If project-based learning is the answer, what’s the question?

Randy Bass
(Georgetown University)

WPI Project-based Learning Institute
June 19, 2019
Presentation Outline

- Risk
- Wine
- What’s the problem?
- More wine
- The future of everything
To engage in learning always entails the risk that learning might have an impact on you, that learning might change you. This means that education only begins when the learner is willing to take a risk.

Gert Biesta

educator
Launched in 2016, the Regents Science Scholars Program provides support for first-generation college students majoring in biomedical fields.
Summer before the first year:
Students enroll in a residential summer bridge program

Every subsequent summer:
Students take specially designed online modules to focus learning, while allowing students to work and be home with their families.
The Goal-Problem Cycle

Goal

Diversity and inclusion

Problem

High rates of under performance and attrition
The Goal-Problem Cycle

Goal

Problem

Build a summer bridge program

High rates of under performance and attrition
The Goal-Problem Cycle

Goal: Build a summer bridge program

Problem: Underwhelming outcomes
The Goal-Problem Cycle

Goal
Build a better summer bridge program

Problem
Underwhelming outcomes
The Goal-Problem Cycle

Goal

Problem(s)

Build a better summer bridge program

“We had been focused on fixing deficits, not building strengths.”
The Goal-Problem Cycle

Focus on:
- Professional identity
- Impact
- Agency
- Community

We had been focused on fixing deficits, not building strengths.
Glen Manor
Feral Wine Project
For a few years I have wanted to try un-inoculated fermentations. Called Feral fermentations because yeast come from a multitude of sources, the vineyard, the cellar, in the air and different yeast strains get together to create new yeast strains, all of which can impact a wine in very complex and interesting ways. After a few years of small and successful trials, in 2016 I finally had the right conditions and enough nerve to explore this on a much larger scale in our red wine program. To better learn, we also performed our normal commercial yeast fermentations and now have wines of the same grape variety and planting fermented using both methods.

I would like you to taste these wines.

You are cordially invited into our cellar for our Spring Barrel Tasting, to taste and learn about these yeast trials that we conducted with our 2016 red wines. We will lead you through stations where at each stop you will taste and compare two wines exhibiting how yeast can affect a wines aroma, flavor, structure and style.
“We covered everything we would have covered just in the context of this project.”

“They were surprised and daunted that they were the research team. But within one day the most common phrase was, “what would help Jeff?”

Professor Heidi Elmendorf, Biology Director, Regents Science Scholars Program
Good Morning,
I have been thinking about the design of the lab all night. And I think I have an understanding now after reading the material all over again.

My suggestion is to create an experiment with like 20 control groups and tests. I would number the different locations that the microbes are found (on grape, leaf, soil, etc.) then organize them into hypothetical dishes. This way hypothetically speaking I will create multiple juices using different combinations of the microbes...This would help me keep track of them, and allow me to distinguish one group from another.

Does this seem possible?

Can this lead me to understanding its flavor profile, giving Jeff the best possible taste?

All the best,
Nohad W
1-4: Purcellville-Tankerville Complex, 15-25% slope
5-8: Tankerville-Purcellville Complex, 15-25% slope
9-10: Myersville Silt Loam, 2-7% slope
11-12: Philomont-Tankerville Complex, 7-15% slope
13-14: Purcellville-Tankerville Complex, 15-25% slope
15-16: Purcellville Loam, 15-25% slope
Regents Science Scholars

In three years, the number of first gen/low income students in biomedical majors has increased 5x.

>20% of the matriculating class of Biology majors are first-gen, low-income students
What is this case a case of?
The Goal-Problem Cycle

Goal

Diversity and inclusion
Deepen learning outcomes
Prepare students for career resilience
Differentiating your institution

Problem

High rates of under performance and attrition
Lack of student engagement
Balance liberal & professional
Constrained resources
What is the goal <-> problem cycle you are thinking about for this week’s Institute?
What is this case a case of?
The First Quadrant: Inclusive and Integrative
The First Quadrant: Inclusive and Integrative
Project-based Learning matters because this quadrant matters.

Focus on:
- Professional identity
- Impact
- Agency
- Community
STEM faculty who believe ability is fixed have larger racial achievement gaps and inspire less student motivation in their classes

Elizabeth A. Canning*, Katherine Muenks†, Dorainne J. Green, Mary C. Murphy*

An important goal of the scientific community is broadening the achievement and participation of racial minorities in STEM fields. Yet, professors’ beliefs about the fixedness of ability may be an unwitting and overlooked barrier for stigmatized students. Results from a longitudinal university-wide sample (150 STEM professors and more than 15,000 students) revealed that the racial achievement gaps in courses taught by more fixed mindset faculty were twice as large as the achievement gaps in courses taught by more growth mindset faculty. Course evaluations revealed that students were demotivated and had more negative experiences in classes taught by fixed (versus growth) mindset faculty. Faculty mindset beliefs predicted student achievement and motivation above and beyond any other faculty characteristic, including their gender, race/ethnicity, age, teaching experience, or tenure status. These findings suggest that faculty mindset beliefs have important implications for the classroom experiences and achievement of underrepresented minority students in STEM.
Project-based learning matters because this quadrant matters.

Growth mindset.
The whole person matters.
Educating the whole person?

Knowledge + Skills + Dispositions (+ Values)

Dispositions:
- Learning to learn
- Critical thinking
- Creativity
- Curiosity
- Resilience
- Empathy
- Humility
- Ethical Judgment

Striving to cultivate a balanced person, with intellectual, affective, imaginative and reflective capacities.

- Design environments where they are more likely to be cultivated.
- Unscripted contexts, guided inquiry and experience.
- “High-impact practices.”
Project-based learning lives here.

Image from John Seely Brown, “Minds on Fire” (2008)
What Matters in the first quadrant?

Judgment in uncertainty.
Relationships and mentors.
Purdue-Gallop Poll on Engaged Work and Flourishing

Life in College Matters for Life After College

New Gallup-Purdue study looks at links among college, work, and well-being

by Julie Ray and Stephanie Kafka

WASHINGTON, D.C. -- When it comes to being engaged at work and experiencing high well-being after graduation, a new Gallup-Purdue University study of college graduates shows that the type of institution they attended matters less than what they experienced there. Yet, just 3% of all the graduates studied had the types of experiences in college that Gallup finds strongly relate to great jobs and great lives afterward.
Whether students think it matters, matters.
Project-based learning matters because this quadrant matters.

Growth mindset.
The whole person.
Relationships and mentors.
Judgment in uncertainty.
Doing work that matters.
The future of higher education, and indeed the very survival of your institutions, largely pivots on what you will be doing the next three days.
The future of higher education, the very survival of your institutions, and potentially the future of humanity, largely pivots on what you will be doing the next three days.
Humans in the age of artificial intelligence.

“The human labor market will center on three kinds of work: solving unstructured problems, working with new information (including complex communication), and carrying out non-routine manual tasks.”
The Future of Jobs Report 2018

Growing

- Analytical thinking and innovation.
- Active learning and learning strategies.
- Creativity, originality and initiative.
- Technology design and programming.
- Critical thinking and analysis.
- Complex problem-solving.
- Leadership and social influence.
- Emotional intelligence.
- Systems analysis and evaluation.

How does an entire university work together to have a culture that values and cultivates these?
ROBOT-PROOF

HIGHER EDUCATION IN THE AGE OF ARTIFICIAL INTELLIGENCE

JOSEPH E. AOUN
Humanics

The New Literacies
- Technological Literacy
- Data Literacy
- Human Literacy

The Cognitive Capacities
- Critical Thinking
- Systems Thinking
- Entrepreneurship
- Cultural Agility
Joseph Aoun, Robot-Proof

We have seen that when learners put their knowledge into practice in real-life situations, they develop a better understanding of themselves, their strengths and weaknesses, and their drives and possibilities. They also sharpen their cognitive capacities, leading to the robot-proof qualities of creativity and mental flexibility—both aspects of far transfer.
By contrast, no computer has yet displayed creativity, entrepreneurialism, or cultural agility. And although machines are continually improving in their ability to map knowledge onto recognizable problems—in other words, improving in their near transfer abilities—they cannot perform far transfer well, at least not in the infinite contexts of real life.
As machines get better at being machines, the primary purpose of higher education has to be helping humans get better at being human.
Project-based learning matters because this quadrant matters.
Education is very much like winemaking
“Craft” is integral to education, no matter the scale.

Project-based learning is the essence of the “craft” of education.
Focus on:
- Belonging
- Professional identity
- Impact
- Agency
- Community
High-impact learning
Reshaping teaching as a team sport
‘Educative assessment’

Inclusive Excellence

Dis-Integrative

Z-axis
“Quality”

Goal
Problem

Exclusive Excellence

Integrative

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Problem

Exclusive Excellence

Integrative
As machines get better at being machines, the primary purpose of higher education has to be helping humans get better at being human.
How does your project fit here?

Integrative

Inclusive Excellence

Dis-Integrative

Exclusive Excellence

Z-axis “Quality”

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This means that education only begins when the learner is willing to take a risk.

educator

Gert Biesta
Thank You and Good Luck!

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