Integrating Liberal Education Perspectives in a Transdisciplinary Design Studio

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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 [1]

- Recognize that **engineering** is **intertwined with human needs, values, and social systems** [2,3,4]

- Be capable of **addressing "wicked" ill-structured problems** [5,6,7]

[1] Oberst and Jones (2003); [2] Bucciarelli (1994); [3] Hynes & Swenson (2013); [4] Campbell (2013); [5] Oyugi, 2015; [6] Rugarcia et al., 2000; [7] Vest, 2010

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 [9]

- **Siloing** of higher education makes **systemic integration difficult** at course and program level [10,11]

[9] Mishra & Ahlot (2012); [10] Bordogna, Fromm & Ernst (1993); [11] Russell & Wickson (2008)

Continuum of Liberal Arts Integration

Easier, but less successful

Difficult, but more successful

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

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
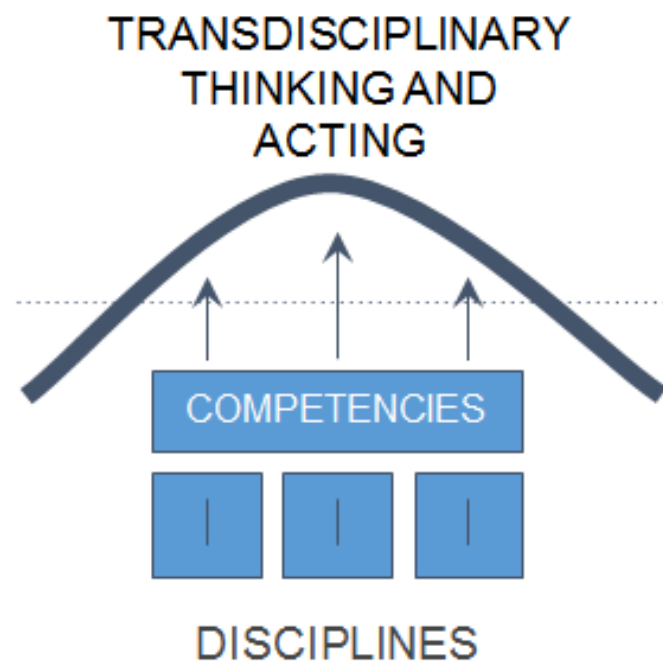
Instructors & Students

Semester	# of Instructors (subset of program fellows)	# of Students Enrolled
Fall 2014	7 (5 seminar; 2 design lab)	33
Spring 2015	5 (2 seminar; 3 across 2 design lab-like experiences)	13
Fall 2015	4 (2 seminar; 2 design lab)	8
Spring 2016	6 (4 seminar, not all present for all sessions; 2 design lab)	7
Fall 2016	3 (merged experience)	8

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

2013	2014-2015 a.y.	2015-2016 a.y.	2016-2017 a.y.

Integration Timeline

2013	2014-2015 a.y.	2015-2016 a.y.	2016-2017 a.y.
Program design	**Merging Existing Core Course Experiences**	**Parallel Liberal Education and Technology Course Experiences**	**Unifying Liberal Education and Technology into a Single Experience**
Faculty fellows	Program launch		
Plan: to merge pedagogical approaches traditional to the humanities (seminar) and visual/performance arts and design disciplines (studio)	Challenges to implement ideal vision	Revised model: refined scope & hours	Continued focus on multi-disciplinarity
	Seminar = 7 credit h (English, digital tech, communication, information literacy)	Initial focus on multi-disciplinarity	*Studio*: Merged seminar and design lab into
	Design lab = 4 credit h (intro to technology and design)	One area focus in LA and one in technology	
		Disciplinary knowledge from outside courses	

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)

Q&A

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