Collaborative Synergy: Enhancing Face-to-Face Computing Courses

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***Abstract*— This innovative practice paper explores the varied perspectives of a computing faculty member and a group of instructional designers, who partnered to revise courses to increase active learning practices and integrate cross-disciplinary skills and dispositions into two face-to-face computing courses (CS 1 and CS 2), as part of a larger, grant-funded systemic change effort. The instructional design team members varied in terms of level of formal educational experience in engineering, computing, and instructional design**

Keywords—instructional design, collaboration with faculty, design for face-to-face environments

I. Introduction

Collaboration in academia is viewed as a partnership in which participants leverage one another's skills to achieve outcomes that would be difficult or impossible to accomplish individually [1]. The collaboration between instructional designers and faculty is not only crucial but also inherently complex, serving as the backbone of successful course development in higher education. This partnership, though potentially fruitful, is often fraught with challenges stemming from individual pulls such as institutional demands, workload expectations, and diverse professional backgrounds [2].

II. The Role of Instructional Designers in Course Development

An instructional designer in higher education is a professional who develops and enhances curricula and educational materials, focusing on improving learning outcomes and integrating technology effectively within college or university courses [3]. The collaboration between faculty and instructional designers in course design is increasingly recognized as going beyond technical support to enhance student learning experiences through broadening faculty perspectives on learning theories and instructional strategies for online and face-to-face learning environments [4], [5]. A new level of partnership emerged during the COVID-19 pandemic, due to significant challenges in meeting learner needs effectively and efficiently during the quick transition from traditional face-to-face to online models [6].

Funded by the National Science Foundation

Working with instructional designers provides faculty with support in designing learning materials and helps reduce their workload [7], [8]. However, such partnerships are often unfamiliar to faculty, raising concerns about trust and mutual expectations. Faculty may also worry about losing control over their course content and academic freedom [4], [5]. As an example, instructional designers, trained to give detailed feedback, might overwhelm faculty who are not used to such comprehensive advice, which can lead to stress and poor communication [9]. The lack of clear guidelines on how to interact further hinders effective collaboration, making it inefficient and time-consuming [9]. Additionally, the workload for both parties is considerable, necessitating effective task prioritization during course development to achieve completion and maintain balance in their other responsibilities [10].

An ongoing debate among faculty and instructional designers is whether instructional designers without significant experience within a domain (such as Engineering or Computing) can effectively support learning for students in that domain [5]. Furthermore, instructional designers typically come from epistemological and academic backgrounds different from those of the faculty they serve. However, instructional designers often serve as consultants for faculty across a wide range of disciplines.

III. Collaboration between Instructional Designers and Faculty Members

This paper explores such relationships, focusing on a partnership between a computer science faculty member at a Minority Serving Institution and instructional designers as part of NSF grant. Our goal was to incorporate cross-disciplinary skills and dispositions into two computing courses. The collaboration provided a fertile ground for exploring the challenges and strategic approaches that can significantly enhance course design, especially in specialized fields such as computing.

The partnership in focus involved two primary instructional designers with contrasting backgrounds: one with extensive experience in designing over 100 courses across various

disciplines without a background in STEM fields, and another with less instructional design experience but a background in an engineering-related discipline. The team lead, on the other hand, held formal education and professional experience in computing and educational research but possessed limited direct instructional design experience. The faculty member had years of experience teaching computer science to minority students.

The design of the current paper was to have a panel discussion and co-design takeaways as a collaborative effort across all members of our collaborative team. We have met multiple times to reflect on key milestones and challenges of our relationship and collaborative efforts and recorded our reflections. Then, these reflections were summarized as takeaways. Through sharing our experiences, we aim to shed light on the successes and challenges encountered in establishing our collaborative relationship. This discussion contributes to a broader understanding of how interdisciplinary collaboration can enhance educational practices, particularly in the context of face-to-face courses in computing and engineering programs.

IV. What We Learned from Our Collaboration

A. *Takeaway 1: Set the Clarity Level First by Preventing Misalignments in Expectations*

Instructional designers typically expect faculty to not only provide expertise in content but also to be open to innovative teaching methodologies. Conversely, SMEs often expect instructional designers to support their traditional teaching approaches and to enhance the existing course structure without significant deviations. This discrepancy in expectations can lead to misunderstandings and reduced efficiency unless addressed proactively.

Best practices are always to proactively mitigate issues by holding comprehensive orientation sessions at the outset, where roles and expectations are defined.

However, this collaboration emerged to address the misalignments that were uncovered as a result of other grant activities. The initial plan was to conduct faculty development workshops that would focus on the integration of competency-based education and the faculty would do the work largely on their own with some occasional workshops at later dates. However, that proved to be insufficient. This led to a more collaborative co-design approach. As a result, some of the challenges still emerged, like unclear expectations about the scope, workload, and efforts. It is critical to note that since our joint goal is to improve student outcomes, both faculty and instructional designers tend to ignore inconveniences and just move forward. While the final result was successful, looking back we realized that we could have made this path much easier for everybody by ensuring the clarity of expectations from the beginning.

B. *Takeaway 2: Enhance Creative Output through Constructive Tension Due to Background Differences*

Faculty members may have doubts about the contributions of instructional designers to courses due to the designers' lack of subject-matter expertise [4], [11], [12]. If faculty do not recognize the benefits that instructional designers provide, they may disregard the designers' suggestions, which can negatively impact instructional designers, leading to a decrease in their motivation to work on the course when they perceive their expertise to be undervalued or overlooked. Consequently, this situation can detrimentally affect the quality of the course. On the other hand, instructional designers may often bring points of view from different fields, which can also bring some challenges. For example, an instructional designer with a background in psychology might introduce learning strategies based on theories of human memory, which could be unfamiliar and initially uncomfortable for faculty focused on technical disciplines.

In the case of our partnership, the varied academic and professional backgrounds of the instructional designers and the faculty enriched the course design process, albeit with their share of tensions. In this specific partnership, the diversity in the professional background—ranging from a non-computing instructional designer to a team lead with extensive computing experience—facilitated a broad spectrum of ideas. This mix allowed for creative solutions that were engaging and informative for students, such as developing activities that pushed the boundaries of what was traditionally considered feasible within computing courses.

This diversity, while beneficial, also required the development of a shared language and common goals to ensure that all team members were clear about the goals and could effectively communicate their ideas and perspectives. The challenge was to balance creativity with feasibility, ensuring that innovative course elements were both engaging for students and practical to implement.

C. *Takeaway 3: Build on Small Successes by Using A Phased Approach to Implementation*

The integration of various pedagogical approaches, particularly the shift from lecture-based to active learning, could lead to resistance [13]. This resistance is especially pronounced when student needs and constraints vary widely. Faculty face challenges when large-scale changes do not meet expectations, often leading to a quick reversion to traditional methods.

Our team experienced such setbacks as well. For example, in the first-course redesign, the faculty member and instructional design team were excited to try many innovations. However, these innovations did not work for all students, especially those who were not academically prepared for computer science-style courses (which involve a lot of hands-on design and programming work, as opposed to memorization-heavy experiences students may have had in high school). In the semester during which the course was initially piloted, a large percentage of the students fell into this group. The faculty member became concerned when these students did not appear to understand the material, and re-lectured during part of lab sessions, reducing time for the new activities. Many of the students also resisted team- or pair-based work, leading the faculty member to have to change planned activities on the fly.

Learning from these experiences, our team adopted a strategy of implementing smaller, more manageable changes that could be easily integrated into individual classes or segments of a course. This phased approach allowed for the

gradual introduction and assessment of new pedagogical techniques, such as gamified activities with embedded feedback mechanisms. These smaller successes built trust and demonstrated the effectiveness of new strategies, fostering a more collaborative and receptive atmosphere among all collaborators.

However, it is critical to note that these successes would not be possible if we had not established the level of trust and openness in our communication that is needed for a partnership. Setbacks and other challenges are difficult to admit. However, if we all see them as learning experiences that help us learn together and grow together to help students it becomes a milestone on the path of our collaboration.

Conclusion

The relationship between instructional designers and SMEs in higher education settings is undeniably dynamic and complex. Through a detailed examination of a specific partnership, this expanded introduction highlights the critical importance of addressing initial expectations, leveraging diverse professional backgrounds, and embracing the challenges that come with domain-specific knowledge. By fostering effective communication, mutual respect, and a commitment to shared goals, these collaborations can profoundly enhance the quality and relevance of educational offerings, ultimately benefiting both educators and students in specialized fields like computing.

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