Creating Interdisciplinary Curricula

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Rationale for Interdisciplinary Curricula in Art and Design

Interdisciplinarity in higher education is more than just a buzzword or recent trend. Decades of research and practice testify to the benefits of providing students with academic experiences that allow them to integrate diverse knowledge domains in order to produce cognitive advancements that would be unachievable through a mono-disciplinary approach. In art and design, we believe that integrating the unique ways of knowing and doing inherent to the arts can be of benefit to learning and achievement across all fields of human endeavor and that developing interdisciplinary courses incorporating creative practice with other academic fields or across areas of art and design can create transformative learning experiences for our students.

Interdisciplinarity is well suited to art and design: just as creative practice takes many forms, so can academic inquiry between and across the arts. We might observe that interdisciplinarity occurs spontaneously in many contexts, especially when we encounter problems that can only be solved by seeking input or knowledge outside of our primary areas of expertise. For example, a sculptor might seek to collaborate with a structural engineer in order to determine how to suspend a heavy sculpture from a balcony without causing it to collapse. A roboticist might enlist the help of artists and psychologists in order to redesign her home healthcare robot in a way that will be more acceptable to the elderly persons it is intended to help. Or a philosopher might work with a neuroscientist and visual artist to investigate the physical nature of visual representation so that she can learn whether her philosophical theories on the topic have a basis in actual physiological processes involved in experiencing works of art. The arts can enhance the communication of complex data generated through research; infusing content-area knowledge found in other disciplines can strengthen and deepen students' experiences in the arts. No matter which side of the equation provides the impetus for taking an interdisciplinary approach, benefits to learning are apparent.

We can also observe that interdisciplinarity is prevalent in many fields of human endeavor, from product design to media production to healthcare. Many employers expect new hires to be able to serve as competent members of interdisciplinary teams. Moreover, this trend seems only to be increasing, as is student demand for learning experiences that will prepare them with the crucial skills in creativity, communication, innovation, and teamwork that are valued in the 21st century workplace. Professional collaboration is no less significant for artists and designers than for corporate employees, giving the academic community additional impetus to develop interdisciplinary curriculum in art and design.

How to Create an Interdisciplinary Curriculum

When considering how to create courses that provide students with interdisciplinary arts experiences we should take a methodical approach, considering the different options available, our reasons for choosing to approach our teaching in this way, our personal levels of expertise in the disciplines involved, the content-area depth we are trying to achieve in the course, and numerous other factors.

Determine the Approach: Types of Interdisciplinarity

Interdisciplinarity means many things to many people; for our purposes it can be implemented in numerous curricular configurations that generally fall into four basic categories: an equal partnership, another discipline serving the arts, the arts serving another discipline, or a partnership between different areas within art and design. Faculty members who are interested in interdisciplinary teaching should determine which of these options is best for the combination they have in mind, or whether a different approach might be better.

- ***Equal Partnership***: a co-taught, collaborative course partnering a professor of art or design with one or more professors in other learning areas. One example would be a Project Management and Creative Entrepreneurship course, taught by professors from both design and

business, in which students would employ design-thinking methods to the creation of a product. The design professor would address the creative components, while the business professor would address topics like writing a business plan, sales and marketing techniques, and so on. A single individual possessing sufficient content-area knowledge in both disciplines could teach such a course successfully, but due consideration must be given to assessing whether the faculty member's depth of knowledge or expertise in both disciplines is adequate to provide students with a beneficial learning experience.

- ***Another Discipline Serves the Arts***: a course in the visual arts might incorporate content from a partnering discipline, such as a Visual Storytelling course utilizing content from creative writing and media studies to strengthen the communicative value of visual art students' creative practice.
- ***The Arts Serve Another Discipline***: a course taught in a subject outside of the arts can incorporate engagement in artistic practice. One example would be an Arts and Medicine course, in which medical students hone their powers of observation by interacting with artworks and improve their skills in visual communication through drawing activities.
- ***Partnerships Between and Among Art and Design Areas***: the methods and approaches of many artistic genres and design fields can be seen as sufficiently disparate to warrant classification as separate disciplines, so a pairing of two or more of these diverse areas requires an interdisciplinary mindset. The fields of art and design are frequently conflated, but they are built upon different epistemologies, which might be seen to render them separate fields. Artists, for the most part, produce creative works for their own intrinsic value—art for the sake of art alone. Design, on the other hand, is intrinsically goal-driven and client-based. For instance, we might pair the artistic field of traditional printmaking with the design-based field of electronic media in order to bring the expertise and methods of each field to bear in a new

approach to visual production, or create a course combining digital imaging with painting, or ceramics and industrial design.

Comparing the National Association of Schools of Art and Design (NASAD) standards for General Design and General Fine Arts, we can see these similarities and differences more clearly.

NASAD Handbook 2013-2014

General Design (Section IX. H, p. 105)	General Fine Arts (Section IX. I, p. 106)
a. The ability to solve design problems, including the skills of problem identification, research and information gathering, analysis, generation of alternative solutions, prototyping and user testing, and evaluation of outcomes.	a. Understanding of basic design principles, concepts, media, and formats in the various fine arts disciplines. Development of this sensitivity continues throughout the degree program.
b. The ability to describe and respond to clients and contexts that design solutions must address, including recognition of the physical, cognitive, cultural, and social human factors that shape design decisions.	b. Ability to apply principles of design and color and competency in drawing to work in specific fine arts specializations.
c. The ability to create and develop visual form in response to design problems, including an understanding of principles of visual organization/composition and application.	c. The ability to conceive, design, and create works in one or more specific fine arts fields.
d. An understanding of tools, technologies, and materials, including their roles in the creation, production, and use of visual forms. This includes both traditional and digital media.	d. Working knowledge of various aesthetic issues, processes, and media and their relationship to the conceptualization, development, and completion of works of art.
e. Functional knowledge of design history, theory, and criticism, including an understanding of the similarities, differences, and relationships among the various design specializations.	e. Understanding of the similarities, differences, and relationships among the various fine arts areas.
f. An understanding of basic business practices, including the ability to organize design projects and to work productively as a member of teams.	f. Experiences that encourage familiarity with a broad variety of work in various specializations and media, including broad exposure to works of art.
g. Experiences that encourage familiarity with a broad variety of design work in various specializations and media.	g. Opportunities to develop an area of emphasis in at least one fine arts area.
h. Opportunities to develop an area of emphasis in design.	

The highlighted areas represent points of commonality, but these fields have some inherent differences that might complicate potential interdisciplinary efforts. Care should be taken in these pairings to address these points of divergence in order to facilitate a harmonious collaboration.

Consider Key Criteria

When choosing the disciplines that should be involved, each one should be demonstrably necessary or valuable to the project; its absence would have a negative impact on achieving the goals of the course. For example, let's say we're structuring a course around human-computer interactive study involving the design of programmable costumes for a dance performance. We'd need electronics engineers to design and build the circuitry for the costumes, dancers to think about the performers' needs and create the choreography, fashion designers and computer graphics specialists in order to create aesthetically pleasing costumes, and musicians to perform the score for the performance. Therefore, electronic engineering, dance, fashion design, graphic design, and music are essential components of this particular project.

Planning an interdisciplinary course involves consideration of a number of key factors:

- What we are trying to achieve through the proposed course?
- Why is an interdisciplinary approach valuable or necessary in order to achieve this goal?
- Which disciplines will be involved?
    - Why is each one important?
    - How will it make a substantive contribution?
    - How will it present a clearly distinct perspective and way of knowing?
    - What would be missing if this discipline were not included?
- What level of expertise will be required of the instructor(s)?
- What are students expected to produce?
- How will the course lead students to engage in interdisciplinary thinking?

If the concept for the proposed course cannot successfully address the questions above, it might be better to take a more traditional approach rather than striving for interdisciplinarity.

Identify the Big Idea

Successful interdisciplinary courses are focus-driven, bringing one or more learning areas together in order to address a central purpose. Presuming we have determined that interdisciplinary methods will suit our proposed course by working through the questions above, the next step is to develop the "big idea" that will shape our students' learning experience. A big idea can take several forms:

- ***Developing Students' Interdisciplinary Skills and Knowledge***: Rather than primarily seeking to teach content-area knowledge in either the arts or another discipline, the driving force behind some courses is primarily to equip students with the ability to think and work in interdisciplinary settings. In this case, the content does not matter as much as the teaching methodology employed during the course, and students would be assessed on the growth of their understanding of interdisciplinary methods and their enhanced ability to embrace ways of thinking and knowing outside of their major area of study.
- ***Enhancing or Deepening Disciplinary Knowledge***: Incorporating content from a partnering discipline can lead students to a broader understanding of or greater skill in their chosen field. For example, a course for early-childhood or elementary education majors incorporating engagement in arts practice could equip them with skills and knowledge necessary to provide their future students with classroom arts experiences.
- ***Community Engagement***: an interdisciplinary course could bring students from different learning areas together to contribute to the community, such as the pairing of sociology, psychology, painting and sculpture in order to create public art in a disadvantaged neighborhood.
- ***Wicked Problem***: a course may involve a genuine and relevant problem or question for which there is as yet no clear solution, such as:

- A social issue such as homelessness, poverty, domestic violence, or gender inequities
- A problem in the sciences such as climate change or the impact of technology on a natural resource (oil pipelines, irrigation, hydroelectric power)
- An aspect of health and wellness like anorexia or obesity, physical fitness, or heart disease

Humanity is vexed with many "wicked problems" in need of solutions, and any of these can serve as the driving force behind an interdisciplinary course. Furthermore, artists and designers have much to contribute to these discussions because our specialized disciplinary training enables us to develop expert knowledge in ideation, problem-finding, and in communicating complex concepts through tangible representations.

- ***Other:*** Virtually any pairing or purpose is possible, but it should always be strategic, goal-driven, and demonstrate a need for each of the partnering fields.

It should be made clear that the course under development is not necessarily *about* the central topic; rather, the topic provides the unifying idea that brings cohesion to disparate learning areas and provides the purpose for engaging in interdisciplinary thinking. Each of the disciplines involved in the course should be important to consideration of the topic, and it should be evident that interdisciplinary study of the topic will provide greater insight and understanding than taking a mono-disciplinary approach.

Determine Disciplinary Depth

After choosing the big idea for the course, we must consider the depth the course will reach. This depends on the students' level of disciplinary knowledge. A course intended for first- or second-year students who have not yet formed a cognitive map of any particular discipline should account for the fact that these students are not yet prepared to engage in deep interdisciplinarity. Such a course should strive, instead, for breadth and for introducing students to basic interdisciplinary thinking. Courses intended for third- or fourth-year undergraduates or for graduate students could delve more

deeply into interdisciplinarity because the students would be more likely to have mastered one of the disciplines and would be prepared to bring this knowledge to their engagement with the skills and knowledge of the partnering discipline(s). This would be required for highly technical pairings such as architecture and engineering, robotics and medicine, or computer science and cognitive/behavioral psychology.

Evaluate Instructor Expertise

The same considerations of disciplinary depth apply to the instructors planning and implementing the proposed curriculum. An introductory course does not require as much depth of knowledge as one offered at a higher level. If taught by a single instructor, that individual should have sufficient knowledge, skill, competence, and experience in the disciplines involved in the course to be able to facilitate student learning from one or more perspectives. We might compare this to the teaching of instrumental music. K-12 music teachers must master the basics of a variety of band and orchestra instruments in order to be prepared to teach technique to beginning instrumental students. As those students progress, they must be paired with different teachers who have greater expertise in their particular instrument if they want to deepen their skills and knowledge. Similarly, familiarity with a partnering discipline combined with deep knowledge of the instructor's primary field could perhaps be sufficient for an introductory-level interdisciplinary course. At more advanced levels, however, a greater depth of knowledge in the partnering subject becomes necessary. Sometimes a single individual will have developed his or her knowledge base around a pair of disciplines, such as a philosopher of science, or a historian of medicine. This individual would be well prepared to teach an interdisciplinary course in this hybrid field. The same might be true of someone who had completed degrees in one or more fields, who worked in an industry outside of his or her academic area, or who has some specialized training or experience in the partnering discipline.

Instructors should assess their personal level of expertise before deciding to teach an interdisciplinary course. In *Explaining Creativity: the Science of Human Innovation*, Keith Sawyer discusses the idea that 10,000 hours of practice are required to become an expert in any given field. This works out to five years of full-time engagement at 40 hours a week for 50 weeks per year. We might see that graduate study, when added to prior education in undergraduate programs, provides this level of skill and knowledge, as would being employed in a particular field for five or more years, or practicing something as a lifelong hobby or pastime (8 hours per week x 50 weeks per year x 25 years = 10,000 hours). The following questions might prove useful in conducting a self-assessment.

- Education: What formal training or education do you have in the area?
    - degrees earned including majors and minors
    - courses taken and number of hours
    - professional training, certificate programs, conferences or seminars attended, etc…
- Experience: Have you worked professionally in this area? Have you worked in this area as a hobby or pastime? Have you volunteered in this area?
    - professional positions and number of years held
    - organizations with which you've worked in this area and number of hours served
    - average time spent on the hobby/pastime
    - accomplishments in this area—things for which you have earned recognition or awards
- Perseverance: What do you do to improve your knowledge or practice in this area?
    - How do you seek out new knowledge? (reading professional journals, attendance at conferences and seminars, membership in professional organizations)
    - How do you seek to improve your practice? (working with a coach, mentor, or trainer, mentoring others)

- Authority: Are you considered by others to be an authority in this area? Do others consult with you or seek out your expertise in this area?

If the intended instructor cannot determine that he or she possesses sufficient knowledge in the partnering discipline, it might be best to take a team-based approach to the course, finding ways to collaborate with someone with complementary skills and knowledge. This approach is detailed in *Achieving Successful Collaboration in Higher Education* (Mackh, 2014).

Plan and Prepare

Once the key criteria underlying the proposed course have been determined, the next step is to create a comprehensive plan for the course and a proposal to present to the institutional administration.

Develop a Plan of Instruction

The course developer should create a detailed plan of instruction, fleshing out the course concept with a completed syllabus and all related documentation and materials. This should include:

- Outcomes and objectives compatible with all disciplines to be involved in the course, along with interdisciplinary learning goals such as:
    - Enabling students to produce interdisciplinary work
    - Ensuring that students learn how to critically synthesize and evaluate knowledge
    - Leading students to understand the relationship of disciplinary knowledge to interdisciplinary inquiry
- Schedule of lessons and lecture topics
- List of readings and assignments
- Guidelines for projects and assignments, along with specific instructions and timetables for project milestones and deliverables
- Field work, investigations, or guest speakers

- Plans for assessment, including rubrics and templates for assessing student work
- Pre-and post-course surveys

Most of these components are present in many syllabi, but interdisciplinary courses also require additional considerations. The syllabus and/or supporting documentation must demonstrate that the following considerations have been fully addressed:

- Direct instruction in disciplinary vocabulary and skills, especially those that are taken for granted by those who work in this field.
    - Students must be deliberately and systematically introduced to the academic discourse of the field in which they will study, especially key terms and ways of understanding the world.
    - The problem of disciplinary vernaculars is crucial. For instance, the word "mass" means something very different to a physicist, an architect, or a religious scholar.
- Direct instruction in the methods of interdisciplinary inquiry, including specific structures and operations needed for synthesis, translation, accommodation, communication, and collaboration within the course
- Exposure to and development of higher order thinking skills
    - Metacognition: awareness of one's own thinking processes
    - Procedural knowledge: analysis and application of two or more concepts
    - Comprehension: the process by which individuals form new knowledge
    - Creativity: divergent and convergent thinking to produce new ideas
    - Insight: a sudden and unexpected solution to a problem
    - Intelligence: multi-dimensional linguistic-verbal, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal abilities that influence one's approach to thinking and problem solving

    - Problem solving: requires the synthesis or application of the other processes above
    - Critical thinking: includes analysis, inference, interpretation, explanation, and self-regulation
- Presentation of multiple perspectives and ways of knowing/understanding the central topic of the course
- Clear explanation of requirements, especially assessment expectations and grading criteria. Students must understand what they are expected to do, which skills they will need in order to do this, how to apply these skills, and what the instructor will deem to be high-quality work.
- The course should be balanced between the disciplines. A pairing such as chemistry and graphic design should not be overtly skewed towards either discipline. Care should be taken to avoid student perception of the course as either "too science-y" or "too arts-y".
- Support systems for students who will likely be hesitant to learn outside of their personal comfort zones or fields in which they're most conversant. The instructor must plan how to facilitate their willingness to venture into unfamiliar territory.

For more information about curriculum development, see *Curriculum Planning: a Guide for Arts Faculty* (Mackh, 2014)

Proposal

When creating a comprehensive proposal for presentation to the institution's administration, other information in addition to the plan of instruction described above will be needed:

- Budget
- Possible additional funding through grants, donations, or sponsorships
- Anticipated student enrollment
- Required materials and equipment
- Specific considerations for space in which to meet

- Technological requirements
- Community partners
- Guest speakers
- Transportation to field-based activities
- Displacement of standard teaching assignments
- Other factors specific to the particular course

Instructors may want to consider networking with others who have taught interdisciplinary courses, both at their own institution and in other places. Precedents do exist, and being able to tap into the knowledge of people who have traveled down this road before can be advantageous.

Implementation: Conducting Action Research

Presuming the proposed course is being developed as a sustainable, ongoing part of the overall curriculum, instructors should take an analytical approach to their interdisciplinary teaching, especially during the first offering of the new course. One way to achieve a high-quality instructional product is by employing action research. We might consider the first time the course is taught to be a pilot, during which the instructor will gather substantial amounts of data and observations in order to refine the course and develop it further.

Action Research involving an interdisciplinary course generally occurs in four steps:

1. Plan the course
2. Develop a proposal and receive administrative approval
3. Implement and monitor the course
    a. Gather data throughout the course
    b. Employ formative evaluation
    c. Attend to the flow and pacing of topics and activities
    d. Employ summative assessment

4. Revise the course based on data collected and prepare to teach it again, incorporating the changes.

Most of this should be self-explanatory, but two terms require further definition.

1) Formative evaluation is conducted at the start of the course, frequently as a pre-course survey that assesses students' prior knowledge and attitudes. Students are given open-ended questions that they can answer as a homework assignment. The instructor collects these responses and analyzes them in order to determine student's misconceptions, knowledge deficits, and so on, adjusting the plan of instruction to address the findings. Questions could include:

- What is the purpose of this class?
- How do each of the disciplinary areas contribute to this purpose?
- What is interdisciplinarity?
- Why should we participate in interdisciplinary study?
- How will an interdisciplinary approach contribute to the purpose of this class?
- How will we actually *do* interdisciplinary work?

Students could be asked the same questions at the end of the semester, then given back their first paper to see how their responses have changed.

2) Summative evaluation occurs in an end-of-course survey, asking students to respond to statements such as:

- I learned to think in new ways
- I discovered new perspectives or ways of knowing
- I made connections between multiple disciplines
- I used multiple disciplines to gain a deeper understanding of an issue
- I understand what interdisciplinary inquiry is

- I can conduct interdisciplinary inquiry
- I can integrate, balance, and synthesize different perspectives

Action research is a valuable professional tool, providing a means towards purposeful and continuous improvement of pedagogical practice. Many faculty members take to this quite naturally, but others might view the tasks of collecting data and/or implementing formative assessment to be challenging, unnecessary, or troublesome. However, bearing in mind that the goal is to achieve sustainability, treating the first section of the new interdisciplinary course as a pilot and approaching it through the perspective of action research can yield a better educational product and help to ensure that the course will be offered on a regular basis.

Achieving Interdisciplinarity

Despite workplace imperatives that new graduates possess the ability to work as members of interdisciplinary teams, and even factoring in institutional or individual interest in interdisciplinary approaches to learning, achieving the goal of creating courses fitting these expectations is no small matter. Most of these efforts fail before they can even get off the ground or after just one or two iterations of a particular course. Higher education is not well suited to collaboration or interdisciplinarity, even within fields that—at least on the surface—seem to be compatible, such as art and design. We know why interdisciplinarity is a good idea, and we have examined how to plan, prepare, and implement new courses of this type. But what further steps will be necessary in order for interdisciplinary courses to flourish and thrive?

Impediments to Interdisciplinarity

Careful planning is essential, but it occurs within a larger context that has the potential to subvert the best ideas and most laudable intentions.

Faculty and Administrative Concerns

Some of the most significant potential impediments to interdisciplinarity may come from our colleagues and administrators. Generally speaking, the greater a person's level of disciplinary expertise, the more discipline-focused he or she is likely to be. Those who are particularly focused on their own disciplines may be suspicious of courses that they perceive as trivializing, marginalizing, or diluting their subject area, or they may simply be uninterested. Those who seek to include these experts must be especially persuasive, which is another benefit of developing a comprehensive proposal for an interdisciplinary course.

Conversely, those who are most interested in interdisciplinarity might not possess sufficient expertise in the partnering field to provide the depth of knowledge necessary to genuine learning. A faculty member with a degree in ceramics who wants to teach an interdisciplinary course combining the creation of ceramic objects with mechanical engineering should be able to demonstrate sufficient expertise, beyond being a lifelong subscriber to *Popular Mechanics*. (This is a rather exaggerated example, of course, but the principle is valid nonetheless.) On the other hand, a professor of ceramics who formerly worked as a mechanical engineer would be ideally suited to teach such a course. It is difficult for most people to conduct an objective assessment of their own abilities, which is a potential pitfall that must be addressed by administrators charged with the task of approving a proposed course.

Faculty members attempting to develop an interdisciplinary course might encounter resistance from their departmental colleagues if they perceive a non-traditional course as having a negative impact on them personally or on their profession, even if these individuals are not involved in the process. For instance, teaching a new course might mean that a professor is no longer teaching a traditional course for which he or she was formerly responsible, which would mean shifting this task into someone else's workload. Or faculty colleagues may simply disagree with the idea of interdisciplinarity, preferring a traditional mono-disciplinary approach to instruction. These factors must be approached carefully by

departmental administrators in order to avoid the potential for instigating resentment or fostering internal disagreements.

Matters of promotion and tenure are important to all faculty members, but involvement in interdisciplinary courses may present special considerations in performance review. Educational systems are not always equipped to handle professional activities that diverge from expected norms, making the task of evaluating them problematic at times.

Institutional Considerations

Not all interdisciplinary courses will require special accommodations in terms of space to meet, materials, equipment, funding, or other resources. For those that do, however, it is important to assess the availability of such things within the institution. It is also important to ascertain the pertinent policies, procedures, or protocols necessary to launching the course within the existing organizational system. This involves the cooperation of the registrar, departmental administrators, and others who must grant the necessary approvals.

A course cannot take place if students do not register for it. Therefore, generating positive publicity for the new course is important, as is ensuring that students will be able to fit it into their degree plans and semester schedules. For instance, if a proposed Visual Anthropology course (combining photography and anthropology) meets at the same time as a photography course required for graduation in the major, students will find it difficult to enroll in Visual Anthropology no matter how interested they may be.

Flexibility and Resilience

Individuals involved in any new venture must be flexible in their approach so their work will not be derailed by the first roadblock they encounter along the way. Creating a comprehensive plan is a significant accomplishment and is necessary for success; however, this plan cannot be rigid, or the first challenge that arises might put an end to the project. Rather, adopting a resilient outlook, and being

able to engage in creative problem solving when the unexpected inevitably occurs will help to facilitate the successful launch of the proposed interdisciplinary course.

Innovation is rarely easy. For change to occur within an institution as bound by tradition, as contingent upon institutional policy and procedure, and as departmentalized as a university requires no small measure of perseverance or ability to take challenges in stride and accommodate external requirements. If individuals seeking to create interdisciplinary curricula are to be successful, preparing for the challenge by taking a practical, deliberate, yet flexible approach will provide a greater chance of producing a high-quality educational product. Art and design have much to offer in higher education, not only to our majors or in isolated liberal arts requirements, but most especially through interdisciplinary learning opportunities that can be of significant benefit to a wide range of students.