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Interdisciplinary Teaching and Learning: Two Heads Might Actually Be Better Than One

Background

Learning to work with others is a life-long endeavor. These skill sets don't develop in a vacuum. They need to be nurtured through modeling and experience. As suggested by John-Steiner [3], students need to be socialized into the culture of collaborative work and the kinds of creative and critical thinking the new workplace requires.

As you will discover, collaborative work yields processes and results that are far richer than any that a single person's expertise can produce. John-Steiner calls this "creative collaboration": "In collaborative work we learn from each other by teaching what we know; we engage in mutual appropriation. Solo practices are insufficient to meet the challenges and the new complexities of classrooms, parenting, and the changing workplace" [*op. cit.*, p. 3]. However, we found out both by observing the students in their project teams and by reflecting on our own interactions as teachers, that collaborative work creates a complex dynamic where diverse ideas and opinions are continually being challenged and negotiation is a constant presence. It quickly became clear that creating interdisciplinary assignments and forming multidisciplinary student teams to share the work is not enough. Getting team members to actually learn new skills from their peers in other disciplines simply would not happen without a great deal of mediation and guidance from us, the teachers.

Defining Interdisciplinary Teaching

So what exactly do we mean when we say that a course is "interdisciplinary"? There are many definitions and variations, some involving one teacher presenting multiple perspectives and others involving team teaching.

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Interdisciplinarity is often described as "the integration of disciplinary perspectives" [4], which in our case would be music and computer science. It is often confused with "multidisciplinary," which Spelt et al. [8] describe as "additive," presenting multiple perspectives without the integration of the disciplines or opportunities for students to synthesize knowledge from them. Davis [1] points to the need for "blurring genres" and "synthesizing disparate sources into new knowledge." He claims that the disciplinary focus of much of higher education cannot adequately address the issues confronting 21st century thinking. Davis is an advocate for faculty to work in teams, believing that teams can achieve what individual disciplinary specialists cannot.

We embrace Davis's last point wholeheartedly. To us, it takes two to tango. We feel that the only way to give students a truly interdisciplinary experience is to have a professor from each discipline present at all class meetings. We understand the logistical problems that this presents, and we address those in a later chapter. We also understand the differences of opinion and perspective that will arise in class, but we see no need to hide those from students….

"Synchronized" vs. "Hybrid" Courses

One of the first decisions you will need to make is whether to take the plunge into interdisciplinary teaching, either by revising and rethinking an entire course or by beginning with a small well-defined project. Our first foray was project-based and probably closer to the "additive" multidisciplinary approach. We put students together from regular classes that we were already teaching, *General Music Methods* and *GUI Programming*. ("GUI" stands for "Graphical User Interface".) Our colleague Fred Martin dubbed these "synchronized" courses [5]. Students did a project that we will describe later in detail, but suffice it to say at this point that the students in each course did their parts of the project independently. They then came together a few times during the semester to share, discuss, and evaluate their work.

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The synchronized courses showed some positive results, but we wanted more. We wanted students from different disciplines to work together throughout an entire semester. We therefore developed what Martin [*op cit.*] termed a "hybrid" course, co-taught with both of us in the classroom simultaneously. This is *Sound Thinking*, focusing on the study of sound from the perspective of digital musicianship.

Learning from Experience

As you begin to develop your interdisciplinary experience, be mindful of setting up regular meeting times before and during the semester for planning, reflecting, and modifying some of the course details. Strong communication and the ability to evaluate one's work "in process" are essential to a successful collaboration. You and your colleague should attempt to make a conscious effort to find a common class meeting time and try to set aside specific days when the classes will meet as one. As we both learned from previous attempts at this, it's a good idea to introduce the project together and build it in phases. You may also wish to think about setting up multiple planning meetings before the beginning of the semester as well as scheduling regular meetings throughout the semester to evaluate, reflect upon, and make modifications to the project as needed.

You may also wish to consider building in time for the students to evaluate each other's work. Peer-to-peer feedback is invaluable to the learning process, particularly so with a diverse group of students with different strengths. As previously suggested with regard to the definition of computational thinking, we sometimes get hampered by our habits of mind and modes of thinking. Getting students to think about solutions from another person's perspective will help develop their analytical thinking skills, one of the benefits of a computational thinking mindset. In our case, when the teams were required to present their work, we did it as one class. This made it possible for CS students to comment on the work of and give feedback to the music students, and vice-versa. In addition, the students developed an appreciation for the differences in thinking and learning styles and the creative thinking that formed a common link between them.

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What resulted was a successful collaboration all around, based on what, for the most part, fits the definition of an interdisciplinary project. The general sentiment of the Music Ed class with regard to this new collaboration was summed up by one student:

> Boy, do I really like to have the CS students in our class! I feel we are really becoming one class, not just two classes in the same room. It's great to have other voices in the class, and to provide perspective from students outside the music department.

"Not just two classes in the same room." What better confirmation could we have asked for?

Building an entire interdisciplinary course around a long-range project or thematic idea can be a daunting task without a clear idea of your purpose for doing this in the first place. In the case of our own class, our goal was to create an entire interdisciplinary course for all students interested in music technology and how to manipulate it. Or, more to the point, we were going to have students "get under the hood" to discover how these programs work. We therefore based our strategies and projects on the interdisciplinary synchronized course module we created for computer science and music majors.

Whether you are attempting a single interdisciplinary project or developing an entire course, you may want to use the following questions to help frame your thinking and planning:

1. What is it that you hope to gain with regard to your students' learning?
2. How will this impact your own personal and professional growth?
3. What will be the overall benefits? What barriers will you have to overcome?
4. What compromises will you have to make when you enter into a long-term collaborative endeavor?
5. And, most importantly, how exactly are you defining interdisciplinarity with regard to your content and teaching?

In our case, our rationales for developing the new course were straightforward. For Music Education majors, there are few opportunities to gain immersion into areas of study outside their discipline, let alone the technologies that may support and

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enhance their work. Even students in our Sound Recording Technology program sometimes lack sufficient opportunities to understand the programming and visual aspects of multimedia technology that support much of their work. At the other end of the spectrum, those who design and build software applications have few opportunities to pursue in-depth study of multimedia applications from the perspectives of the audio and visual artists who are their end users.

Whatever your rationale, one of your goals should be to break down boundaries created by compartmentalized instruction and have your students see their own work through an interdisciplinary lens. You will find that such experience is critical in preparing students for the multidisciplinary workplace, regardless of their major field.

Benefits to Students

We set out to explore broad concepts through the lenses of our respective disciplines and integrate those concepts within a project-based learning environment. We put students into the position of decision makers, a role they do not often occupy [2]. Boix Mansilla and Gardner suggest that such projects give students multiple opportunities to develop "performances of understanding," in which students are invited "to think with knowledge in multiple novel situations" [*op cit.*, p. 105]. They discuss at length the importance of training students to think like the practitioners in the various fields of study they encounter during their schooling.

So what does this mean for your students and why should you care? In our case, one of our goals was to give students "real-world" experiences. Perhaps the fact that we both began our careers in the world of business might have something to do with shaping our perspectives on the skills and thinking that our students will need once they leave our classrooms.

Among the many advantages of interdisciplinary courses is that these courses encourage and support creative risk taking and the ability to accept ambiguity [7]. This would seem to benefit professors, as well as students.

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Benefits to the Professors

Here are some of the benefits we experienced. We are fairly certain that others can experience these, as well:

- You will each learn a lot more about each other's discipline.

- You can attend and present your work at conferences in each other's field, further expanding your respective knowledge of each other's disciplines.

- You will most likely receive significant recognition within your own university, raising your profiles. In our case we were each invited to serve on university-level committees that may influence the future of interdisciplinary teaching at our institution.

- You will be introduced to other colleagues in your respective departments, thereby expanding the scope of your work, leading to new collaborations and possibly to grant applications.

On top of all that, if our experiences are any indication, you will quite simply have a lot of fun. This last point should not be taken lightly. The National Science Foundation program that funded our own work was conceived to "revitalize undergraduate education in computing" [6]. As we strove to achieve that goal, we found that the process revitalized us as educators. Such faculty revitalization is clearly key to educational transformation, because while faculty are not always the major source of curriculum *innovation,* they are — and for the foreseeable future will remain — the major component of curriculum *implementation*.

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