Integrating Liberal Education Perspectives in a Transdisciplinary Design Studio

Marisa Exter, Michael Smith, Colin Gray
Why (to) Integrate Liberal Arts into Technology Degree?
STEM Students Today Should...

• Be aware of the impact of their work with an awareness of “growing social consciousness around the world” to become well-rounded, socially responsible graduates

• Recognize that engineering is intertwined with human needs, values, and social systems

• Be capable of addressing “wicked” ill-structured problems

Technical and Engineering Programs should...

Consider **multiple ABET criteria**, including ⁸
- Effective communication
- Understanding of the impact of engineering solutions in global, economic, environmental, & societal contexts
- Lifelong learning
- Effective functioning on multidisciplinary teams

[⁸ ABET (2017)]
Universities Today Should...

• Understand that **humanities** and social sciences play a **key role** in preparing socially responsible, well-rounded students.

• **Siloing** of higher education makes **systemic integration difficult** at course and program level.

Continuum of Liberal Arts Integration

**Cross-disciplinary:**
Distinct separation of liberal arts and technology courses
Liberal arts are used for *enhancement* of technical education

**Multi/Trans-disciplinary:**
Purposeful seamless integration of liberal arts and technology courses

*Easier, but less successful*  
*Difficult, but more successful*
Integration Challenge: Transfer of Knowledge

• Multiple contexts are **not equal** to transfer \(^{12}\)

• Need to scaffold/guide and engage learners to support high-level transfer (deliberate creation of connection between disciplines) \(^{13}\)

• Draw attention patterns and properties between contexts \(^{14}\)

• Social framing: framing of connection between what is learned and transfer context \(^{15,16}\)

\[^{12}\] Lobato, 2006; \[^{13}\] Salomon & Perkins, 1989; \[^{14}\] Marton, 2006; \[^{15}\] Eagle 2006; \[^{16}\] Eagle, 2011
Our Case Study:
Transdisciplinary Design Studio Environment
Transdisciplinary Undergraduate Program

- Launched in 2014 as a pilot program or an “incubator” in which faculty group could experiment with different approaches to teaching undergraduate students from the College of Technology (and beyond)
- Initiated within Purdue Polytechnic, multidisciplinary faculty group (within and outside the college)
- Strong support from Pres. Daniels as one of the Purdue Moves initiatives
- Key characteristics:
  - Meaningful blend of technology and humanities
  - Student-centered
  - First competency-based undergraduate program at Purdue University
Transdisciplinarity to recognize space above, between, and through disciplines that inform specific actions (i.e., competencies)

Competency to recognize skills and knowledge that can transfer across disciplines in specified ways

Discipline as material with which to think (epistemological lenses)
<table>
<thead>
<tr>
<th>Semester</th>
<th># of Instructors (subset of program fellows)</th>
<th># of Students Enrolled</th>
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</thead>
<tbody>
<tr>
<td>Fall 2014</td>
<td>7 (5 seminar; 2 design lab)</td>
<td>33</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>5 (2 seminar; 3 across 2 design lab-like experiences)</td>
<td>13</td>
</tr>
<tr>
<td>Fall 2015</td>
<td>4 (2 seminar; 2 design lab)</td>
<td>8</td>
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<tr>
<td>Spring 2016</td>
<td>6 (4 seminar, not all present for all sessions; 2 design lab)</td>
<td>7</td>
</tr>
<tr>
<td>Fall 2016</td>
<td>3 (merged experience)</td>
<td>8</td>
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Seminar

• To foster creativity, empathy, critical thinking, productive risk-taking, and communication skills across the domains through
  • exploring and addressing global issues using a range of disciplinary lenses and forms of knowledge with guidance and feedback from the faculty.
• An open learning and discussion space, facilitated by the faculty, for students to engage with multi-disciplinary topics across humanities, social sciences, and technology.
Design Lab: Studio Model

- To engage students in real-world, “wicked” projects that required the application of multiple skills and knowledge domains
  - Project-centered
    - Project sequences of varied lengths and complexity
    - Projects would increase in scope and complexity over time, becoming increasingly driven by students’ interests and combinations of disciplinary knowledge
  - Regular formative feedback
<table>
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<tr>
<th>Year</th>
<th>Program design</th>
<th>Merging Existing Core Course Experiences</th>
<th>Parallel Liberal Education and Technology Course Experiences</th>
<th>Unifying Liberal Education and Technology into a Single Experience</th>
</tr>
</thead>
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<td>2013</td>
<td>Faculty fellows Plan: to merge pedagogical approaches traditional to the humanities (seminar) and visual/performance arts and design disciplines (studio)</td>
<td>Program launch</td>
<td>Challenges to implement ideal vision</td>
<td>Revised model: refined scope &amp; hours</td>
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<td>2014-2015 a.y.</td>
<td>Merging Existing Core Course Experiences</td>
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<td><strong>Seminar = 7 credit h</strong> (English, digital tech, communication, information literacy)</td>
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<td><strong>Design lab = 4 credit h</strong> (intro to technology and design)</td>
<td>Revised model: refined scope &amp; hours</td>
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**Integration Timeline**

- Seminar = 7 credit h (English, digital tech, communication, information literacy)
- Design lab = 4 credit h (intro to technology and design)
- Initial focus on multi-disciplinarity
- One area focus in LA and one in technology
- Disciplinary knowledge from outside courses
- Continued focus on multi-disciplinarity
- Studio: Merged seminar and design lab into
Merging Existing Purdue Core Course Experiences (Fall 2014)
• Seminar: 7 credit hours - English, Communication, Digital Technology, & Information Literacy. Co-taught by 5 faculty members

• Design lab: 4 credit hours - intro to technology and design. Co-taught by 2 faculty

Challenges:
• Scaffolding & clear instructions
• Merging of disciplines
• Perception of liberal arts being *in service* to technical courses
2015-2016: Parallel Liberal Education and Technology Course Experiences
• **Four-year degree program** with seminar & design lab being prominent but **smaller in scope**

• Seminar and design lab kept separate to provide **access to different pedagogies, projects, and faculty**

• **Content:** a focus area in LA and technology each, domain knowledge from outside courses

• **Co-teaching:** an equal representation of faculty from both areas

• **Knowledge transfer:** onus on students to connect and transfer materials

• Initial **joint design of topical areas** for both courses, but independent course development
Faculty Observations

• Some student engagement in humanities-related topics
• Perception that humanities are yet again in service to design work
• Lack of shared understanding of what to teach and how
Student Perceptions

“It kind of feels like they've **blurred the lines** between our design lab and seminar. It's actually **nice** because it makes it **harder to differentiate between the two**. I liked the classes have somewhat blurred together just because it makes them feel like they're still a single part of the course, whereas previously it felt like, ‘Here's this part of the course, here's this course, here's this course.’”
Student Challenges

- Broad open-ended assignments
- Lacking self-directed learning skills
- Lacking interest in reading/writing
- Large workload in 2 credit hour seminar
- Dislike of seminar focal areas (e.g., feminism)
- Perceived divide between seminar and design lab even with more interconnected topics
- Perceived single specialties of faculty (e.g., surprise when an English professor also had a degree in economics) in a co-teaching model
2016-2017: Unifying Liberal Education & Technology into a Single Experience
• Studio - merged seminar & design lab - an integrated experience intended to continuously bridge and synthesize knowledge from across the humanities with technical content in a single project-based curriculum

• Focus on the equal value of humanities and technical content

“There's no boundary on what we [faculty] hope they get out of them. Specifically, the themes included range from everything: from dystopian studies to sexuality to technology as a handicap to technology as a tool against/weapon for societal inequality. Ideally, a literary analysis will cross an unspecified number of things to create a larger thread of discussion.” (Faculty)
Faculty Observations

• Student were more successful
  • In part, due to maturity
• Establishment of liberal arts as “something of the norm”
• Belief that a merged experience will allow for more natural connections
• BUT uneven reception and application of disciplinary perspectives
Student Perceptions

“I like the humanities side of this class a lot because it's human interaction and cyber technology. To understand the users so you can design stuff that are useful to them [and] will have a huge impact on his personal life, social life, his dating life, his everything. You just realize that you have this empathy. That's what drives you to design better products for other people. I love it.”
Main Takeaways
Barriers to Systematic Integration of LA and Technology

Institutional Level
- Formation of a transdisciplinary team
- Lack of enrollment in traditional LA courses as a roadblock

Faculty Level
- Perception of liberal arts in service to tech & design (cross-disciplinarity)
- Complications due to lack of awareness of differing connotations of key terms and concepts.

Student Level
- Strong divide: Humanities (“fluffy”) v. technology (“building stuff”)
- Not seeing faculty as multi-disciplinary professionals
- Poor behaviors “taught” during our earlier iterations
**Successes**

- Movement towards our original goals of a spiralling curriculum that truly integrates humanities, technology, and other disciplines.
- Iteration of program design has allowed us to improve students’ experience
- Students are starting to really “get” it
- Lessons learned being integrated into new four year model
  - Scaffold development of underlying skills and deep understanding of transdisciplinarity across the program
  - Help students to connect disciplinary focus areas and competencies to move towards personal and professional goals
Recommendations

• (Re)consider boundaries/dichotomy between humanities and technology???

• Be conscious of drawbacks to siloing and modularization

• Provide sufficient scaffolding

• Make sure you don’t teach “bad behaviors”

• Be willing to contemplate different roles for faculty, including different types of faculty autonomy (i.e. more freedom of topic and content, more standardization of teaching practices to provide a coherent program-long experience and development of underlying competencies such as critical thinking, empathy, and life-long learning)
Contact Info:

Marisa Exter: mexter@purdue.edu
Michael Smith: smith859@purdue.edu
Colin Gray: gray42@purdue.edu
References


