Interdisciplinary Learning in General Education

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Susan Elrod, Project Kaleidoscope

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Whether we take a stance on the stem cell research controversy, interpret a work of art in a new medium, or assess the reconstruction of Iraq, a deep understanding of contemporary life requires knowledge and thinking skills that transcend the traditional disciplines. Such understanding demands that we draw on multiple sources of expertise to capture multi-dimensional phenomena, to produce complex explanations, or to solve intricate problems.

– Veronica Boix Mansilla

“Assessing Student Work as Disciplinary Crossroads”

(2005)
Program Types in the Project

- A few beyond STEM
- Many beyond STEM
- Many STEM
- A few STEM
- Campus-wide
1. Start by articulating a common understanding of STEM interdisciplinary learning goals that will drive the cycle of curricular innovation, development, assessment, and improvement.
“You’ve got to want to connect the dots, Mr. Michaelson.”
Interdisciplinary Learning Goals
By Keck/PKAL TEAMS

- Recognize disciplinary strengths, process, limitations, and perspectives.
- Purposefully connect and integrate knowledge and skills from across disciplines to solve problems.
- Synthesize and transfer knowledge across disciplinary boundaries, even beyond the STEM disciplines, in the context of novel situations.
- Be agile, flexible, reflective thinkers who are comfortable with complexity and uncertainty, and can apply their knowledge to respond appropriately and positively.
- Understand that other factors—cultural, political, ethical, historical, and economic—must be considered when addressing the complex problems of this century.
- Apply their capacity as integrative thinkers to solve problems in ethically and socially responsible ways.
- Prepare for future learning as lifelong learners in their careers and as citizens.
- Think critically, communicate effectively, and work collaboratively with others within diverse cultures and communities.
Levels of Shared IDL Vision

Institution

Division/College

Department

0  2  4  6  8  10  12

Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Assessment

2. Use assessment to connect interdisciplinary learning goals with program structure, content, and pedagogy, paying attention to students as individual learners who come with diverse backgrounds, experiences, expectations, career aspirations, and goals.
ASSESSMENT INSTRUMENTS from Project Teams

AAC&U VALUE RUBRICS
BSES
Biology Self-Efficacy Scale
CLA
Collegiate Learning Assessment
CURE
Classroom Undergraduate Research Experiences
FLAG
Field-Tested Assessment Guide
FSSE
National Survey of Student Engagement
NSSE
National Survey of Student Engagement
RISC
Research Integrated Science Curriculum
SALG
Student Assessment of Learning Gains
SURE
Summer Undergraduate Research Experiences
VASS
Views About Science Survey

RISC: David Lopatto, *et al.* (w/ HHMI funding as well)
What might we learn from RISC?

Once survey validity is more established, we will query RISC data with more “profound” questions.

**EXAMPLE:** What are the relationships between degree of independent learning (pedagogy), student attitudes about nature of science, and courses with a focus on complex ID problems or systems?

RISC: David Lopatto, et al.
Learning Goals:
Items from Faculty survey common to “high” ID courses

• Students learn to ask "big questions" that implicate more than one discipline in a solution.
• Students learn about two (or more) disciplines so that new insights emerge from considering them together.
• Students learn to find similarities and differences between disciplines or fields of study.
• Students study problems with multiple causes that operate simultaneously and interactively.

RISC: David Lopatto, et al.
Pedagogies: Items from Faculty survey common to “high” ID courses

- Students engage in **class discussion**
- Students spend the entire course on **one or a few problems**
- Students work on **problems that have no clear solution**
- Students learn about **two (or more) disciplines so that new insights emerge from considering them together**
- Students have input on **design of a project**

RISC: David Lopatto, *et al.*
3. Build a critical of mass of faculty, from within and with new hires, that assumes leadership responsibility in the iterative process of shaping interdisciplinary curricular and co-curricular approaches and in assessing the impact of those approaches on undergraduate STEM learners.
Factors Facilitating the Change Process

Top five for all responses shown:
- Strong teams
- Leadership support
- Shared vision
- Resources
- Incentives
4. Incorporate interdisciplinary program needs into the processes of campus governance and resource distribution—financial, personnel, equipment, and spaces.
Resource Strategies

• Ensure interdisciplinary programs have the same rights and accountability responsibilities.

• Ensure that interdisciplinary program faculty and directors are present at key budget, planning and governance meetings.

• Create transparent financial policies.

• Create governance documents or memorandums of understanding.

• Visibly support interdisciplinary projects with travel funds, meeting space, and course release.

• Leverage indirect costs from interdisciplinary grants.
Institutional Alignment

5. Align interdisciplinary learning with the institutional vision, mission, and identity, as well as in strategic planning processes at all levels.

“Another important lesson from this project is that institutions tend to overestimate barriers and that this overestimation can be a deterrent. Change agents tended to believe that there would be incredible campus resistance. The lesson learned from FIDL campuses is that while barriers should not be ignored, they should not overwhelm campus leaders.” — Kezar and Elrod, 2011
Barriers

• Departmental teaching obligations (with 84% of campuses marking this as “difficult” or “very difficult”)

• Risk- or change-averse culture (75%)

• Lack of resources (75.0%)

• Absence of incentives and rewards (with 66% indicating this as “difficult” or “very difficult”)

INTERDISCIPLINARY & INTERPROFESSIONAL
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Process for Building and Sustaining Interdisciplinary Programs

This process takes 5-10 years!