

Collaborative Teaching:

Exploring Reflective Practice to Address Uncertainty Avoidance

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Abstract— In order to promote engineering students' creative practice and self-authorship in undergraduate general education, instructors must first understand the creative process and, second, serve as models to students by engaging in reflective and transparent practice. However, these learning goals require some tolerance for uncertainty, both in students and in co-taught environments. This research addresses uncertainty in teaching and learning environments and explores instructor reflective practice in interdisciplinary, collaborative teaching and its impact on faculty relationships, course design, and student engagement. The work also seeks to strike a balance between flexible course structure and consistency, while fostering dynamic instructor teams to enact and model creativity for students.

Keywords—interdisciplinary; uncertainty avoidance; design

I. INTRODUCTION

In order to promote engineering students' creative practice and self-authorship in undergraduate general education, instructors must first understand the creative process and, second, serve as models to students by engaging in reflective and transparent practice. However, these learning goals require some tolerance for uncertainty, both in students and teachers in co-taught environments. In cross-cultural psychology, uncertainty avoidance is a construct that is based on how an individual responds to uncertainty and ambiguity [1]. In undergraduate course settings that incorporate uncertainty, students and instructors face a number of challenges. This research addresses uncertainty in teaching and learning environments and explores instructor reflective practice in interdisciplinary, collaborative teaching and its impact on faculty relationships, course design, and student engagement. The work also seeks to strike a balance between flexible course structure and consistency, while fostering dynamic instructor teams to enact and model creativity for students.

Questions the research seeks to address are:

- How do instructors deal with the uncertainty that is inherent in co-teaching, especially with students ranging from engineering to the fine arts?
- How do instructors collaborate to develop an innovative course designed to engage a variety of students and disciplines?

Data collected from a collaborative autoethnography by three instructors of an interdisciplinary, undergraduate course on creative inquiry and ideation were analyzed using thematic coding. The reflections are focused on course design, management, and implementation, including instances of uncertainty, coordination efforts, patterns of student participation, and general logistical concerns. Data also include observational data of classroom activities (e.g. ideation workshops, studio critiques, team meetings) and student design artifacts. The paper draws conclusions about how instructors can collaborate to develop and implement interdisciplinary curricula that is sustainable and flexible. Findings will provide insight into collaborative, interdisciplinary teaching, the balance of pedagogical strategies, as well dealing with uncertainty for both instructors and students.

II. COURSE DESIGN

The course examined here was designed to encourage the development of competencies in several areas, including critical and creative thinking, collaboration and communication, and identifying and proposing innovative ideas. Recognizing that the main objectives of the course involved collaborative and interdisciplinary work and communication, it was critical these skills were modeled to the students. Thus, the course was co-developed and taught by two instructors. The instructor-of-record, a professor in engineering education, taught the course for the first time. The secondary instructor, a research professor in instructional design and technology, had designed and taught the course for five previous semesters. In addition, a graduate student in human-centered design was present in each of the classes as well as in planning sessions with the instructors to observe and offer additional support. Since the course also aimed for students to engage in cross-disciplinary discussions, it was critical to offer a variety of perspectives and areas of expertise. As such, the instructors created a list of guest speakers to periodically visit class. These guests included representation from industry (strategy planning, user experience design, marketing) as well as other departments (industrial design, business, and library science).

To help move through the design process, students were assigned to present and offer feedback in three studio-based critique sessions. The goal for these sessions was to provide

at least one content-area expert for each different project idea, as well as industry and academic representation. From each critique, students were expected to analyze and consider all feedback to shape and progress on their projects.

15 students were enrolled in the course, which was an undergraduate honors course titled *CREATE!*. The undergraduate students represented freshman through fifth year seniors from a variety of disciplines, including 4 students enrolled in engineering majors, 3 design/architecture majors, 2 art majors, 3 science majors, 1 math major, and 2 business majors. The course was electively taken to fulfill three hours of 21 credits required to receive an honors degree. Of the 15 participants, 4 were male and 11 were female.

The instructional activities were designed to link to authentic learning outcomes that would serve the students in their experiences beyond the classroom [2]. Thus the course was structured to include instructional methods such as presentation of problem spaces, team forming exercises, critiques, completion of reflections and final projects, and a co-creation activity conducted at the end of the semester. The data collected from these activities throughout the semester served as both assessment data and data that informs the research. The paper specifically draws on data from the instructors' autoethnography in which they concurrently reflected on how student progress aligned with course objectives.

III. DATA COLLECTION

Inspired by the work of Sochacka, Guyotte and Walthers on STEAM education [3], the instructors exchanged reflections, through a collaborative autoethnography, in order to more deeply explore uncertainty avoidance in relation to learning objectives as the course progressed. The instructors took notes during class periods, guided by rubric criteria when appropriate and otherwise informed by course objectives, primarily indications of student responses to uncertainty and collaborative behaviors. Examples of student behaviors noted included students questions and concerns, engagement in group activities, and group conflicts. Within the week following the class period, the instructors would reflect on their notes and post summaries on a collaborative, web-based document that included observations from the class meetings as well as their own responses as instructors to the progression of the course. They also responded to each other's posts and took turns on who would lead first in that week's discussion. Finally, the graduate student instructor would periodically (approximately every 3 weeks) synthesize the trajectory of the instructors' posts, pointing out patterns and pain points that she observed in the narrative and as a participant in the course.

As research data, the collaborative autoethnography was analyzed using a thematic coding process for identifying patterns both within each data set and across data sets. While informed by research on uncertainty avoidance, the instructors approached the thematic analysis primarily from iterative, inductive readings of the data [5], focusing on the

research question of instructor uncertainty avoidance (analysis of student uncertainty avoidance is reported elsewhere). The purpose of this thematic analytic approach was to get more familiar with the data and identify broad patterns that all three researchers agreed upon.

IV. DISCUSSION

The following discussion highlights four of the main themes pulled out during the analysis of the collaborative autoethnography. These themes are not only reflected throughout the autoethnography document, but also reflected in research previously conducted on collaborative teaching and uncertainty avoidance. The four themes most apparent address understanding shared responsibilities, the unique demand on time and mental capacity, the importance of remaining transparent with each other and through the reflections, and the balance between flexible course structure and consistency.

A. Shared responsibilities

This collaborative teaching experience was an opportunity to conduct research on uncertainty avoidance, due to some unique characteristics, such as the instructors having differing viewpoints on structuring educational experiences and a learning environment where uncertainty is plentiful, for instructors and for students. The potential sources of uncertainty for instructors in this course included starting a new collaboration team, sharing roles and responsibilities with instructors with different work styles and personalities, and the challenge to assess and grade the students work in an open innovation environment.

As defined by Lester and Evans, collaborative teaching includes a rigorous degree of collaboration [5]. Both instructors are responsible for planning the curriculum, coming to a consensus on how the class material should be presented, providing the instruction, and assessing student learning [1]. The experience of collaborative teaching helped to understand the importance of creating a "common language" among the instructors, making the roles and the division of work clear and visible to students, having a plan to address the reflections, and clearly defining directions for each day while envisioning the next steps. It quickly became evident that co-teaching requires more planning time than a solo-taught course [6]. Within a week or two of teaching the class, Instructor 1 was already experiencing some struggle with her own uncertainty in many of these areas. She states:

"I'm struggling a bit with structure vs. uncertainty, definitely, and I think much of it is stemming from a new collaboration and sharing the role as teacher...co-teaching is always different and probably dependent on work styles and personalities. Maybe this is a bit of a focus on the research question that we're looking at in terms of the instructor team--how in the world do we put in something this unstable as a cornerstone in a program? So, I keep thinking about the balance we're trying to target, and figure out how assessment is going to happen and perhaps serve as some kind of backbone or touchstone when we're not the ones teaching."

B. Time and Demands

In addition to time, co-teaching requires a high level of mutual trust and commitment. As such, some instructors might never be comfortable in team teaching, while others say that it gives them a renewed energy and prompts them to try new ideas [4]. Instructor 2 commented on this several weeks into the semester by stating, “I’m excited! This is going really well! The first time in 4 years I don’t have anxiety about teaching/offering this class. I’m so excited to have your support!!!”.

The process of interdisciplinary and collaborative teaching can be very demanding for instructors, especially in the developmental stages of the course or program [5], not only in terms of time, but also in terms of understanding and responsibility. In the present case, there was some confusion on roles and shared responsibility, which indicated the need to step back for a moment and redefine individual roles. In the beginning, Instructor 1 took the lead on moderating class, answering student questions, managing assignments while Instructor 2 instructor served as guidance and support, allowing her to spend time on observation and synthesis. The frustration and confusion on division of labor, however, is evident throughout the semester. Instructor 2 commented on this a few weeks into the course:

“I think, first, there is some confusion on my role and maybe this is in response to [Instructor 1] comment about shared responsibility. I think we should step back and redefine who’s doing what. We can do that in person, but for the purposes of keeping record, my perception/understanding at the beginning of the semester was that I would serve as guidance and support and mainly let [Instructor 1] take lead on class activities. I would then be available to spend much more of my focus and energy on observation and synthesis. Please, let’s make sure I’m doing what I’m supposed to be doing. I’m starting to feel like I’m missing something and certainly don’t wish to continue as such, so let’s make sure we iron out those expectations.”

C. Transparency and Reflection

Sharing and reflecting on research and teaching in the course makes sense as the instructors are figuring out how to make this venture not just service and teaching but also research. The more knowledge the team gains and has to contribute from this experience (and others), the more credible the program it builds. As Graziano & Navarrete state, “collaborative planning time is critical in co-teaching. Planning meetings prior to and during the course, coupled with debriefing meetings after each class, are important to maintain the course continuity, monitor the integrity of the content and instruction, and communicate with one another” [5]. When co-teachers choose one another and communicate throughout the semester about their styles, preconceived notions, fears, and growth, the experience is positive for both the instructors and students [6]. As the frustrations related to responsibilities, responding to students, and

assessment continued through the semester, it was important for the instructors to remain open and honest in their response to these frustrations. Instructor 1 pointed this out by stating:

“Big thanks to [Instructor 2] for getting the rubric together and doing the debrief with the class. That was perfect, and it really helped me to see that. Unfortunately I know it took some time for you [Instructor 2], and if we follow our plan of meeting every Monday then you will be putting in more time too. But maybe the way forward will work well--sharing and reflecting on research and teaching in the course makes sense to me as we’re both figuring out how to make this venture not just service and teaching but also research.”

D. Balance between flexible course structure and consistency

Along the semester, the instructors shared reflections highlighted the importance of combining structure and creativity in the course. The structure of the class was subject of intense debate among the instructors, going back and forth on levels of structure, communicating expectations to students, grading, etc. It was necessary to adjust the course at the start and iteratively throughout the semester, in order to ensure the balance between the value of maintaining structure and the value of keeping space for creativity.

A more structured process allows everyone to get a better sense of their role and permit time and energy to perform research alongside to teaching; besides allowing the team to be prepared when something unexpected happen (e.g. a guest instructor does not show up). However, the instructors recognize the challenge to improve the structure, developing a framework that integrates all the aspects, without compromising the creativity and spontaneity.

In the beginning, the need of structure was very clear to one instructor (“how in the world do we put in something this unstable as a cornerstone in a program?”), while the other one stressed how the lack of structure would be fundamentally important to develop the goals of the course:

“Students handled the lack of structure beautifully and I think giving them this first experience that was, essentially, free of risk, will set them up to know what to expect and prepare for next time. They’ve done it, they’ve failed, they’ve succeeded, they’ve struggled, and they’ve learned...they can do this again.” (Instructor 2)

V. CONCLUSION

In order to move forward with this Work-in-Progress research, the team will repeat the study in Fall 2016, using a similar auto-ethnography but implementing a guiding structure of themes for the instructors to follow in their reflections. In addition, the process will be changed to one that enables a more immediate and consistent exchange by scheduling a debriefing meeting each week after the class

ends. This meeting will be structured around a verbal exchange in which the instructors reflect on each of the themes identified in this pilot analysis:

- Shared responsibilities
- Time and Demands
- Transparency and Reflection
- Balance between flexible course structure and consistency

The course will change as well, pursuing a goal of continuous improvement. The instructors will record the curriculum planning meetings and use Lattuca & Stark's eight-step heuristic for bringing tacit assumptions to the surface. This plan brings together instructors and other stakeholders to intentionally addressing eight fundamental elements of curriculum building: Purpose, Content, Sequence, Learners, Instructional Methods, Instructional Resources, Evaluation and Adjustment [7]. Finally, a step of evaluation and adjustment at the mid- and end-points of the semester will be added to the auto-ethnographic data collection

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