IGE Hub
Innovations in Graduate Education

Enabling Graduate Program Innovation by Creating the Conditions for Change

May 21, 2026

Webinar Logistics

- Today's webinar is being recorded. The recording and slides will be made available through the IGE Hub and CGS website.
- You may submit a question at any time during today's webinar by using the Q&A feature in your Zoom toolbar. While questions may be submitted at any time, we will only be answering questions during the designated Q&A period after the presentation.
- You will be sent a survey after today's webinar. Please complete the survey to help us continue to provide relevant webinars to the graduate community.

The Innovation in Graduate Education (IGE) Hub fosters research, learning and collaboration among researchers on STEM graduate education.

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The IGE Hub is facilitated by the Council of Graduate Schools (CGS).

University of Pittsburgh

Enabling Graduate Program Innovation by Creating the Conditions for Change

NSF Innovations in Graduate Education

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Quality Evaluation Designs
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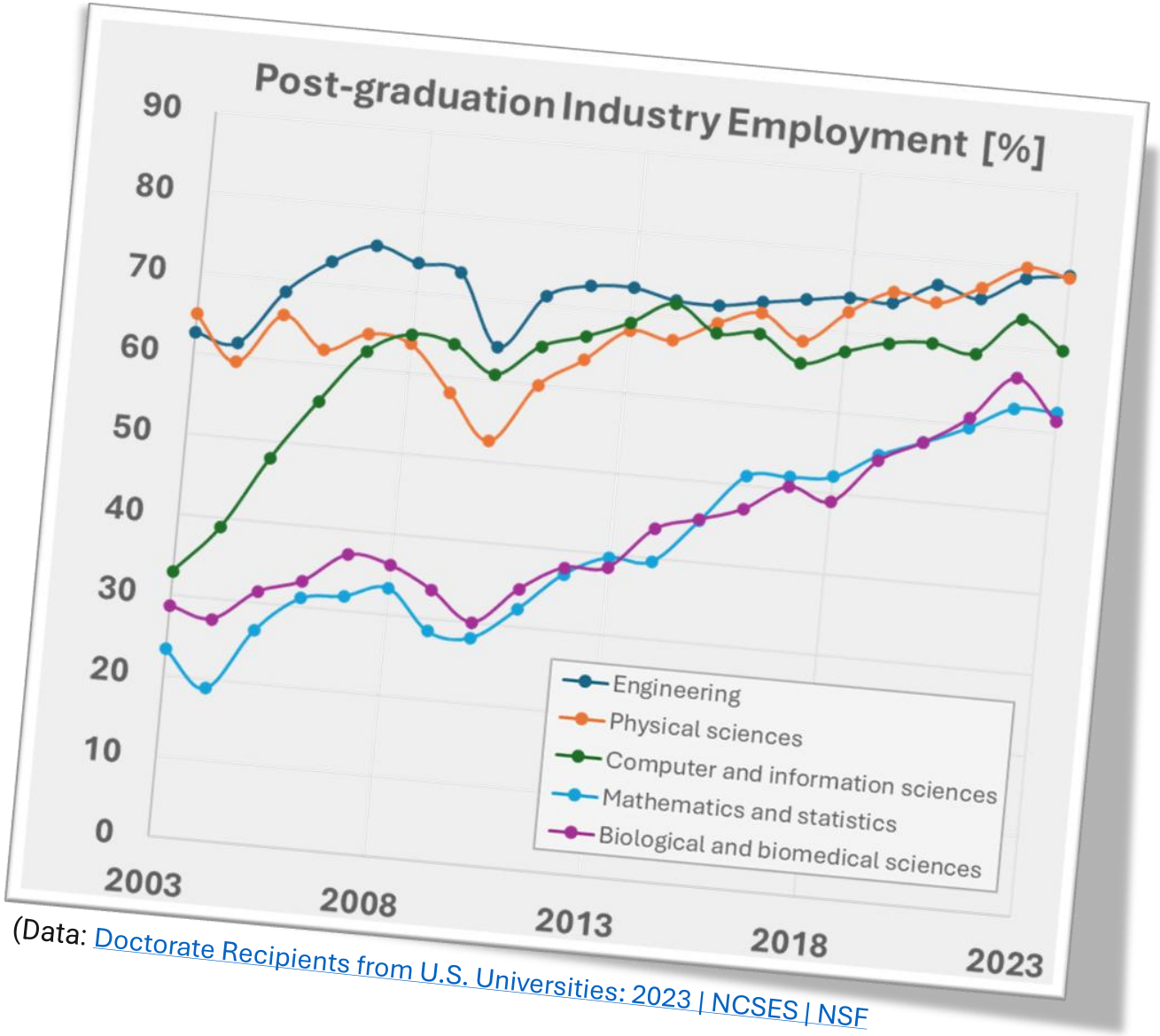
PITT | SWANSON ENGINEERING
CHEMICAL & PETROLEUM

NSF-DGE-2325599

Where do your students get jobs after graduation?

Proportion of Doctorate recipients getting jobs in US industry has more than doubled since 2003

Employment in industry or business has become more prevalent across all STEM fields.



(Data: Doctorate Recipients from U.S. Universities: 2023 | NCSES | NSF

Problem 1: Graduate STEM programming follows a uniform approach that is narrowly focused on research skills, adapts slowly to emerging trends, and provides career training predominately for academic careers

Goal 1: Create a personalized learning model (PLM) for graduate STEM education that is inclusive and incorporates professional training

Problem 2: Many educational innovations in STEM have been highly successful; however, few have been successfully propagated.

Goal 2: generate the knowledge and examine the potential to extend the PLM from one STEM context to another

Today's learning objectives

1. Identify the core elements of a **personalized learning model** for STEM education and explain its **value proposition** for multiple stakeholder groups.

2. Identify **institutional barriers** to implementing components of the model

3. Formulate **actionable strategies** to overcome these barriers

Personalized leaning model (PLM)

INSTRUCTIONAL GOALS

Set goals beyond the classroom

Identify strengths

Learn to write SMART goals

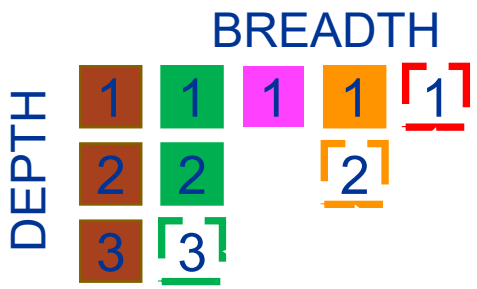
Craft an Individual Development Plan

Refine with your advisor

TASK ENVIRONMENT

Engage in the learning environment

Coursework



Research

Professional Development Streams

SCAFFOLDING OF INSTRUCTION

Experience intentional support

Active learning, guided practice, skills review, just-in-time-teaching, higher-order thinking.

Move from observer → active participant → research mentor

Learn from experiences beyond academia: internships, seminars, workshops, fieldtrips

ASSESSMENT OF PERFORMANCE AND LEARNING

What were the results?

Homework, exams, projects

Papers, presentations, Entering Research Learning Assessment (ERLA)

CV building, networking, job offers

REFLECTION AND EVALUATION

Reflect on Results; Repeat

How did the year go? Are the goals progressing? Do they need updating?

Who do we have on the call today?

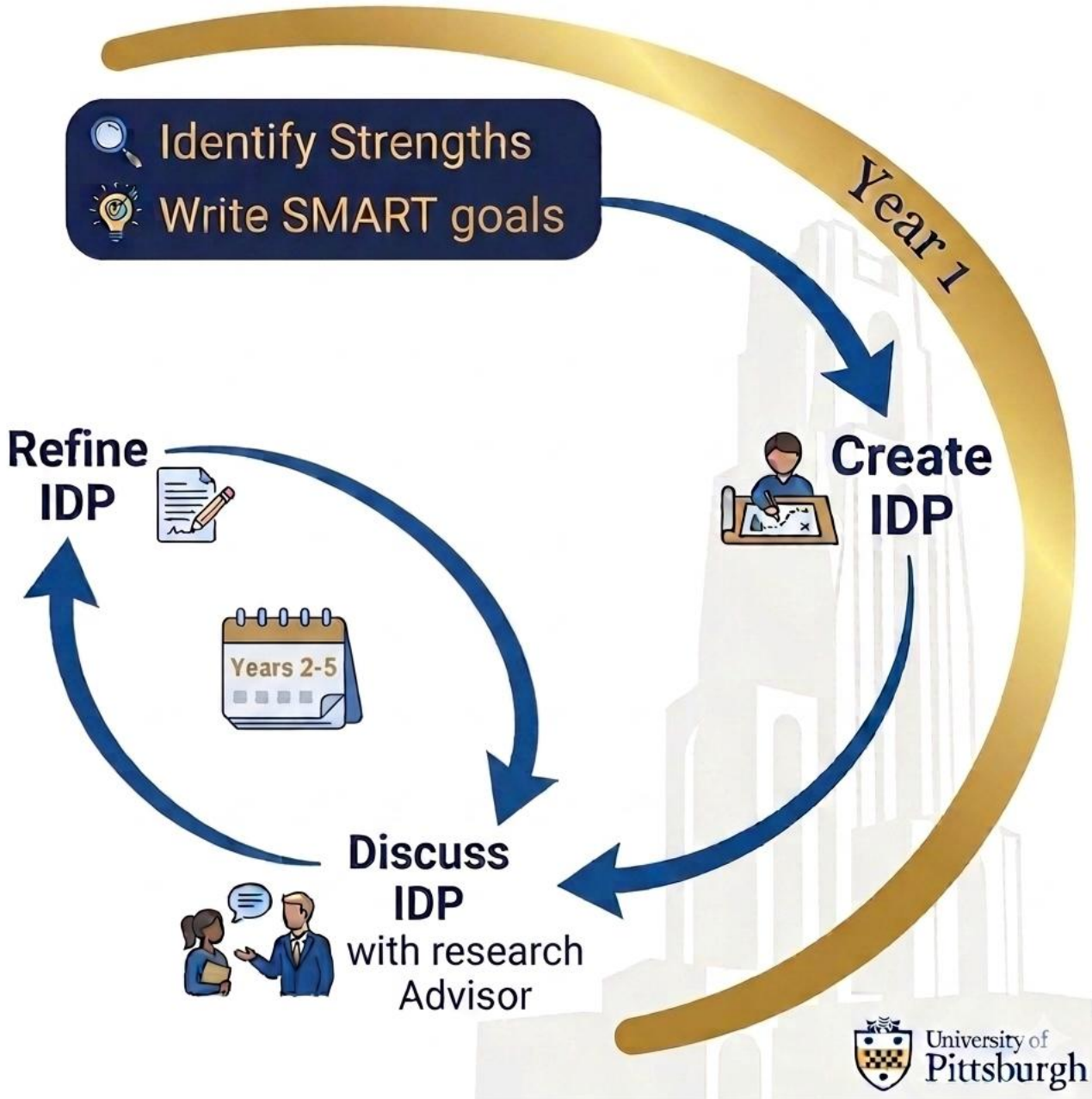
Value Propositions of the Personalized Learning Model (PLM)

Students	Faculty	Admin
• Tailor your grad experience to your unique strengths and career goals • Align your coursework with your career interests • From your very first day of graduate school, PLM positions you to be competitive for jobs you want	• PLM distributes the burden of student advising • Richer interactions with students, focused on career goals and strategies • PLM features alert mentors to students' progress early and often	• PLM tracks students' progress from day one • Improved student engagement & retention • Build strategic partnerships with industry

(1) Individual Development Plans (IDP)

CliftonStrengths®

S-pecific
M-easurable
A-chievable
R-elevant
T-imely



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(1) Individual Development Plans (IDP) - 1st Cohort

CliftonStrengths®

S-pecific
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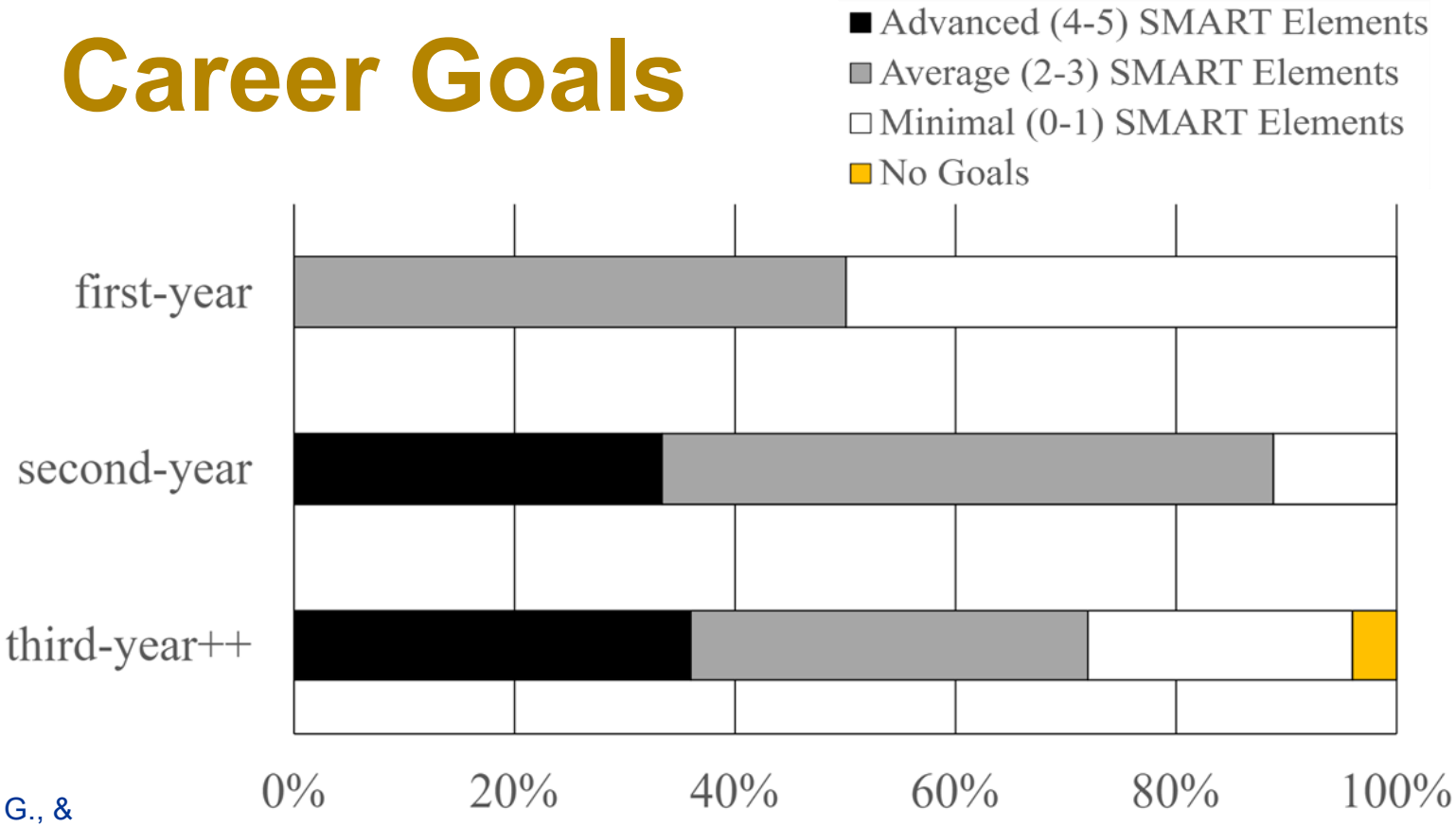
T-imely

Career Goals



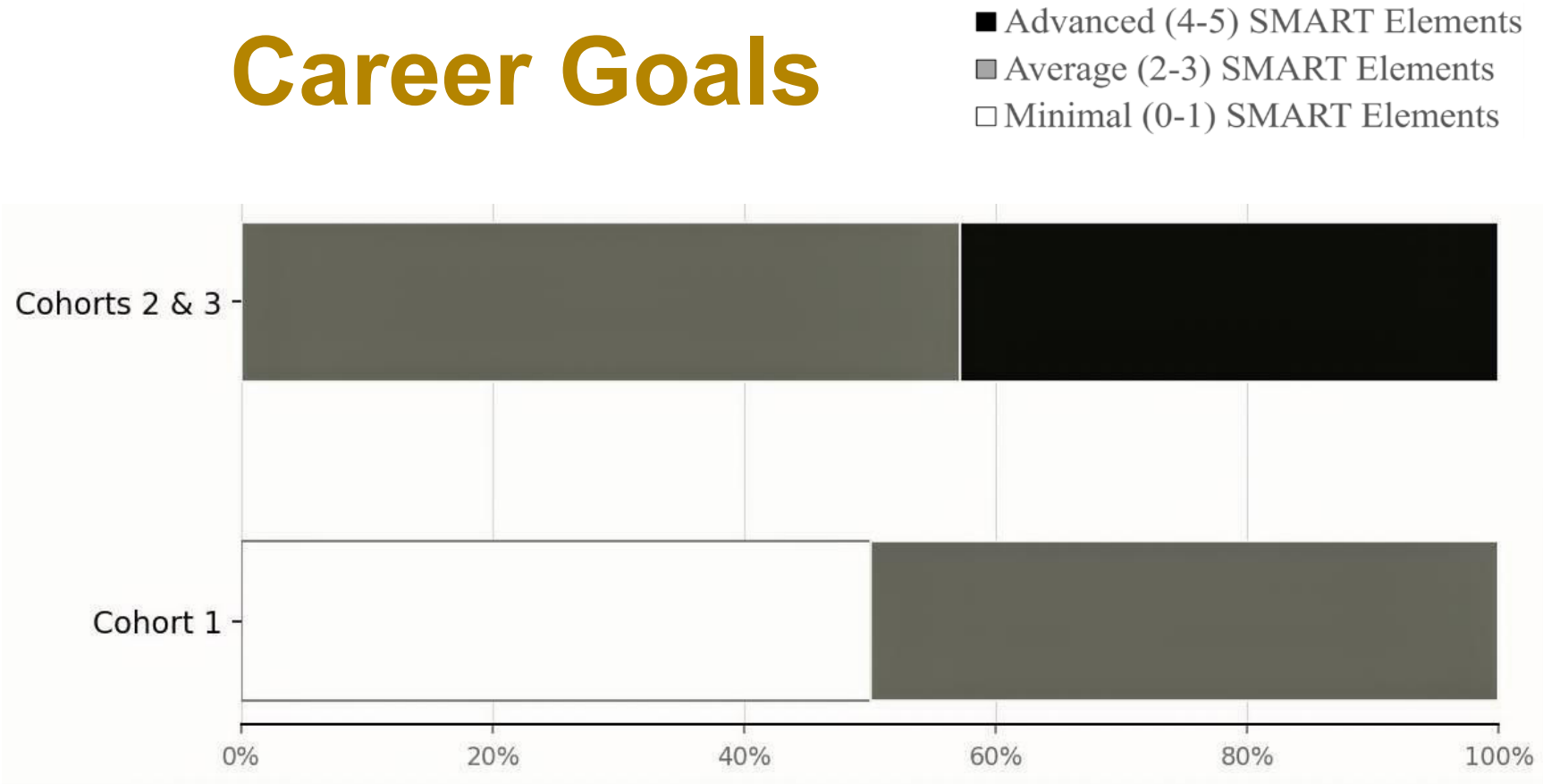
Percent of Students with IDPs containing Advanced, Average, and Minimal SMART Elements

Dukes, A. A., Kerr, V. E., Fullerton Shirey, S. K., Veser, G., & Besterfield-Sacre, M. E. (2024). *A new personalized learning approach towards graduate STEM education: A pilot in chemical engineering.* In *Proceedings of the 2024 ASEE Annual Conference & Exposition*, Portland, Oregon. https://doi.org/10.18260/1-2--46464

(1) Individual Development Plans (IDP) - Cohorts 2 & 3

Changes to IDP

- Separated topics (CliftonStrengths®, SMART Goals, IDP)
- Structured practice and formative goal feedback
- Replaced AAAS' myIDP with a Gantt-style Excel template



New papers in 2026 ASEE *Annual Conference & Exposition*

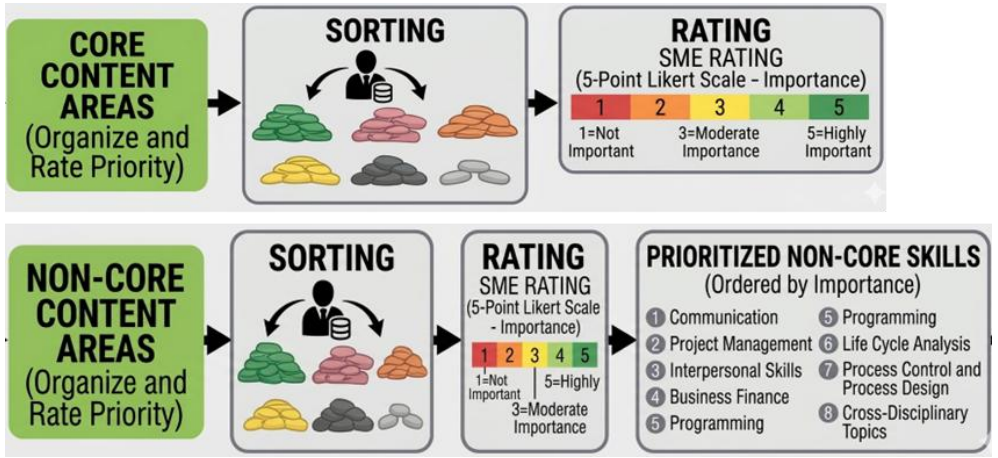
Percent of **First Year** Students with IDPs containing Advanced, Average, and Minimal SMART Elements
Comparizon of Cohort 1 with Cohorts 2 & 3

(2) Identify the Body of Knowledge (BOK) - Curriculum Update

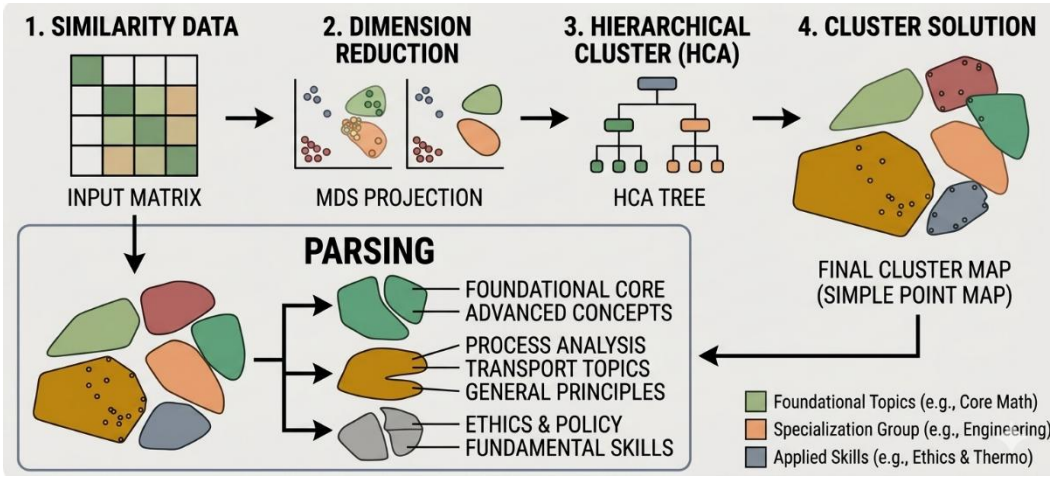
Besterfield-Sacre, ME, Dukes, A.A., Fullerton, S.K., Veser, G., (2025). Creating a Modularized Graduate Curriculum in Chemical Engineering, *Proceedings of the 2025 ASEE Annual Conference and Exposition,* Montreal, CA, June 2025.

1- Data

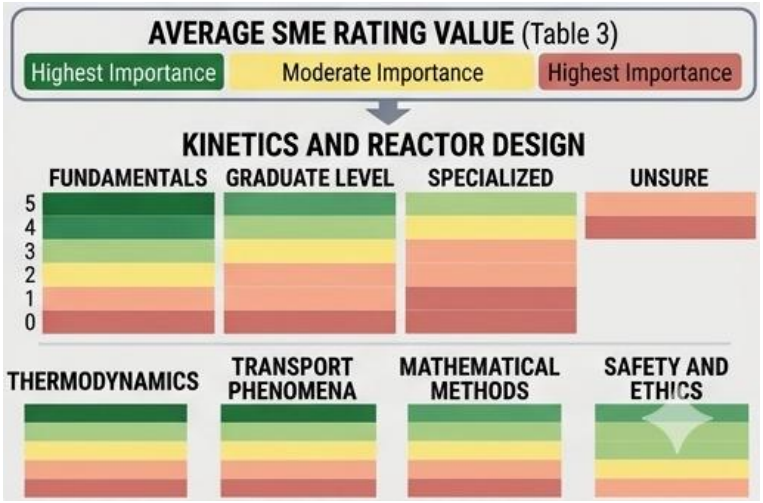
2 -Group Concept Mapping



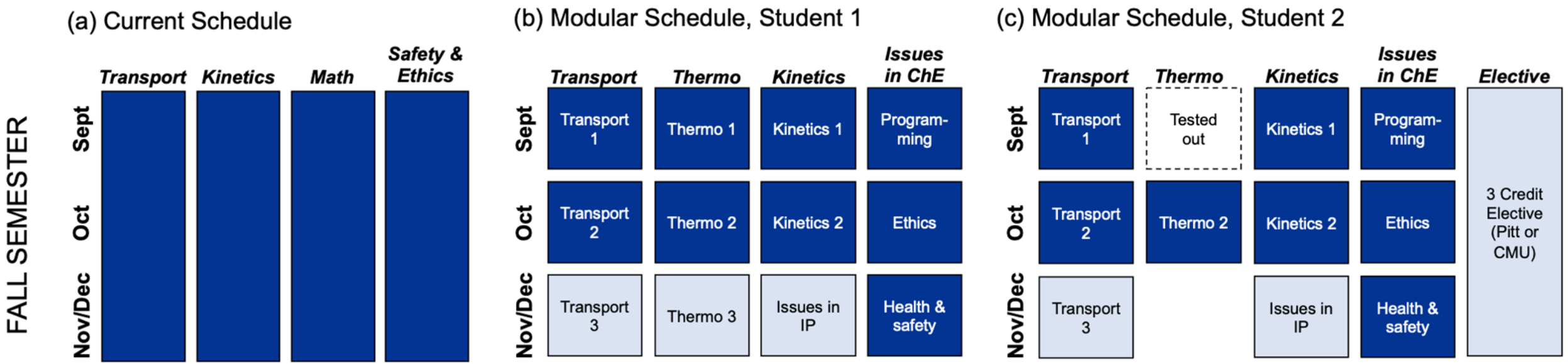
3 - Hierarchical Cluster Analysis



4 – Curricular Content Organization



(3) Modularization of classes: Faculty Learning Community



(3) Modularization of classes: Faculty Learning Community

Kinetics

James McKone

Götz Veser

Transport

Susan Fullerton

Mohammad Masnadi

Math

Jason Shoemaker

Joaquin Rodriguez

Thermo

Karl Johnson

John Keith

Engineering Education

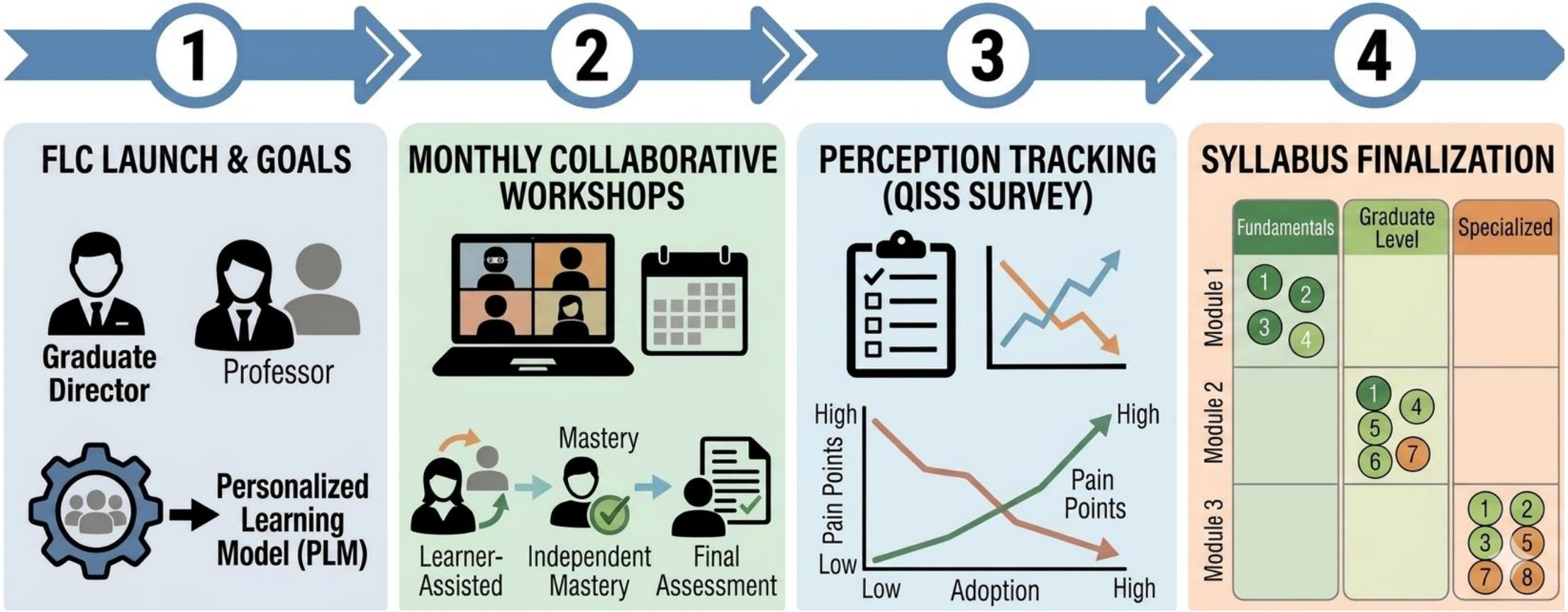
Mary Besterfield-Sacre

April Dukes

Safety and Ethics

(3) Modularization of classes: Faculty Learning Community

Besterfield-Sacre, ME, Dukes, A.A., Fullerton, S.K., Veser, G., (2026). From Body of Knowledge to Modular Implementation: A Faculty Learning Community Model for Graduate Chemical Engineering Reform, *Proceedings of the 2026 ASEE Annual Conference and Exposition,* Charlotte, NC, June 2026.



(4) Professional development streams

Industry

Götz Veser

Goal

Prepare students to be successful on day one of their industry job

- Seminar speakers from industry
- Grad student panel on internships
- Help place students in internships
- SSOE-business school classes
- Present at industry-focused meeting
- Industry mentor
- Industrial thesis committee member

Entrepreneur-ship

Chris Wilmer

Goal

Show students that spinning off a company is a viable & valued option

- Coffee at the Big Idea Center
- Field trips to local start-ups founded by Pitt and CMU students
- Young Entrepreneur seminar series
- Participation in student pitch competitions
- Trips to angel investing meetings

Academia

James McKone

Yanni Mpourmpakis

Goal

Guide students early to build a killer academic record

- Educate students on range of careers
- Participate in faculty interviews
- Building a professional network
- More thesis committee feedback
- Fellowship/grant writing

Personalized leaning model (PLM)

INSTRUCTIONAL GOALS

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TASK ENVIRONMENT

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SCAFFOLDING OF INSTRUCTION

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ASSESSMENT OF PERFORMANCE AND LEARNING

What were the results?

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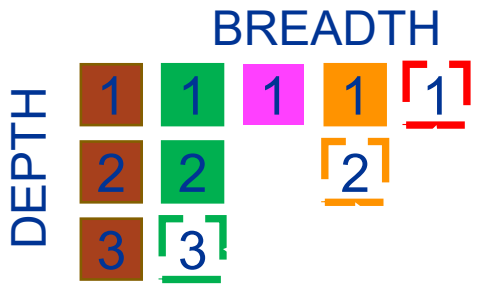
Reflect on Results; Repeat

(1) Individual Development Plans

Coursework



Active learning, guided practice, skills review, just-in-time-teaching, higher-order thinking.

(2) Identify the Body of Knowledge (BOK)

(3) Modularization of classes (FLC)

(4) Professional Development Streams

Of these elements, which one do you think is the most valuable?

What is the biggest barrier to implementing your choice for most valuable element?

Actionable strategies to overcome barriers

Concept	Barrier	What worked for us
IDP	Buy-in from students (not a “check box”!)	• Flexible IDP templates/format • Workshops on CliftonStrengths, SMART goals, IDPs
	Buy-in from faculty	• Increased IDP quality; Students invested in planning

Actionable strategies to overcome barriers

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Professional Streams	Faculty concern about “distraction from research” Difficulty in managing internships and graduate requirements	• FLC dialogue and student demand drove increased interest • Students come back from internships better prepared for their research and with job offers. • Admin support connects students to internships

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BOK	Many… mainly logistics.	• Dedicated staff member to manage logistics • Structured engagement respected stakeholders' time • Intentional selection of advisory board (diversity of expertise, career path, stage of career)

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Modularization	Buy-in from faculty	• FLC gave faculty time and support to redesign courses • QISS regular check-ins to ensure redesign was on track
	Coordination across classes	• Bring all faculty together in one room (FLC)
	Clear LOs, Scaffold Instruction	• Bring educational experts onboard!

Describe or list the ways your department or unit intentionally prepares students for careers outside of academia?

We would love to hear from you!

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