

Embedding Culturally Relevant Instructional Supports for Self- Directed Learning in Online College STEM Courses

**AAC&U: Transforming STEM
Higher Education**

November 9, 2024





Welcome!

Presenters



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SRI Education



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Research Center
(CCRC)



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For today's discussion we will...



Share a brief overview of the Collaborative & SDL



Elevate student voices and experiences



Implementation and Best Practices



Discuss takeaways and supports for instructors

Postsecondary Teaching with Technology Collaborative: An Overview

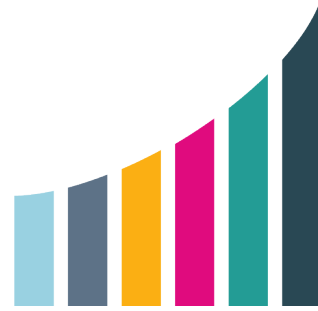


What is the Collaborative?

A research and capacity-building center that aims to study and improve how faculty **teach** and use **technology** to help students apply and strengthen **self-directed learning skills** to increase their success in online courses.



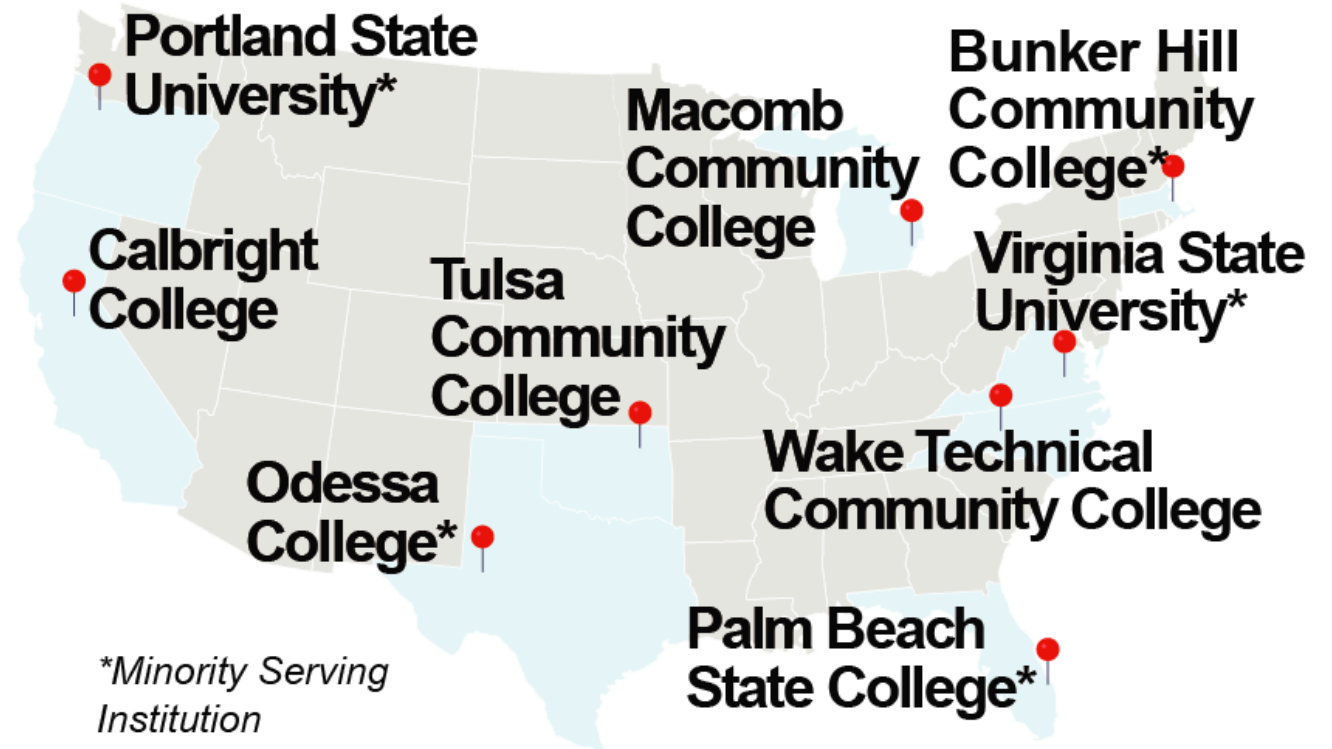
The Collaborative: Who we are



SRI Education[™]
A DIVISION OF SRI INTERNATIONAL

CCRC COMMUNITY COLLEGE
RESEARCH CENTER
Teachers College, Columbia University

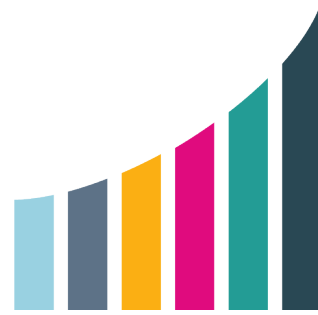
**Achieving
the Dream**



Discussion Questions



Select the top 3 changes you'd like to see in your students' academic behavior. Choose what you believe is most important to succeeding in online courses.



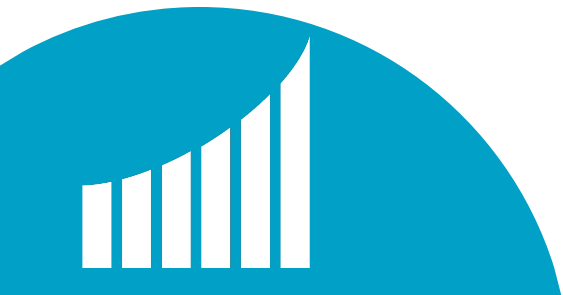
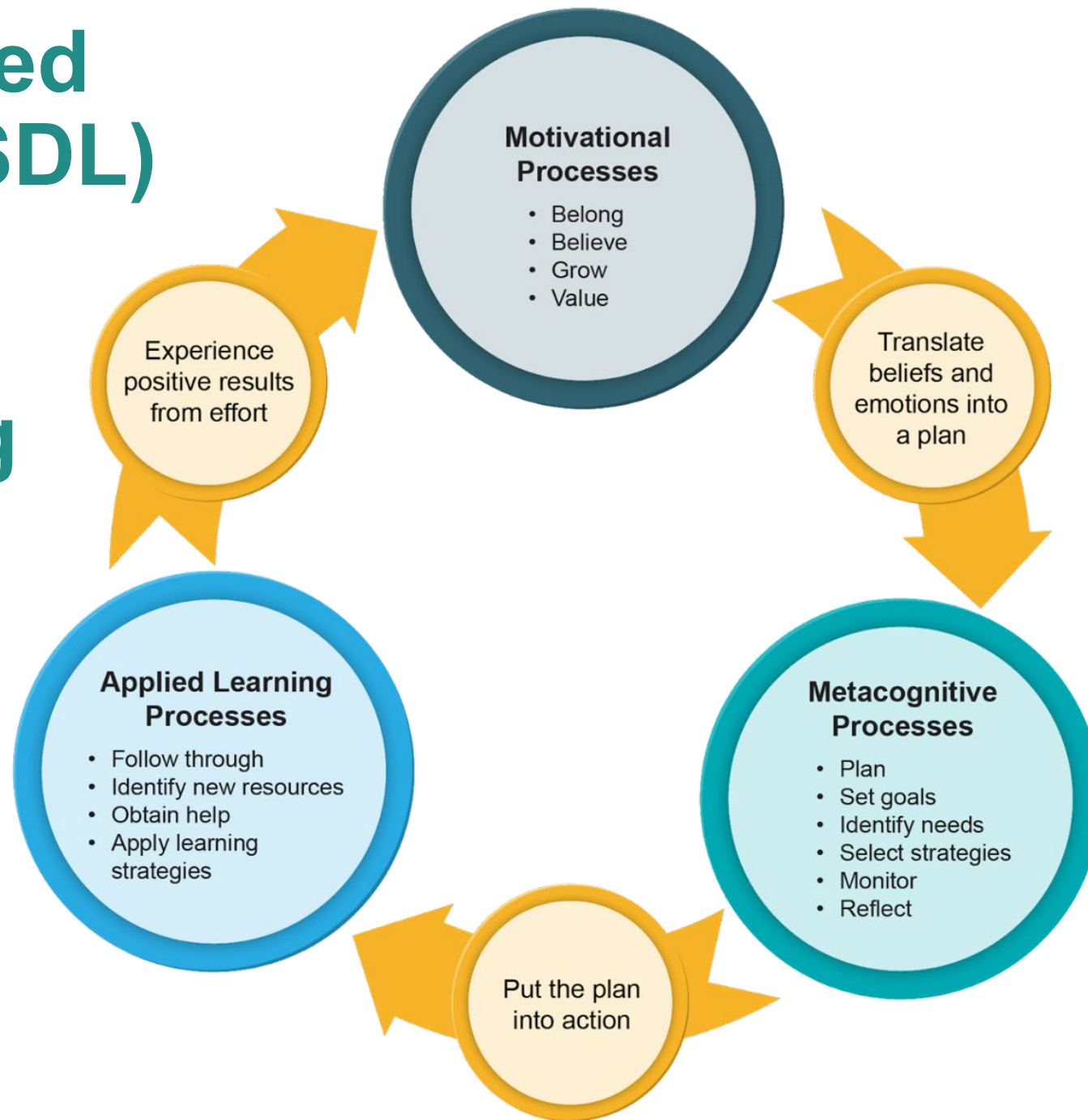
I'd like more of my students to...

1. read the assigned readings
2. take effective notes from the assigned readings
3. preview the lecture material before class
4. review the lecture material after class
5. visit my office hours
6. complete homework assignments before the due date
7. create a calendar with due dates for class assignments
8. use a calendar with designated study time for my class

Self-Directed Learning Skills: A Framework for Supporting Student Success



Self-directed learning (SDL) skills are mutually reinforcing



Promoting Motivation and Learning in Online STEM Courses

Perspectives from students



Findings



- Interactions with peers and faculty promote **motivation**
- Students are seeking effective **applied learning** approaches
- Instructional practices can mitigate barriers to **help seeking**
- Students bring **strengths to SDL** skill development

Recommendations



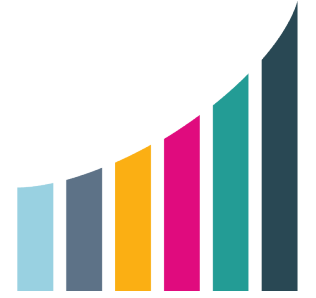
1. Utilize reflection activities to allow students to recall previously learned strategies as well as sources of motivation and resilience.
 - Example: *What keeps you motivated when you encounter challenges in online courses?*
2. Maintain instructor-to-student connection to lower barriers to help-seeking and promote confidence and belonging.
 - Example: *Require touch points early in the term through email, synchronous meetings, video messages, and other channels.*

Recommendations (cont.)



3. Have varied and frequent opportunities for student-to-student interactions beginning early in the term.
 - Example: *Set community guidelines or norms to be followed in group activities and discussion boards to maintain a positive online community.*
4. Provide students with guidance to navigate course resources.
 - Example: *Share ideal workflows, estimated times for assignments and studying, and predictable structures for deadlines.*

Discussion



Do any of these recommendations resonate with the approaches you take to support students' online learning?



What would be challenging about implementing these recommendations?

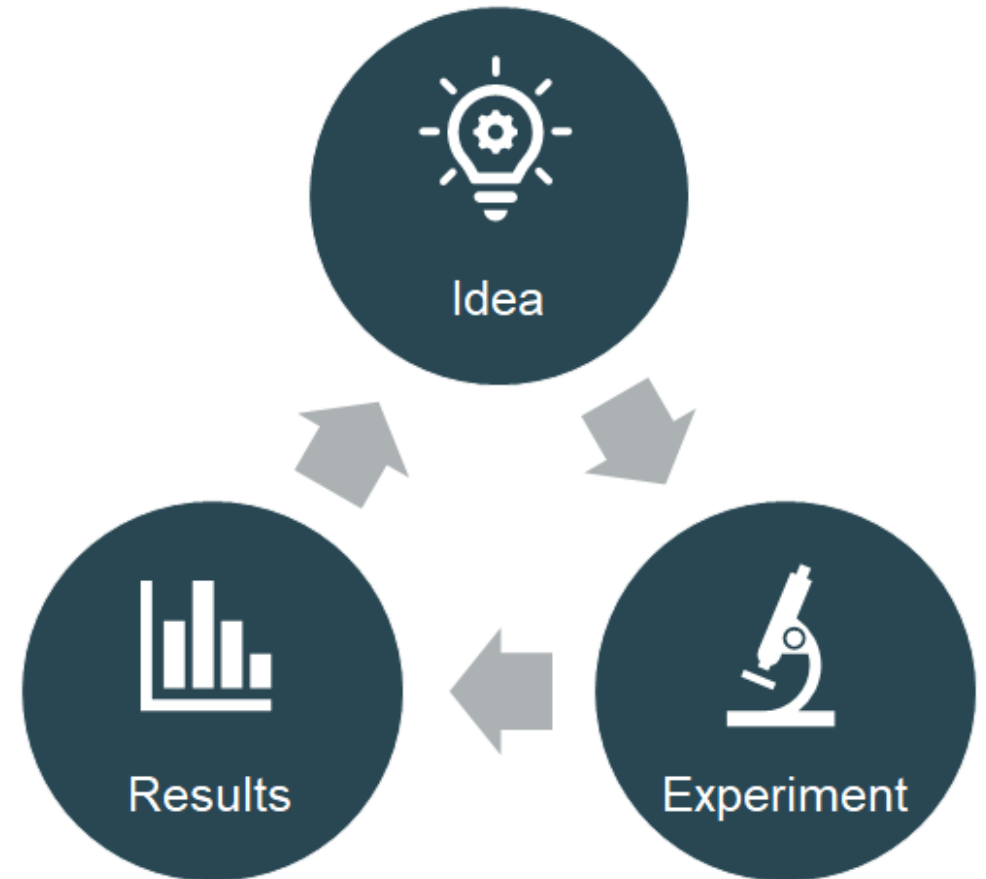
RCE Evidence-Based Strategies & Findings



Rapid cycle experiments (RCEs)

RCEs allowed instructors to test a specific strategy (or combination of strategies) in course sections that are designed to help students develop self-directed learning skills.

Findings from these formative studies, triangulated with other sources, are helping to identify and refine promising strategies to include in our culminating resources.



Strategies tested

Strategies were identified via literature review and systematic database review,¹ and were co-developed/adapted for online courses with instructors at four partner institutions:



Assign **videos** to support sense of belonging, time management, and growth mindset

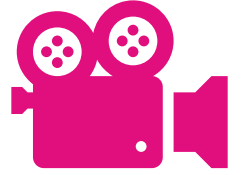


Set up automated **prompts** focused on goal setting, task planning, and reflection



Use technology to support student-peer interaction and networking (**SPIN**) and promote help seeking

Videos: Consistent structure



- **Part 1:** Overview
 - What students will learn in this video
- **Part 2:** Introduction to the SDL skills/mindset
- **Part 3:** Strategies to develop the SDL skills/mindset
 - Two or three strategies to encourage development of the skills/mindset
- **Part 4:** Closing
 - Where can students find more resources to develop SDL skills/mindset

Prompt strategy: Metacognitive supports



	Reflective prompts	Timing
Academic behaviors	<ul style="list-style-type: none"> What assignments and other coursework do you need to complete this week for this class? What information, resources, or help do you need to complete this week's coursework? 	Starting at 1x/week
	<ul style="list-style-type: none"> Have you scheduled a specific time to complete this week's work for this class? [If no] When will you complete this week's work for this class? 	Starting at 1x/week
Checking gaps in understanding	<ul style="list-style-type: none"> What questions from your last [assessment] did you not understand? What resources and strategies do you need to improve your understanding? <ul style="list-style-type: none"> <i>[Includes customized list of resources for each institution]</i> 	Starting with each major assessment
	<ul style="list-style-type: none"> Which concepts from this class do you feel you mastered this week? Which concepts are you still struggling with? 	Starting at 1x/week

Administrative and survey data



Administrative data

- **Outcome measure:** end-of-course grade in study course
- **Covariates:** gender, race, Pell recipient indicator, first generation indicator, birth year, cumulative GPA and cumulative credits at start of semester
- **Sample:** 1,647 students (855 intervention, 792 comparison)

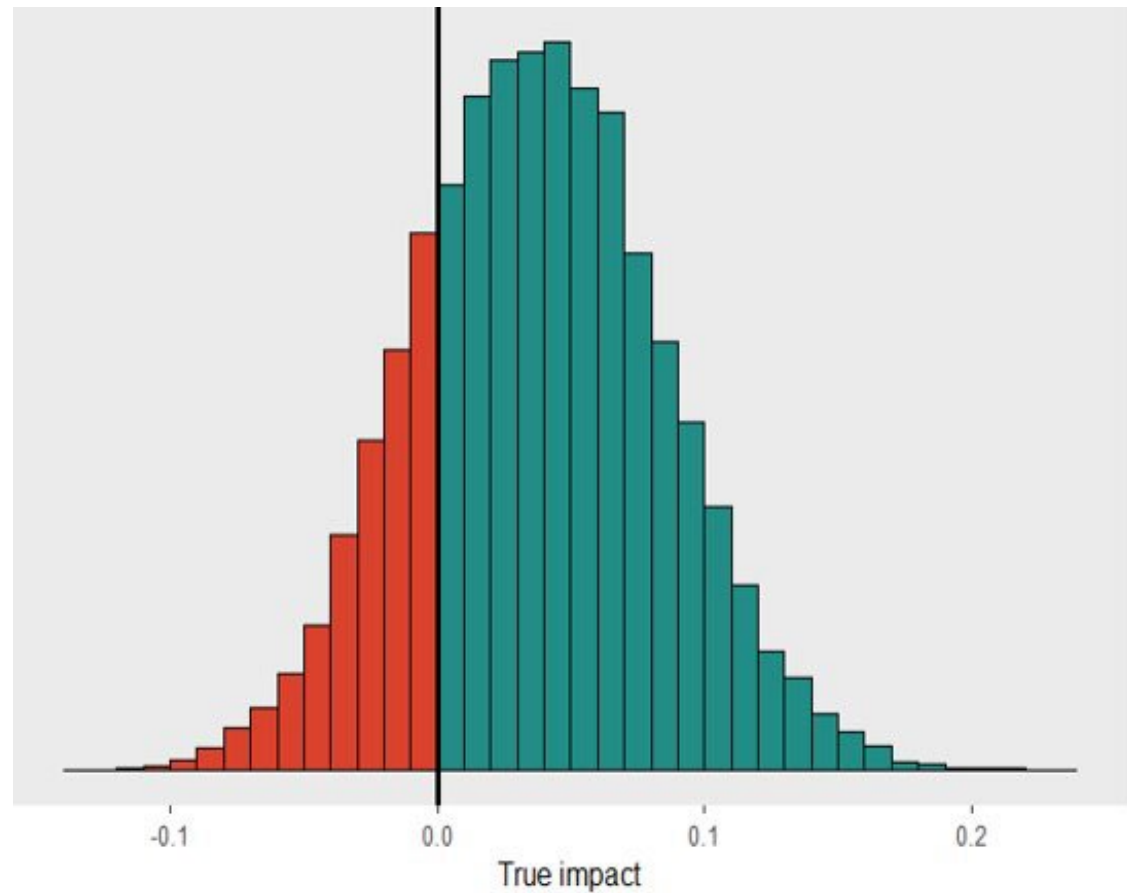
Student self-report survey data

- **Outcome domains:** motivational, metacognitive, applied learning strategy
- **Covariates:** baseline measures of each outcome measure, parents' highest education, full-time/part-time status, employment status
- **Sample:** 734 students (373 intervention, 361 comparison)

Findings on end-of-course grades

To account for smaller sample sizes, the study team conducted a Bayesian analysis, which incorporates prior evidence on other post-secondary strategies.

There is a 78% probability that our strategies had a positive effect on student achievement, specifically end-of-course grades.



Findings from Survey

- **Being in a class implementing at least one strategy positively impacted:**
 - **students use of more learning strategies (drawing diagrams, revising lecture notes and revisiting practice problems)**
 - **whether students evaluated their learning strategies.**
- **This study found the effectiveness of the strategies were consistent across student populations and across different courses.**

Outcome Domain	Outcome (* = Admin. Data)	Impact Estimate (SD)	p-Value	Prob Positive Impact
Motivational outcomes	Self-efficacy	-0.10	0.188	19
	Sense of belonging	-0.15	0.121	15
	Fixed mindset	-0.07	0.341	34
Metacognitive outcomes	Comprehension monitoring	0.08	0.283	81
	Debugging strategies	0.06	0.528	81
	Evaluation	0.21	0.006	98
	Goal-setting	-0.02	0.762	65
Applied learning	Learning strategies inventory	0.16	0.019	83
	Help seeking	0.08	0.314	72
	Time management	0.01	0.916	65
Achievement	End-of-course grade*	0.05	0.450	78

Experience With Using the Instructional Model

Presented by Wanda Velez

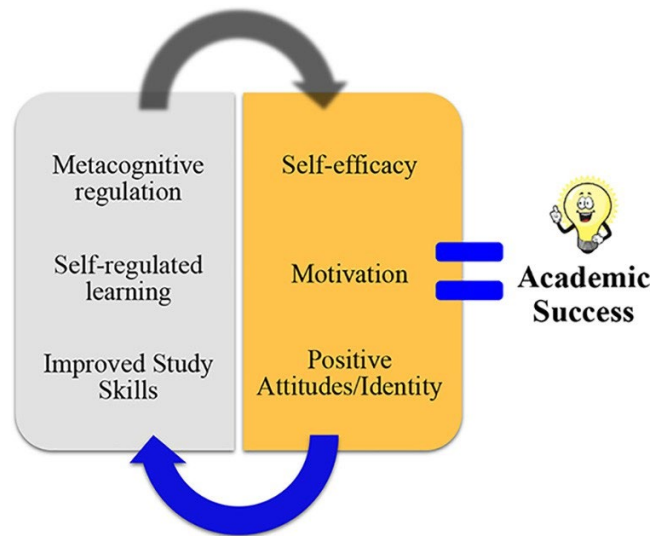


Introduction



- **Non-Majors Biology**
- **Instructional Model – Why?**

- Metacognition strategies already in the course
- Time management
- Notetaking



Positive feedback loop for student success in online learning.

Examples of application



- **How to do it – It's easier than you think.**
- **Be brave and try it.**
- **Practice and Implementation**
- **Showcase Canvas Discussion Board**
- **<https://vsu.instructure.com/>**

Student Responses: Sense of Belonging

"I definitely had severe anxiety when it came to biology and math, not my favorite subjects. I had expressed my concerns with Professor V, telling her how I tried biology in community college, and it was very stressful and a lot. But with her reassurance and motivation poured into me, I was allowed to build my confidence and take it again. I suggest opening up and discussing your fears with others because you never know who is experiencing the same and what help or advice can be offered. And so far, so good. I am enjoying this biology class."

(Sense of Belonging Discussion Board)

Student Responses: Time Management

"I plan to use time management and turn in my assignments on time or earlier since this class is online and during the summer, we can not afford to get distracted and waste time. I need to check my assignments every day and create a calendar while setting due dates for assignments. It's also important for you to take a mental break so you don't overstress yourself and take your time working."

– (Time Management Discussion Board)

Student Responses: Reflection

"I could benefit from slowing down when I read to process my reading. I could spend more time reviewing material before taking the next exam. Another way that I can improve in the next half of the semester is to make sure that I look at the BIO 116 Summer 2024- Calendar every day to be sure that I am staying on track to submit everything on time because I have to get used to turning in assignments before 6 pm as opposed to 11:59 pm."

– (Reflective Prompts)

Student Responses



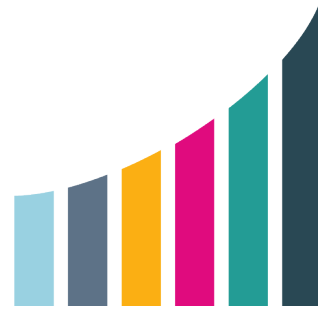
What preparation strategies worked well?

- *"Organizing my time and utilizing the exam preparation tools such as lectures and notes worked well."*

What kinds of mistakes did you make on the exam? (2-3 sentences)

- *"I made mistakes on the multiple-answer questions. Even though I studied, some answers to the matching questions were too similar, so I made an educated guess on those questions. I can be better at that by practicing more of these kinds of questions for the next exam."*

Student Responses



Based on what you learned from this exam, name at least two things you will do to prepare for the next exam. Be specific. For example, will you spend more time, start your preparation earlier, change a particular habit of study, try a new one (if so, try to name it), sharpen some other skill (if so, name it), participate in more review opportunities or something else?

- *"Based on what I learned from this exam, and the grade that I earned, I would start my preparations earlier than I did. I will spend more time practicing on the multiple-answer questions. I will take better notes on the upcoming units. Most importantly, I will organize my time to give myself at least an extra 45 minutes a day dedicated to this class." (Exam Wrapper II)*

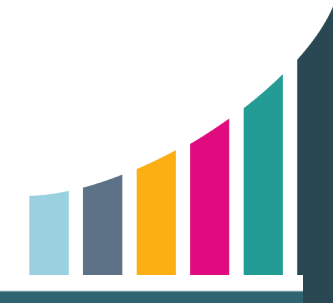
Discussion

In your experience in your online courses, do these instructional strategies seem feasible?

How would you implement these strategies in your online courses?

How does your institution support instructors in their efforts to address noncognitive skill development such as SDL skills and mindsets?

Tell your colleagues!



Access to resources
and & guidance



Building Students' Motivation and Learning Skills in Online Courses:
Insights from the Postsecondary Teaching with Technology Collaborative
Webinar: Thursday, November 14, 2024 at 2pm ET / 11am PT

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Teachers College, Columbia University  **Achieving the Dream**

New Webinar: Building Students' Motivation and Learning Skills in Online Courses: Insights from the Postsecondary Teaching with Technology Collaborative

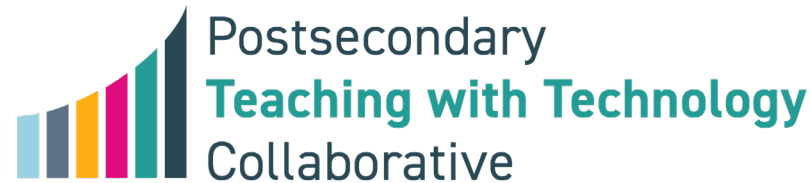
Thursday, November 14, 2024, 2 - 3:15pm ET



Thank you!

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