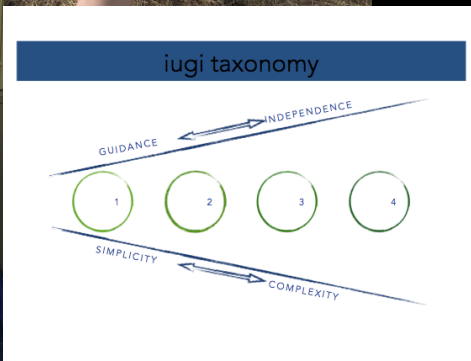# If project-based learning is the answer, what's the question?

Randy Bass
(Georgetown University)

WPI Project-based Learning Institute
June 17, 2020

Questions of this moment

How can we apply our understanding of learning to scaling and sustaining quality education to everyone, equitably?

How can education play an ever meaningful role in creating a more just society and fostering a sustainable human future?
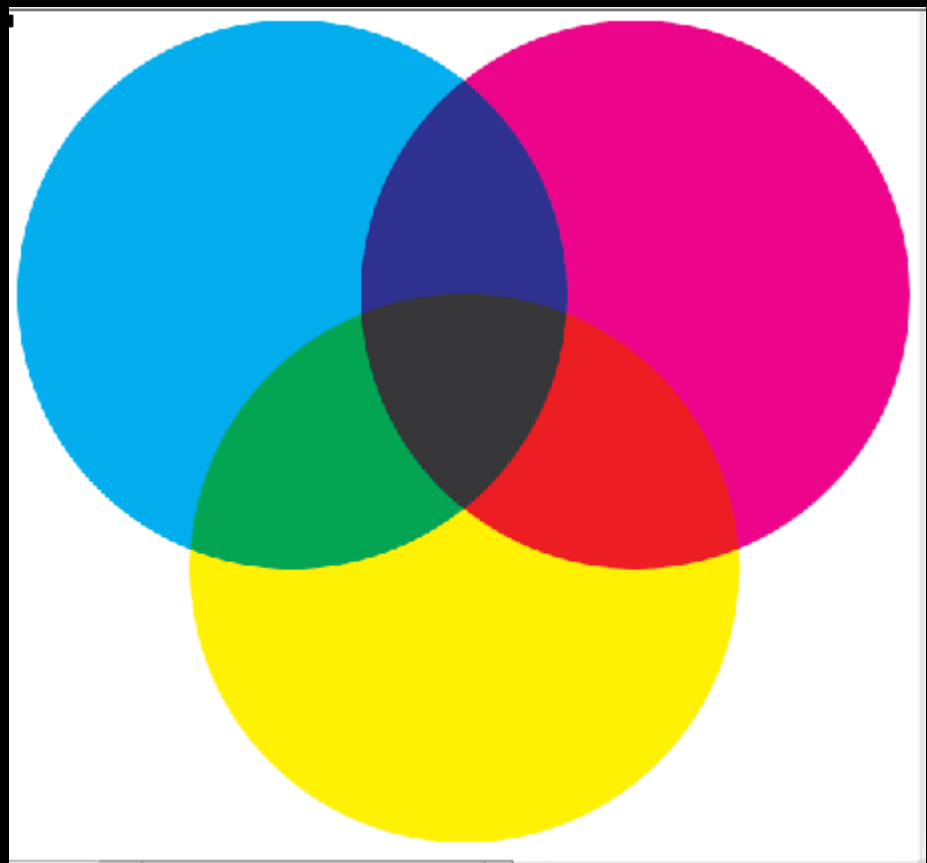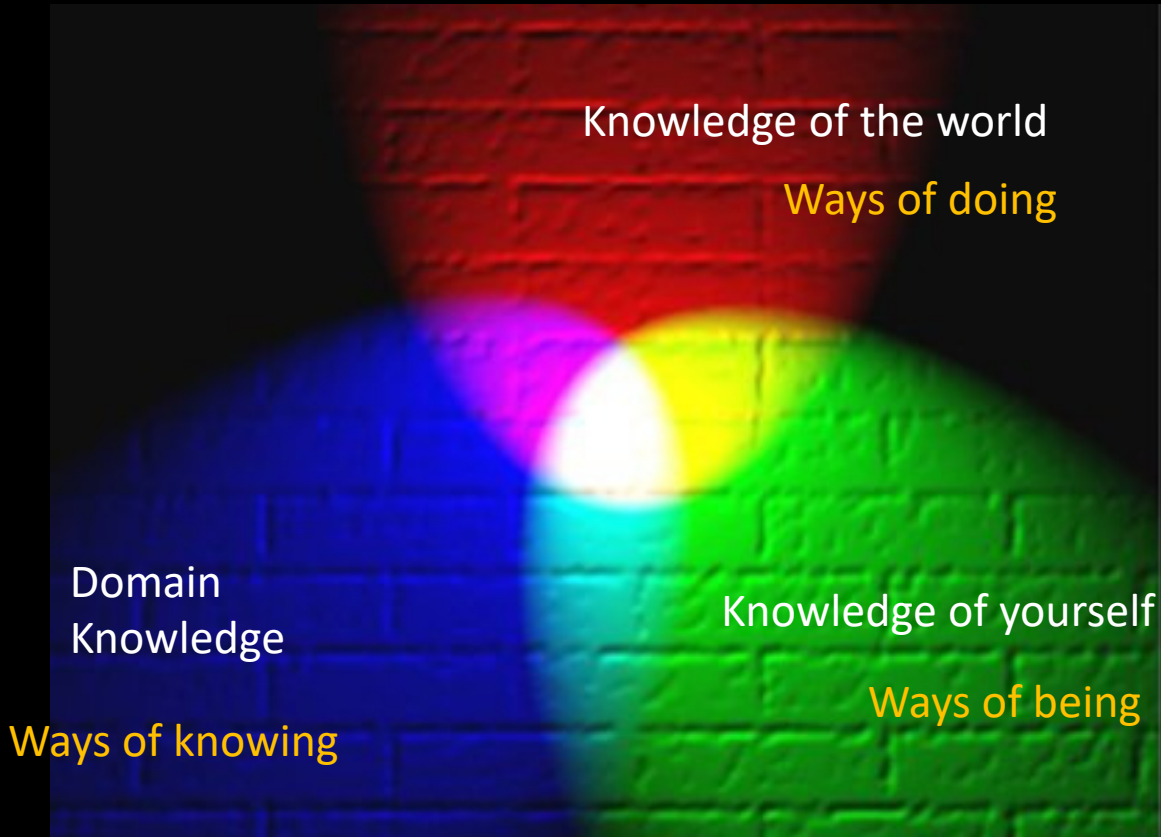
Knowledge of a domain

Knowledge of the world

Knowledge of yourself

Heidi Elmendorf, Ph.D.
Biology, Georgetown

Signature paradigm for the future of higher education?

The space of integrative applied learning: formation, transformation and whole student development

Great Problems Seminar

The Great Problems Seminar (GPS) is a two-term course that immerses first-year students into university-level research and introduces them to the project-based curriculum at WPI. The course gives students and faculty the opportunity to step outside their disciplines to solve problems focused on themes of global importance, culminating in annual Poster Presentation Days that celebrate students' innovative research on a wide range of solutions to some of the world's most critical challenges.

TEN YEARS OF THE GREAT PROBLEMS SEMINAR

Teaching Students to Care

Finding Humanitarian Solutions to Real-World Problems

Great Problems Seminar

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← UNDERGRADUATE STUDIES

GREAT PROBLEMS SEMINAR

TEN YEARS OF THE GREAT PROBLEMS SEMINAR

Extinction: Who Will Survive?

Heal the World

Humanitarian Engineering: Past & Present

Designing Progress: Living on the Edge

Food Sustainability

Ignorance is Not Bliss: Can Schools and Technology Help?

WPI Great Problem Seminars

The Great Problems Seminar (GPS) is a two-term course that immerses first-year students into university-level research and introduces them to the project-based curriculum at WPI. The course gives students and faculty the opportunity to step outside their disciplines to solve problems focused on themes of global importance, culminating in annual Poster Presentation Days that celebrate students' innovative research on a wide range of solutions to some of the world's most critical challenges.

Goals:
- Engage first-year students with current events, societal problems, and human needs;

- Require first year students to perform/produce critical thinking, information literacy, and evidence-based writing;

- Devote time and attention to nurture the development of professional skills including effective teamwork, time management, organization, and personal responsibility.

Ethnic Food Market Assignment

Ethnic Markets/Food Costs

Goals of this assignment: By the end of this assignment you will know a bit more about Worcester, and you will have a broader awareness of the constraints on food choices imposed by income, geographic location, and cultural preferences as well as the impact on nutrition. (Plus you might have a greater appreciation for whomever it was in your family who did the shopping and meal prep in your household.)

Ethnic Food Market Assignment

Ethnic Markets/Food Costs

You have been divided into groups and assigned 2 amounts of money, either $90 and $120 or $90 and $150. Each group has also been assigned a local market. Go to your assigned market and determine what you would buy to feed a family of 4 for a week if you had only $90. Then decide what you would do differently if you could spend the larger amount of money (either $120 or $150). … *Your primary consideration* is to keep your family from being hungry; this means meeting the caloric needs of the family for the week.

MEKONG MARKET PROJECT

Our Store

For our project, our group took an Uber to Mekong Market. This store is known for selling international foods primarily from Asia while also selling the typical vegetables, fruits, meats, and other common items found in all grocery stores. The store is small, has a small parking lot, and seems to be in a low- income neighborhood. The median income in the neighborhood around the market is $31,500. The ethnicity of the residents in the area are 38.9% Hispanic, 40.8% White, 16.6% Asian, 3.1% Black, and 0.7% Multi-race. The median resident age is 25, almost 40% of the residents are in poverty, and about 20% are unemployed.

Our Trip

Our trip took place on Friday the 8th, and we got there in an Uber which we all split the costs for. We drove for about 10 minutes through the neighborhood around the Mekong Market and then we got dropped off in front of the store. Getting there

$80 Budget			
Cal/person			
M	F	C (8)	C (6)
550	412	321	275
1398	1049	816	699
472	354	276	236
2421	1816	1412	1211

$150 Budget				
Cal/person				%
M	F	C (8)	C (6)	All
539	404	314	269	
1407	1055	821	704	
481	361	281	241	
2427	1820	1416	1214	

Male	Female	Child 8y/o	Child 7y
2400	1800	1400	120
0.3529	0.2647	0.2059	0.176
480	360	280	24
1440	1080	840	72
480	360	280	24

MEKONG MARKET PROJECT

Signature paradigm for the future of higher education?

Knowledge of the world

Ways of doing

Domain
Knowledge

Knowledge of yourself

Ways of knowing

Ways of being

The space of integrative applied learning: formation, transformation and whole student development

Small Group Breakout Discussions

What is at stake for you in focusing on project-based learning?

Has that changed or deepened over the recent weeks?

Knowledge of the world

Domain Knowledge

Knowledge of yourself

What does it look like to design for this white space? What is possible here?

❖ Empowerment

❖ Equity
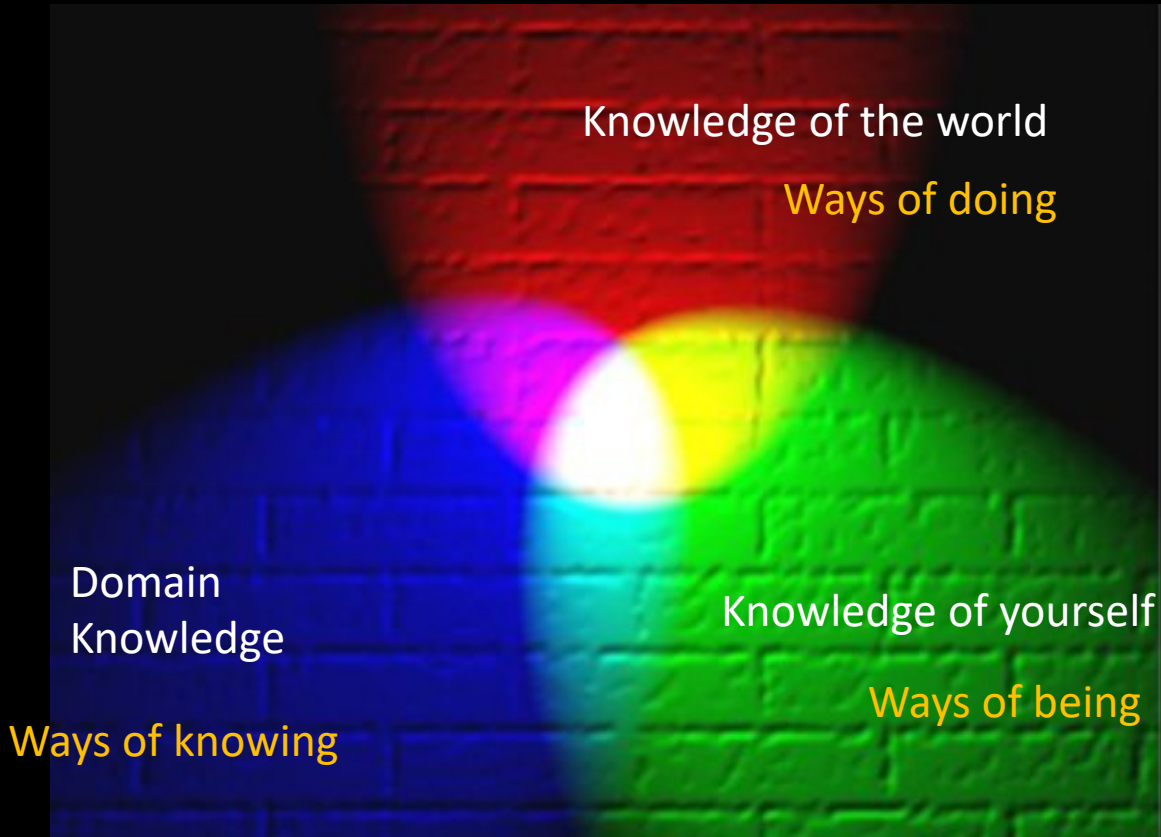
❖ Agency

❖ Well-being

❖ Responsibility

❖ Openness

The future of higher education, and indeed the very survival of your institutions, largely pivots on what you will be doing during this institute.

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 during this institute.

Signature paradigm for the future of higher education?

Knowledge of the world

Ways of doing

Domain
Knowledge

Knowledge of yourself

Ways of knowing

Ways of being

The space of integrative applied learning: formation,
transformation and whole student development

2030: Designing for *context* not content

What will the conditions of knowledge, technology, learning and work be in 10-15-20 years?

What kind of graduate would we want to produce?

iugi

/yoo-gee/

naman delbert esi

iugi: unlock the future

WHAT IF GEORGETOWN COULD PROMOTE KNOWLEDGE SYNTHESIS THROUGH COLLABORATIVE PROJECTS FROM DAY 1 TO GRADUATION, INVOLVING STUDENTS, PROFESSORS, STAFF AND PRACTITIONERS?
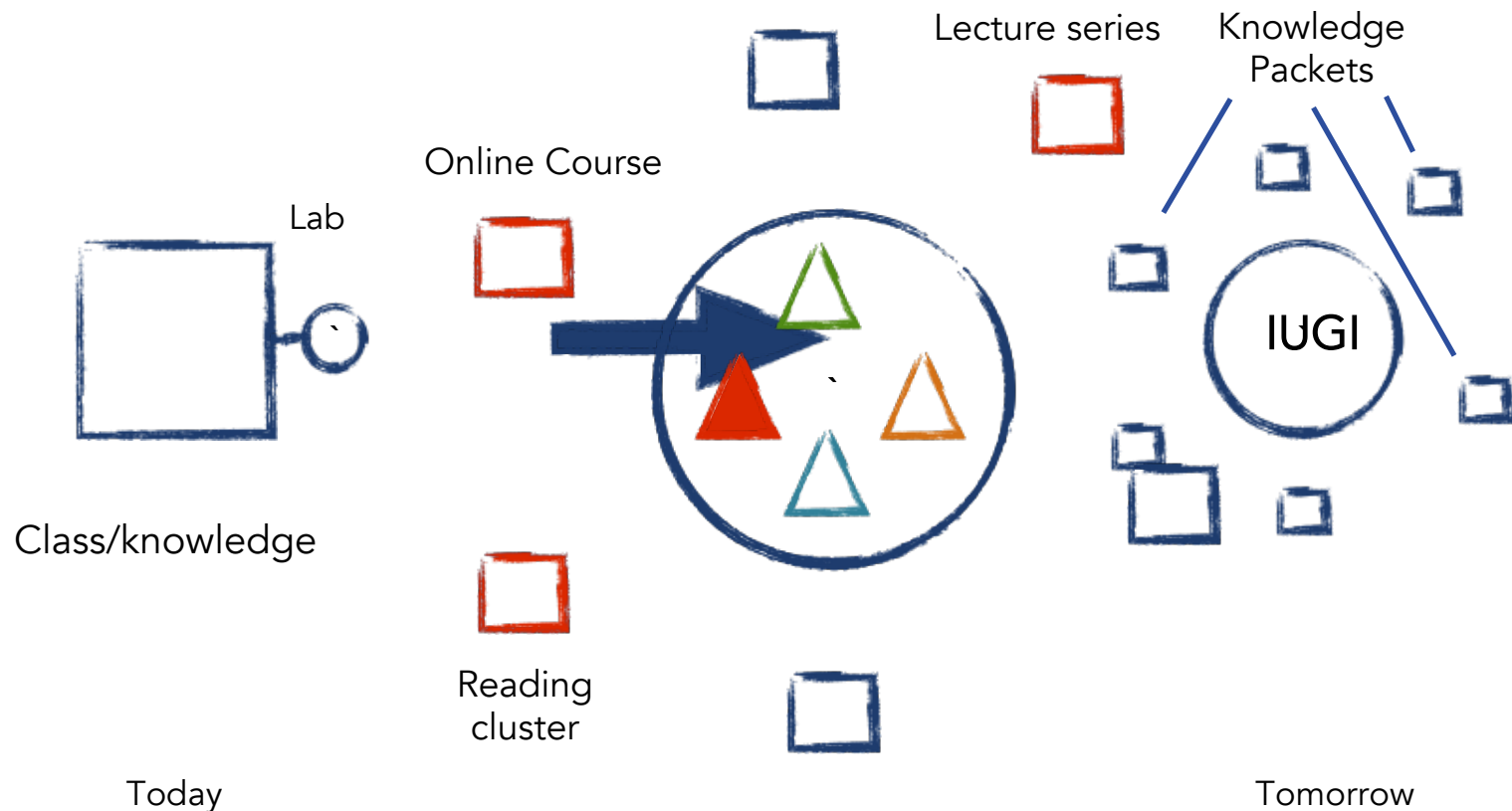
SYSTEM FEATURES

IUGIS

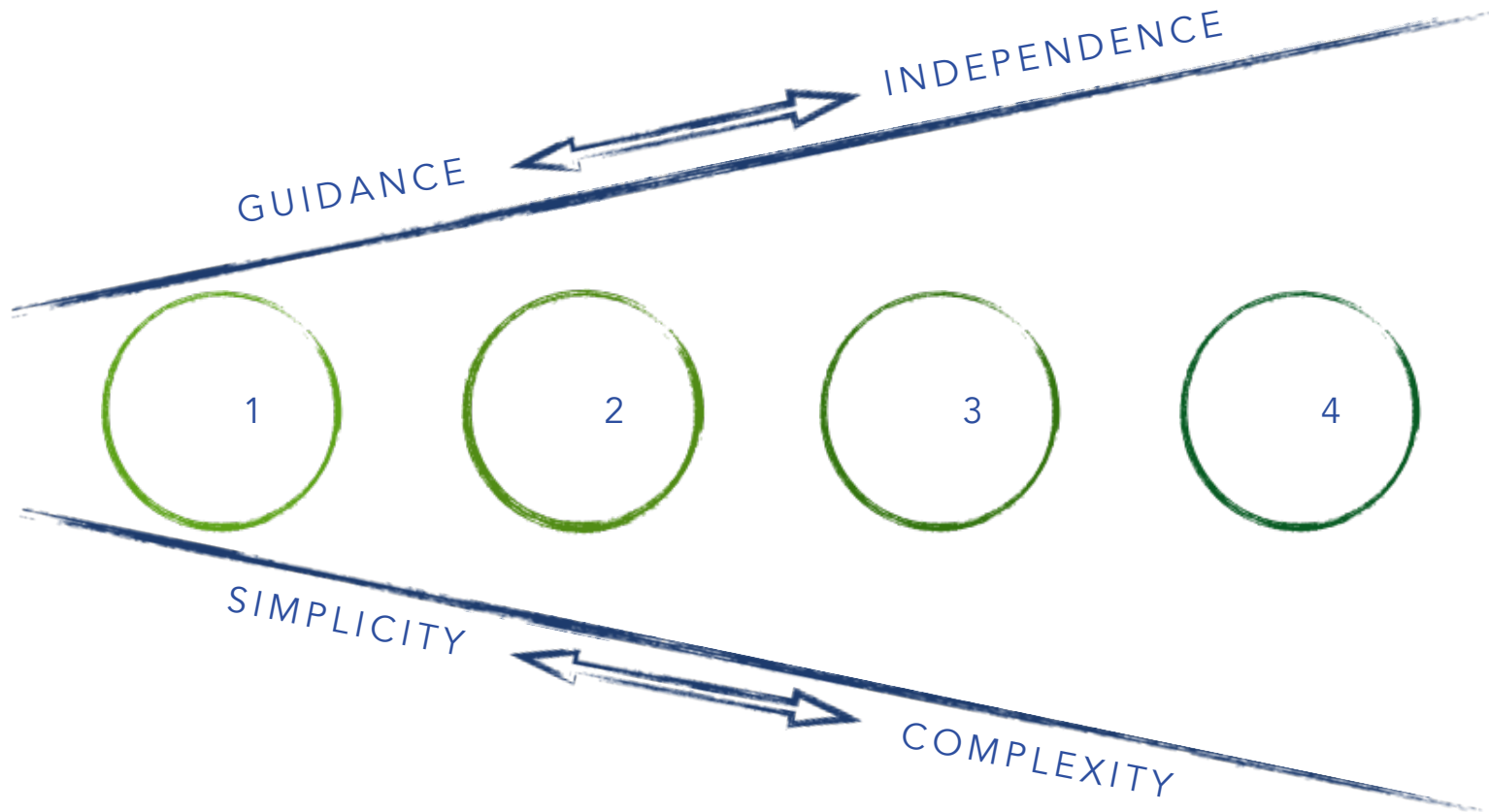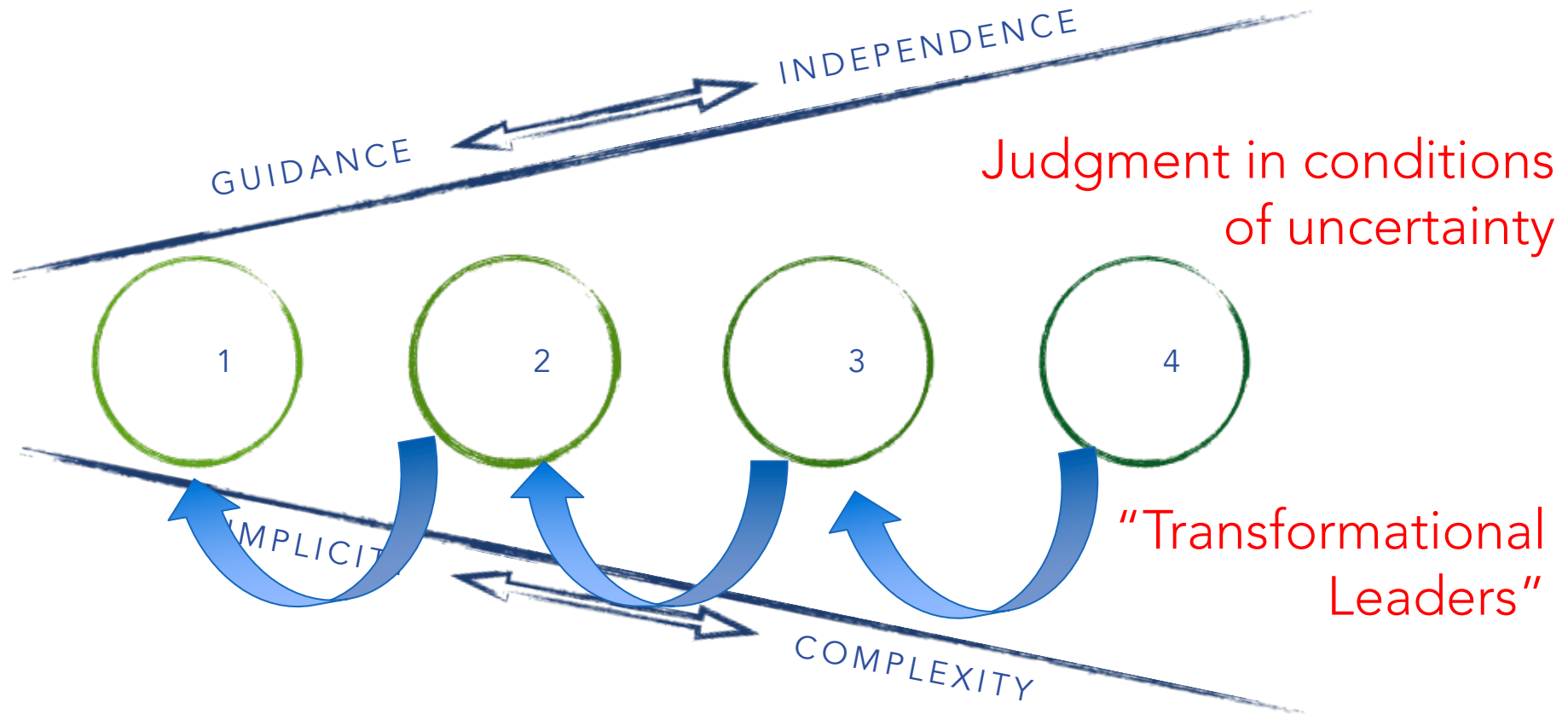UNLOCKING MECHANISM

SKILLS-BASED CORE

DASHBOARD

PORTFOLIO

iugi

Iugis are project families that reverse the course-centric learning model.

Lecture series

Knowledge Packets

Online Course

Lab

IUGI

Class/knowledge

Reading cluster

Today

Tomorrow

iugi taxonomy

INDEPENDENCE

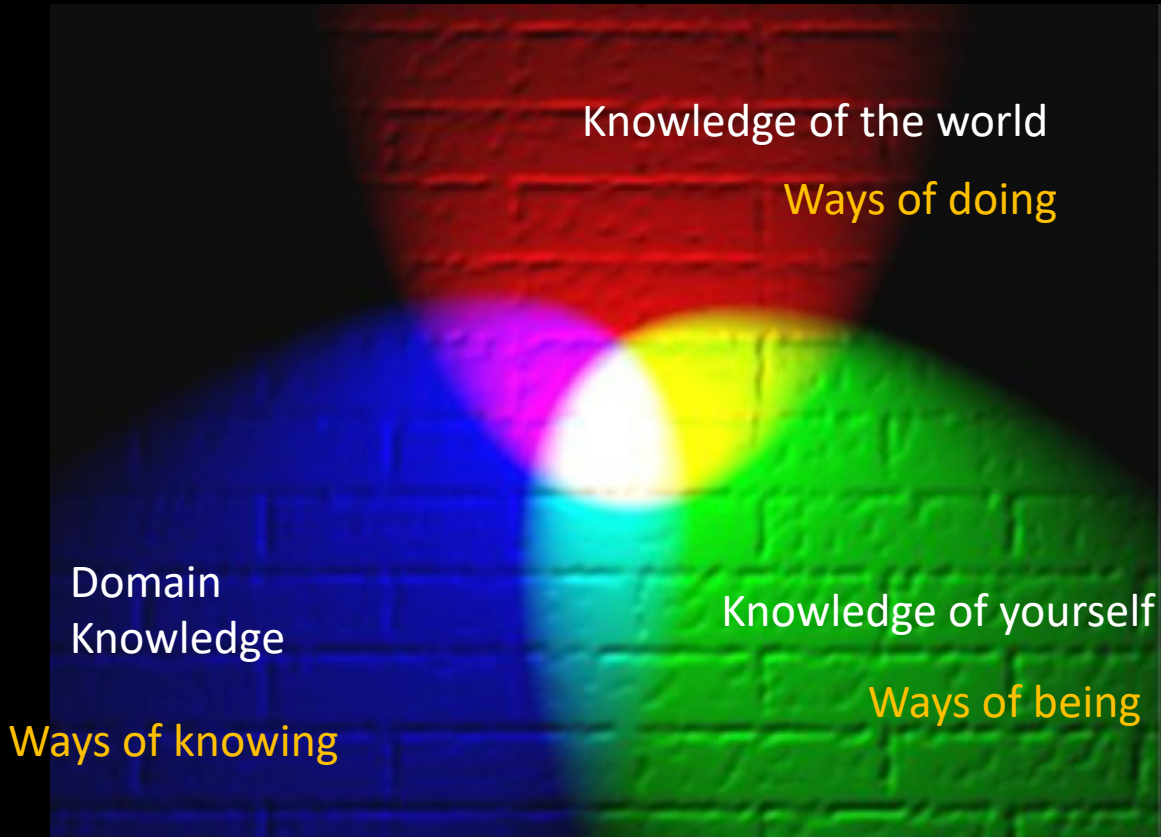GUIDANCE

SIMPLICITY

COMPLEXITY

1

2

3

4

iugi taxonomy

If we are to raise our expectations for who we want our students to become, then what should they be doing in each stage?

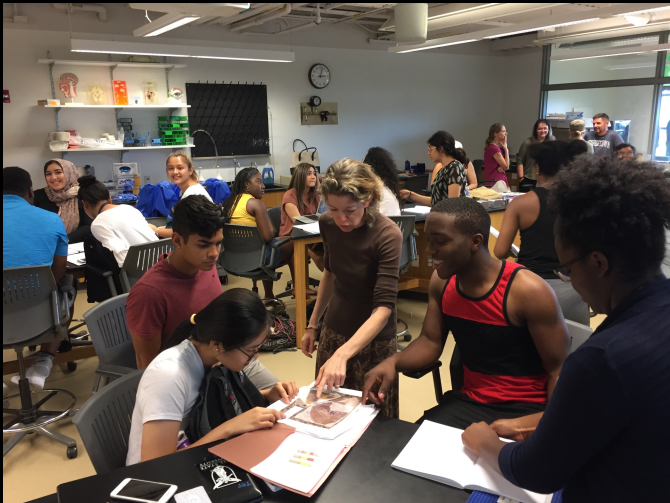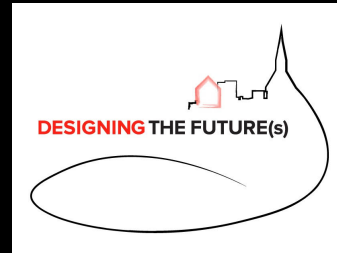*Signature paradigm for the future of higher education?*

The space   of integrative applied learning: formation, transformation and whole student development

Regents Science Scholars

Launched in 2016, the Regents Science Scholars Program provides support for first-generation college students majoring in biomedical fields.
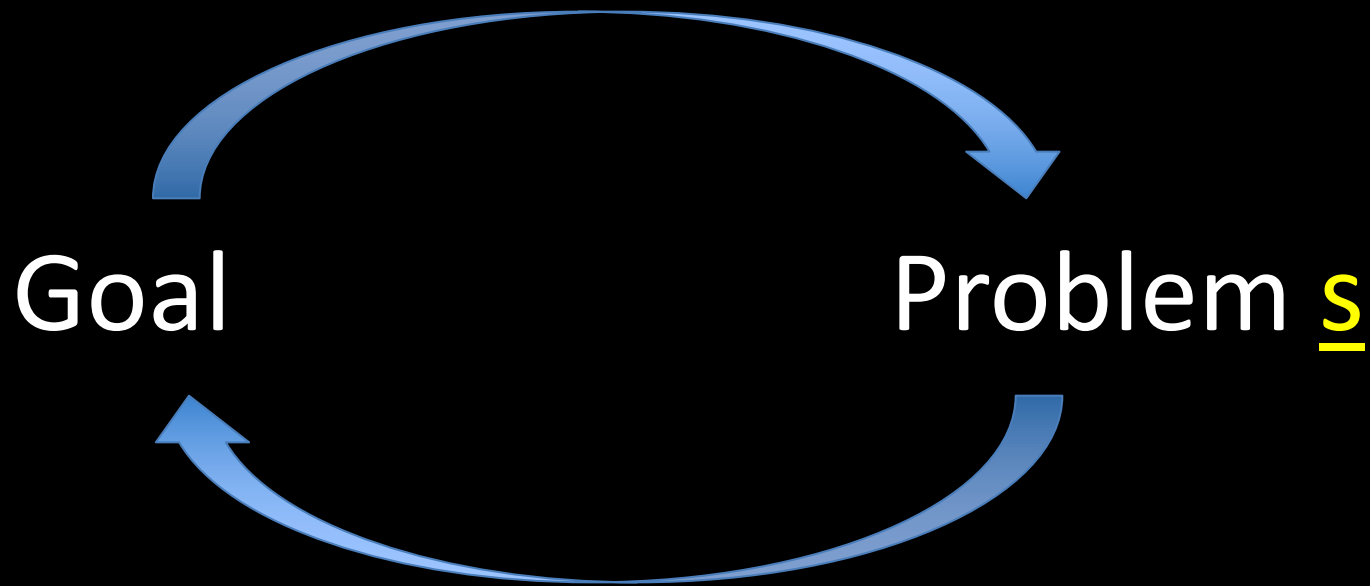
Summer before the first year:

Students enroll in a <u>residential summer bridge</u> program

Every subsequent summer:

Students take specially designed <u>online modules</u> to focus learning, while allowing students to work and be home with their families.
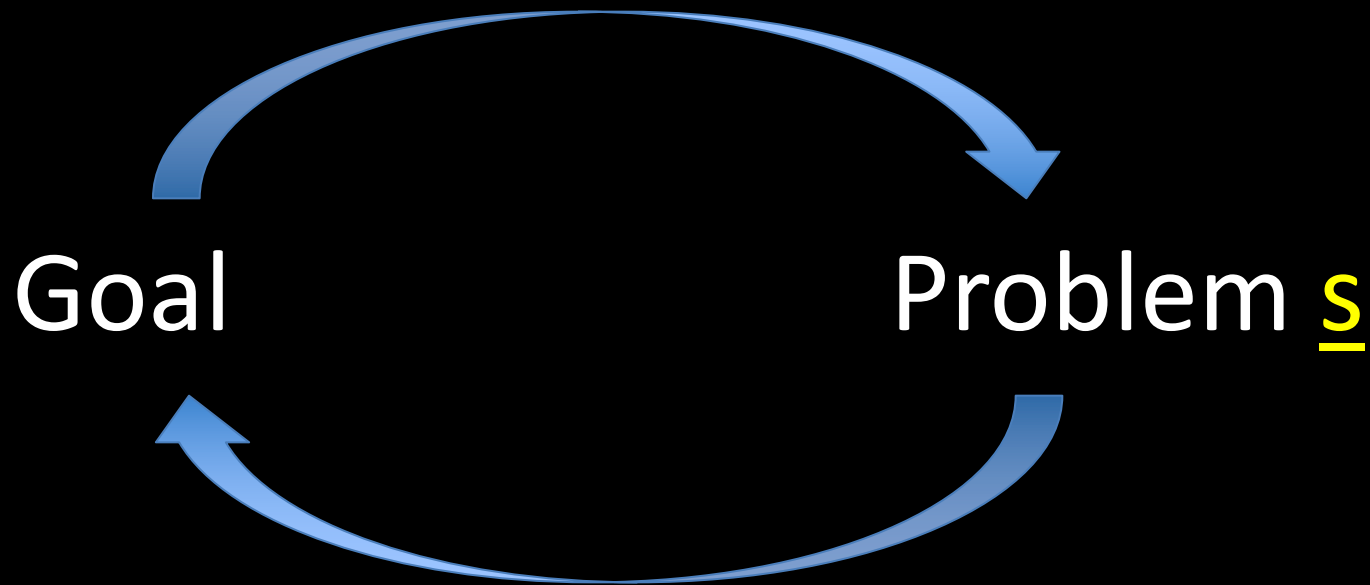
The Goal-Problem Cycle

Goal Problem **s**

Build a <u>better</u> summer bridge program

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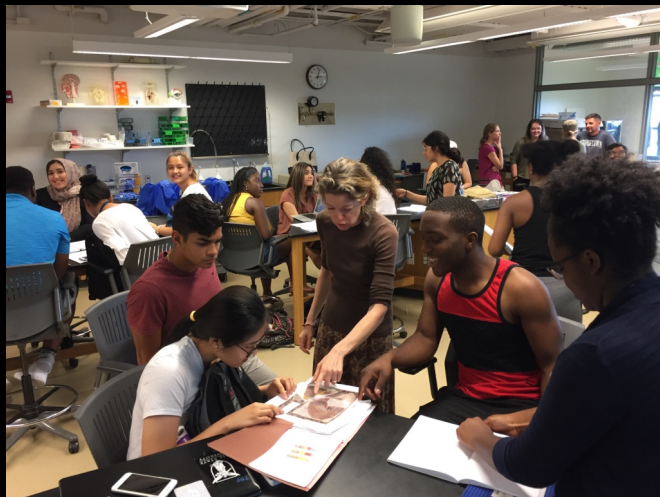
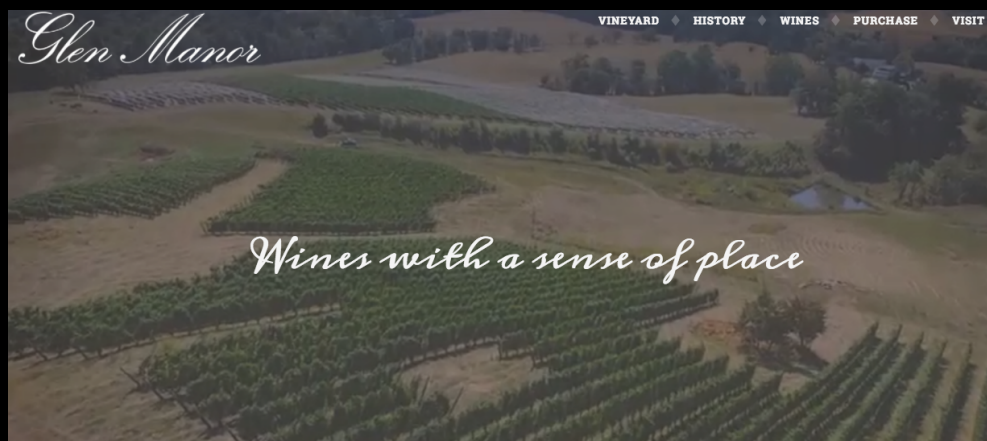# The Goal-Problem Cycle

Goal   Problem s

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

We had been focused on fixing deficits, not building strengths.

Glen Manor
Feral Wine Project

Glen Manor Vineyards Case Club Event Announcement

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.
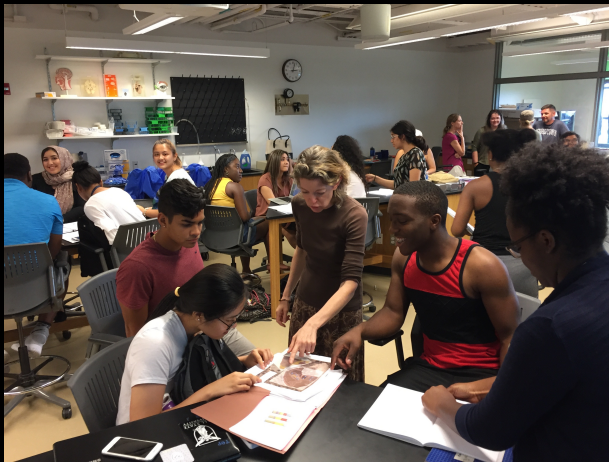
My suggestion is to create a experiment with like 20 control groups and tests. I would number the different locations that the microbes are found (on grape, leave, soil, etc.) then organize them into hypothetical dishes. This way hypothetically speaking I will create multiple juices using different combinations 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
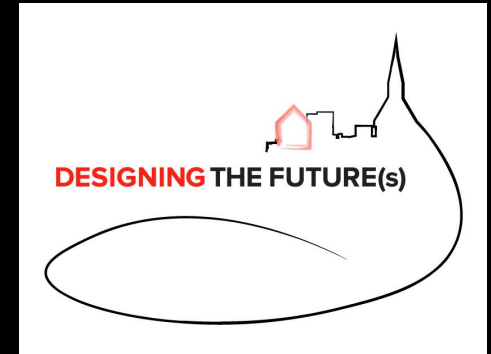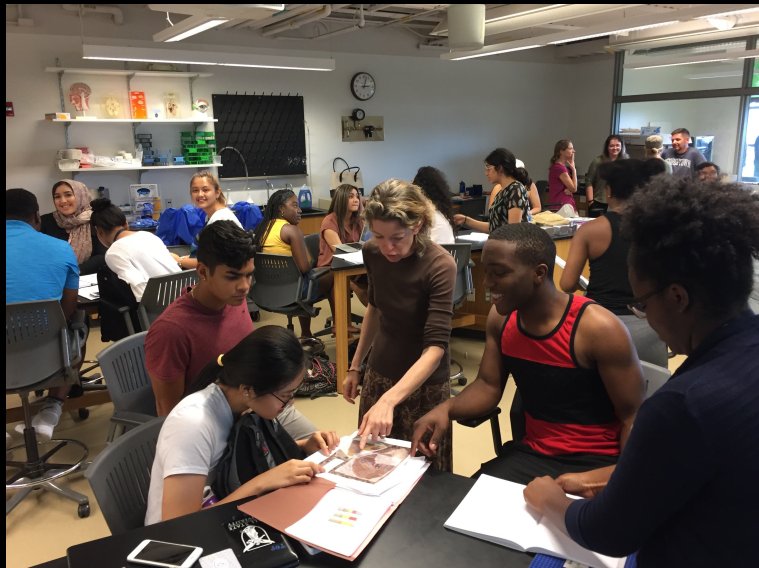
Regents Science Scholars

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 First Quadrant: Inclusive and Integrative

Inclusive

Dis-integrative

Integrative

Exclusive

The First Quadrant: Inclusive and Integrative

Project-based Learning matters because this quadrant matters.

Inclusive

Dis-integrative

Integrative

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

Exclusive

Project-based learning matters because this quadrant matters.

SCIENTIFIC 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.

Educating the whole person?

Knowledge + Skills + Dispositions (+ Values)

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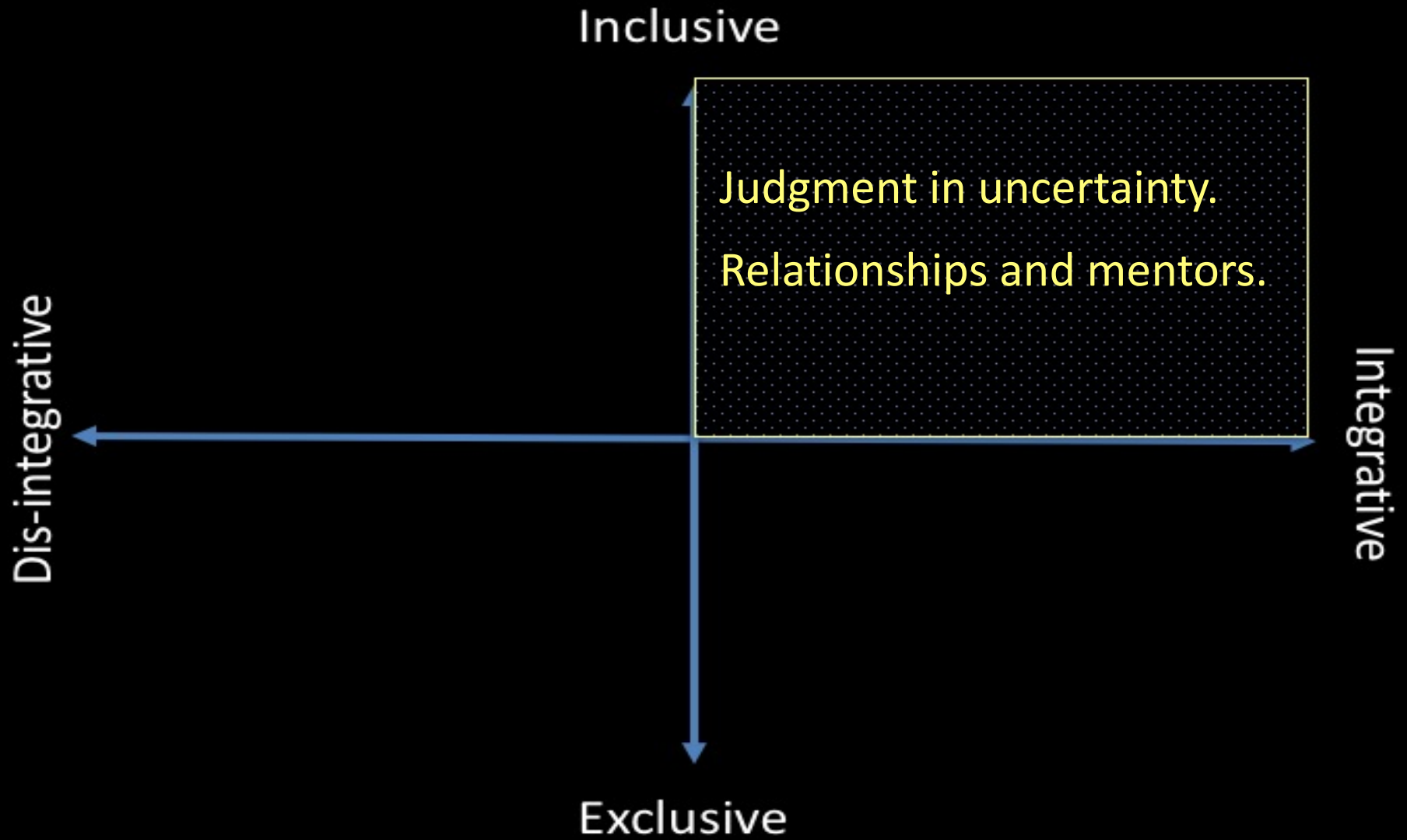- Curiosity
- Resilience
- Empathy
- Humility
- Ethical Judgment

- Design environments where they are more likely to be cultivated.
- Unscripted contexts, guided inquiry and experience.
- "High-impact practices."

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

What Matters in the first quadrant?

Inclusive

Dis-integrative

Integrative

Exclusive

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.

Two most important predictors of success:

1) Adult mentor who cared about you

2) Sustained project

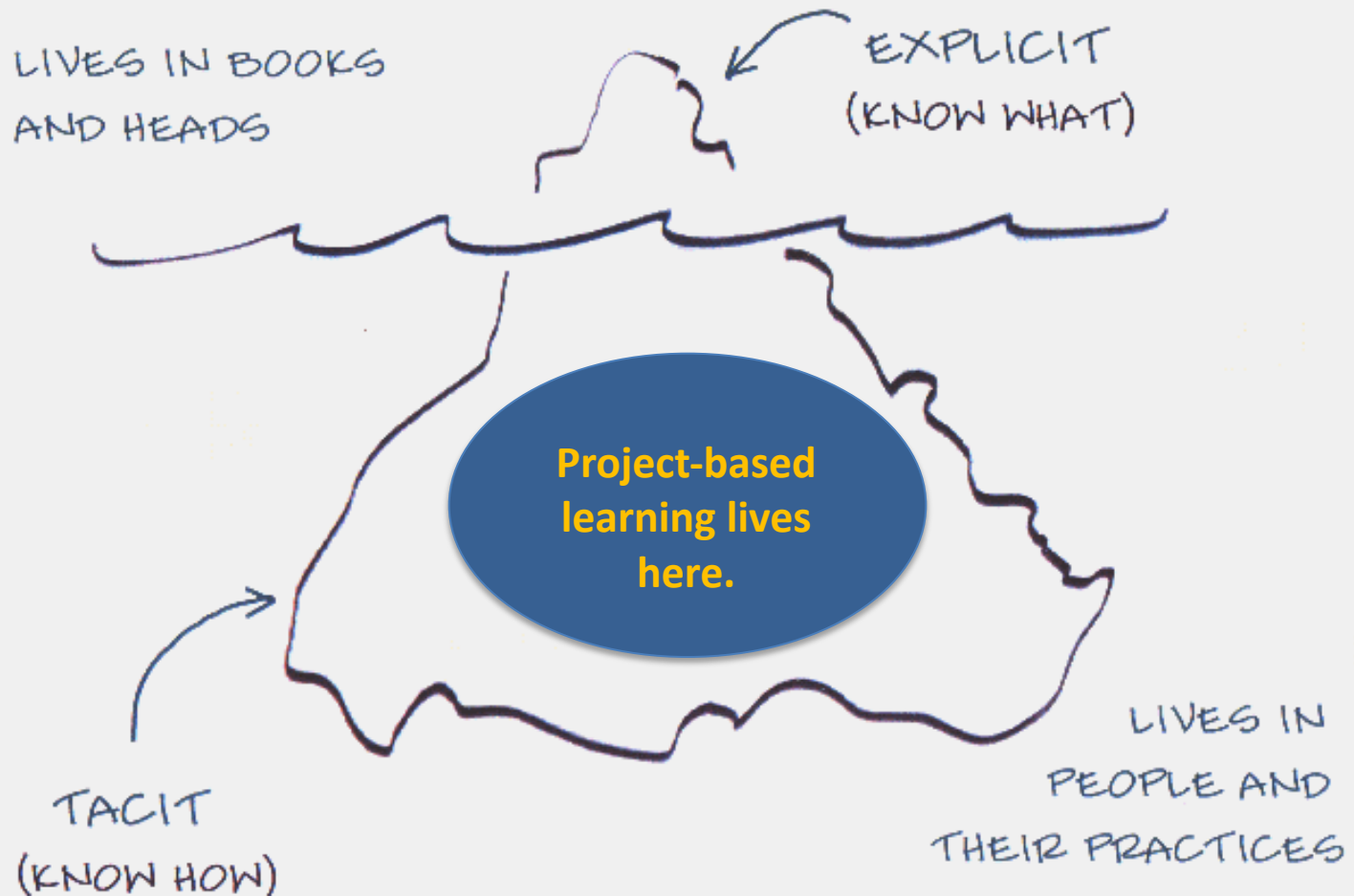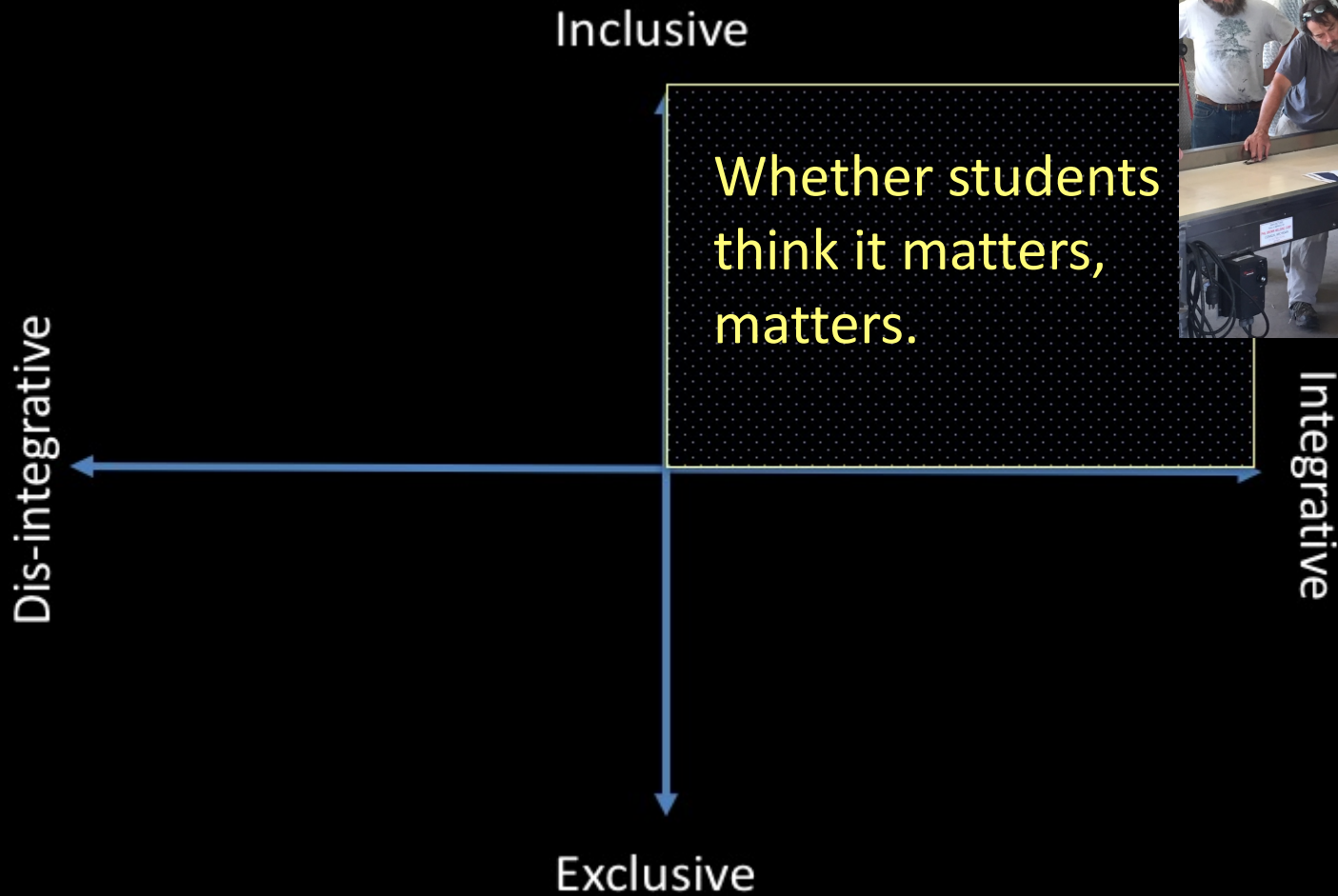Image from John Seely Brown, "Minds on Fire" (2008)

Project-based learning matters because this quadrant matters.

Inclusive

Dis-integrative

Integrative

Whether students think it matters, matters.

Exclusive

Project-baed learning matters because this quadrant matters.

Inclusive

Growth mindset.
The whole person.
Relationships and mentors.
Judgment in uncertainty.
Doing work that matters.

Dis-integrative

Integrative

Exclusive

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 this institute.

Humans in the age of artificial intelligence.

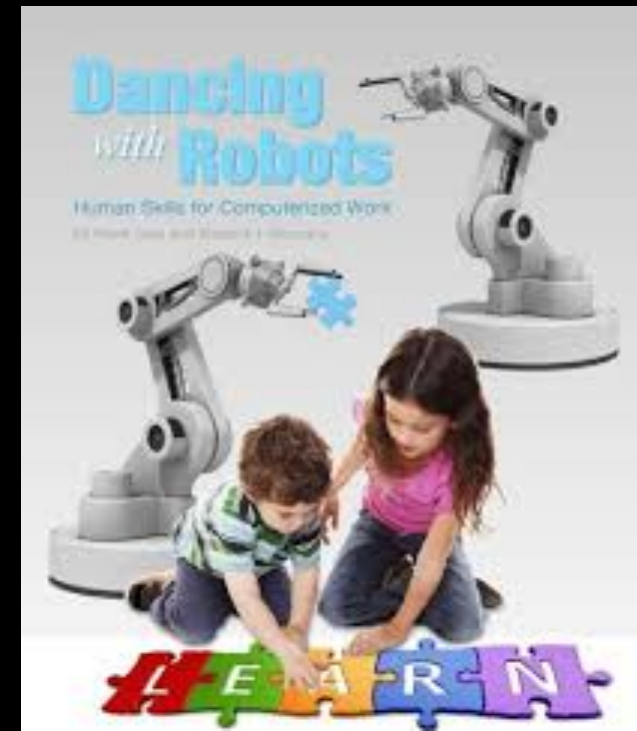"The human labor market will center on three kinds of work:

solving unstructured problems,

working with new information (including complex communication),

and carrying out non-routine manual tasks."

Frank Levy and Richard J. Murnane

THE NEW DIVISION

OF LABOR

How Computers are Creating the Next Job Market

Dancing with Robots

Human Skills for Computerized Work

LEARN

The Future of Jobs Report 2018

How does project-based learning help shape an institutional culture that cultivates these qualities?

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.

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.
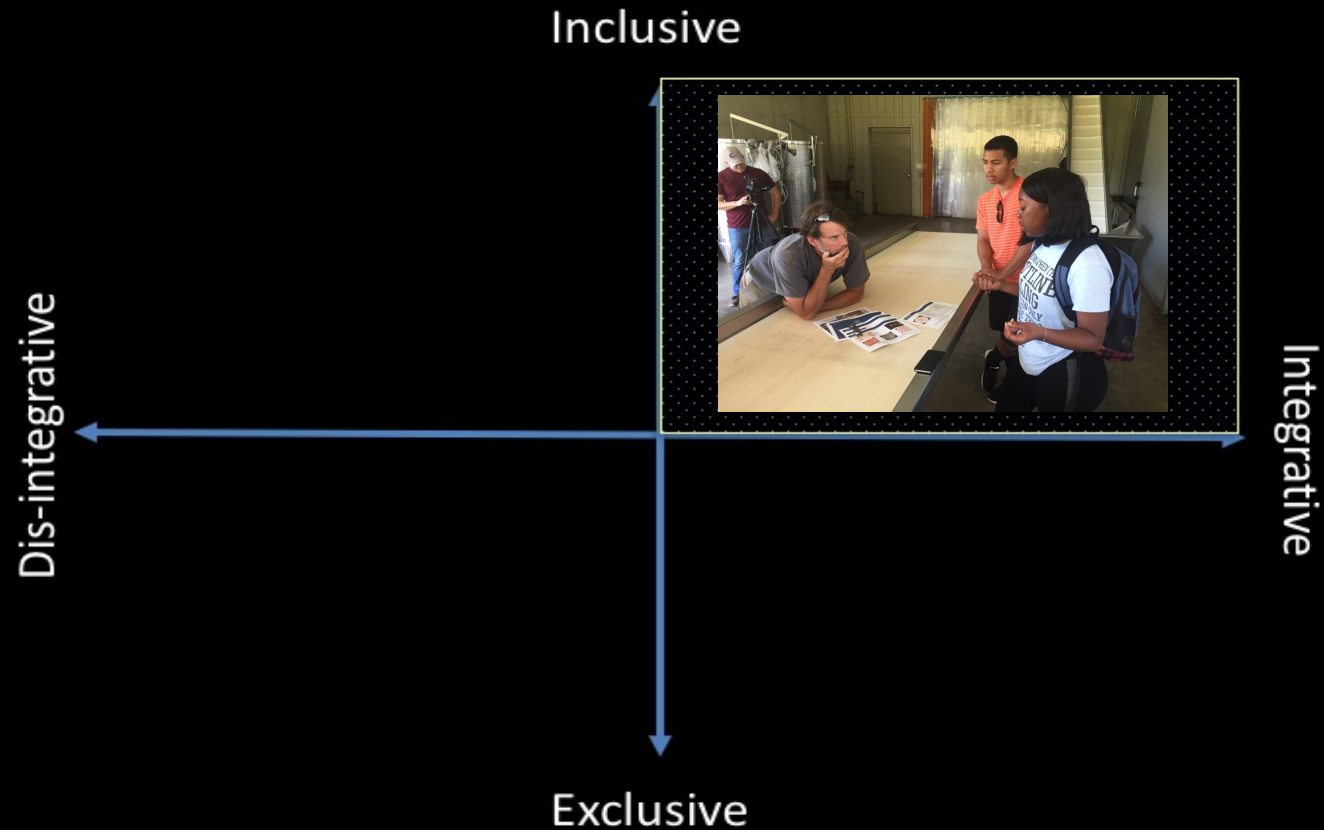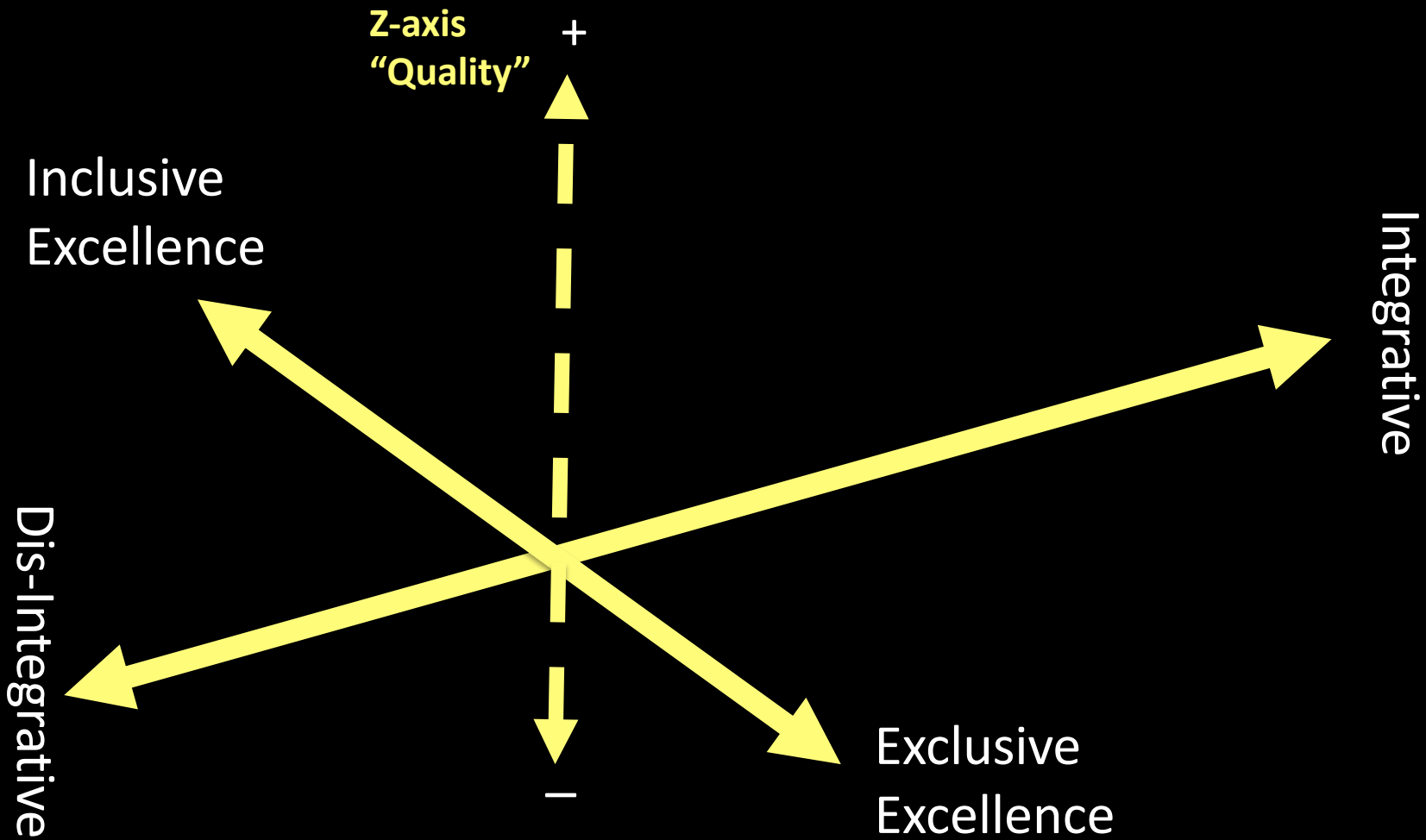
Joseph Aoun, Robot-Proof

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.

Aoun, Joseph E.. Robot-Proof: Higher Education in the Age of Artificial Intelligence (MIT Press)

As machines get better at being machines, the primary purpose of higher education has to be helping humans get better at being human.
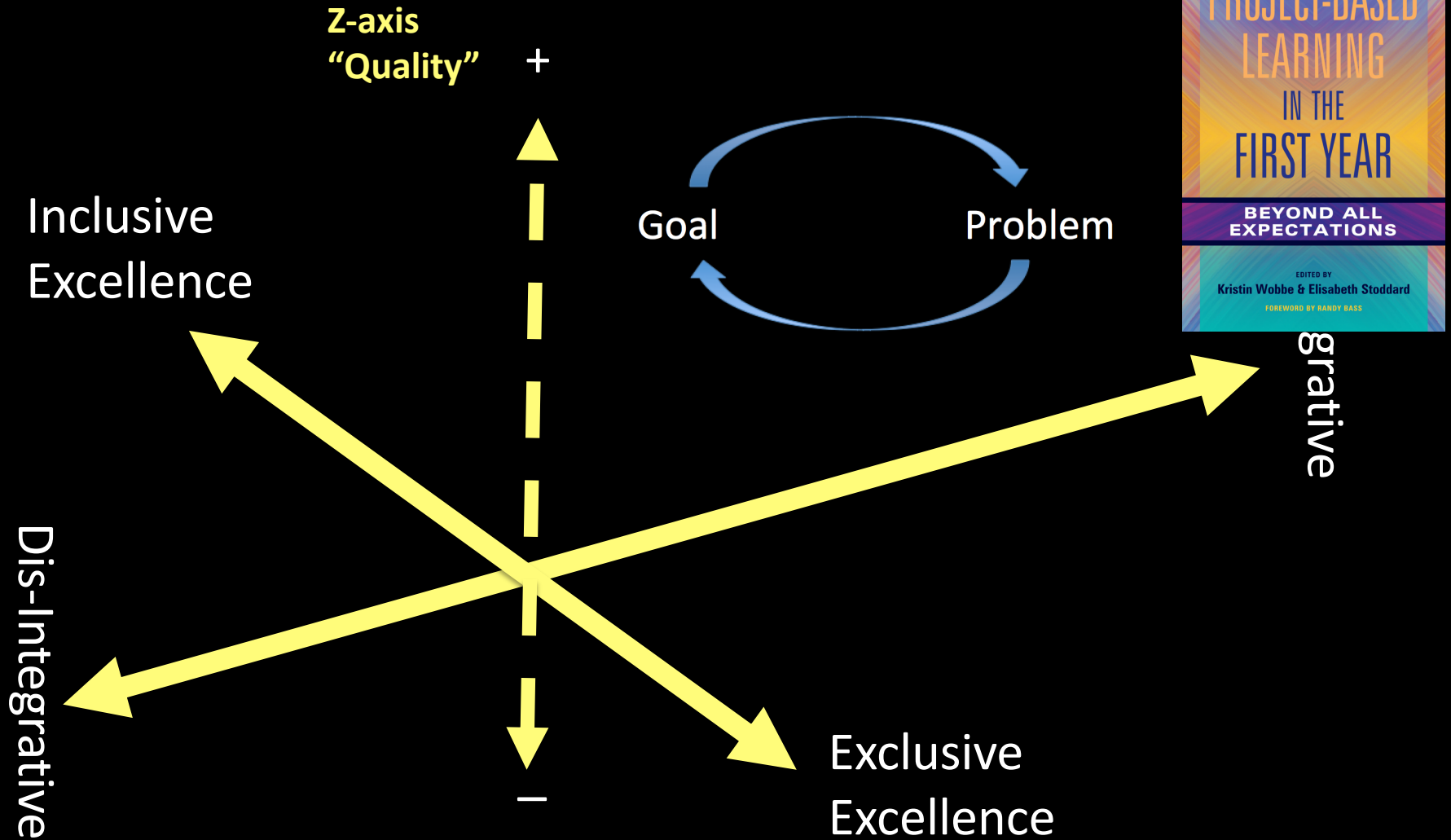
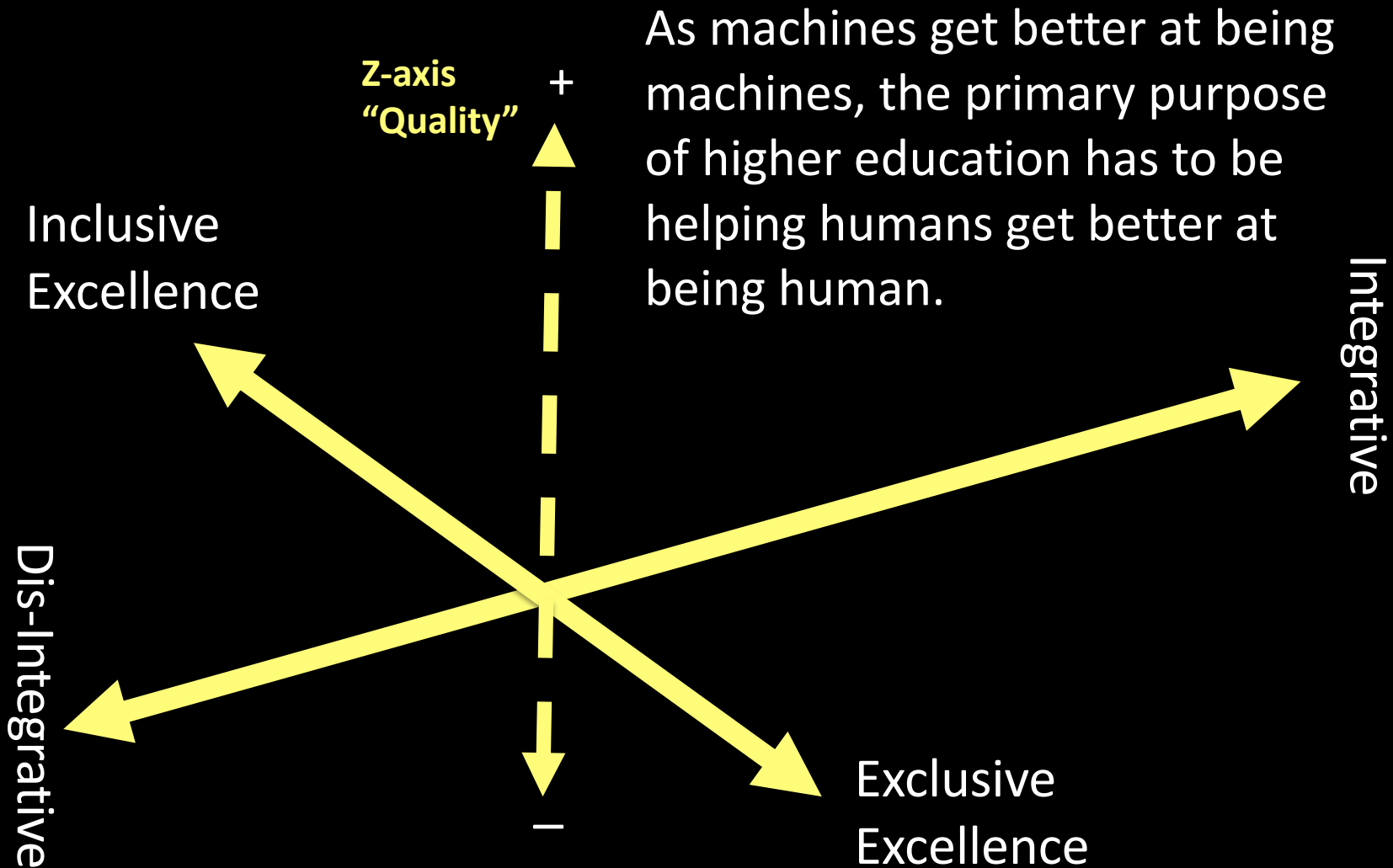Project-based learning matters because this quadrant matters.

Inclusive

Dis-integrative

Integrative

Exclusive

Z-axis "Quality" +

Inclusive Excellence

Integrative

Dis-Integrative

Exclusive Excellence

−

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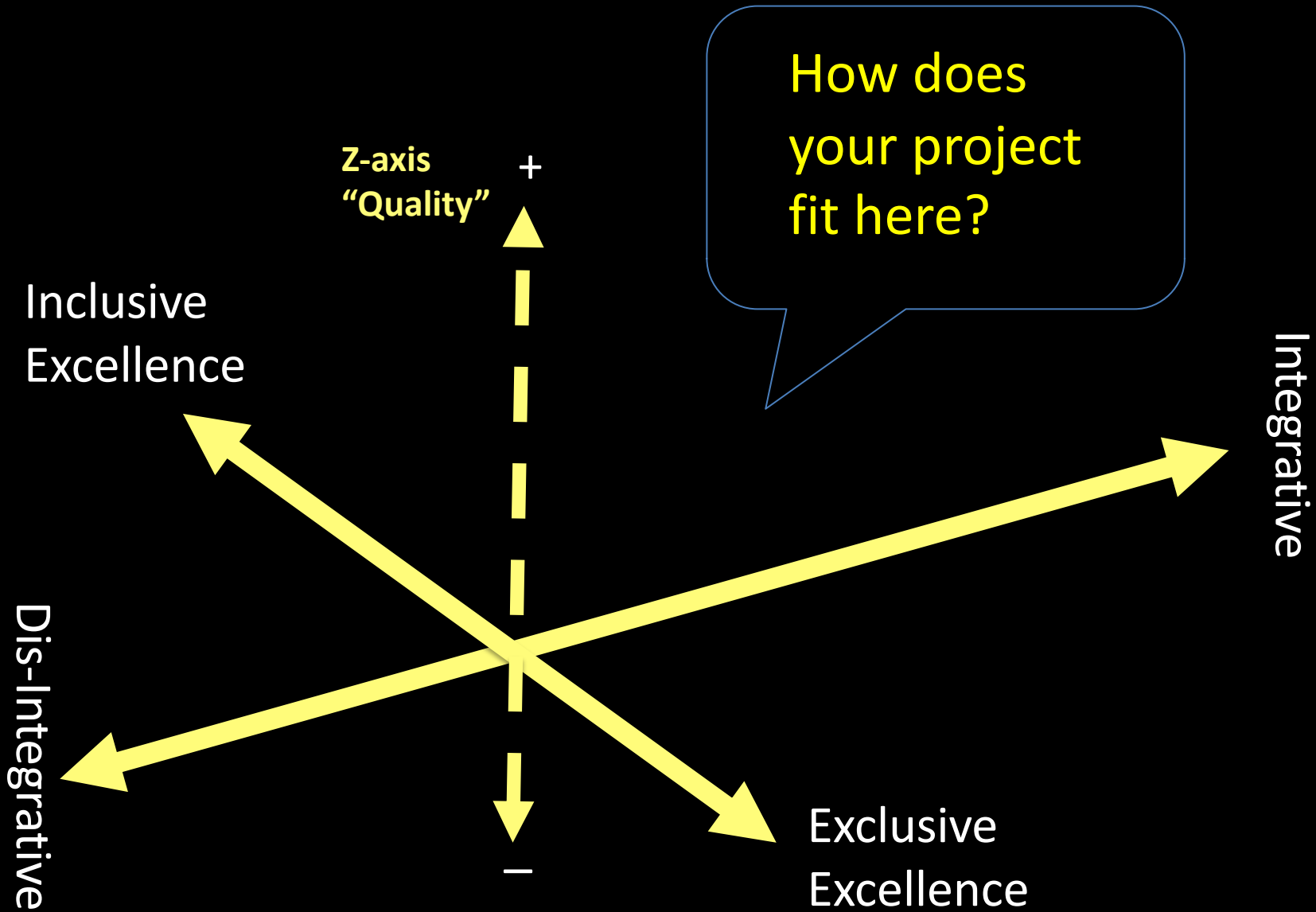- Impact
- Agency
- Community

The "wicked" problem of learning in higher education:

How can we apply our understanding of learning to scaling and sustaining quality education to everyone, equitably?

How can education play an ever meaningful role in creating a more just society and fostering a sustainable human future?

Thank You and Good Luck!

bassr@georgetown.edu