serve as co-creators in any learning environment. By shifting learners from passive recipients to active contributors of the curriculum, the project fostered deep engagement with the content, aligning with the theorized benefits of utilizing the CLT. The student-driven curriculum development of the AI Ethics microcredential created a space in which participants could internalize complex ethical principles—such as Responsibility and Human Control—more fully than would likely be possible in conventional coursework.

The initial results from this pilot at an HSI indicate that this co-design approach not only enhanced ethical reasoning but also fostered key professional competencies and confidence. The use of iterative feedback cycles offered the needed support to connect technical aspects of computer science with real-world applications. Although this work focuses on AI ethics, the model can be applied to any subject area where small class sizes allow for intensive curriculum development in any discipline. It is important to emphasize that this approach requires substantial time with co-creators; therefore, much larger classes do not create high level of engagement with students.

Future work will include piloting the micro-credential through NMSU's Global Campus and examining its effects on broader university and community audiences. This study, however, does not investigate how the micro-credential affects those who ultimately earn it. Rather, it centers on AIALA participants as co-creators of the curriculum and explores how their engagement in designing the micro-credential supports their learning, skill development, and interdisciplinary growth. Insights from this research will guide subsequent versions of the curriculum, which may be revised after wider implementation. In doing so, the project provides a scalable model for involving students as co-creators while nurturing interdisciplinary leaders who combine technical expertise with a strong commitment to ethical responsibility.

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