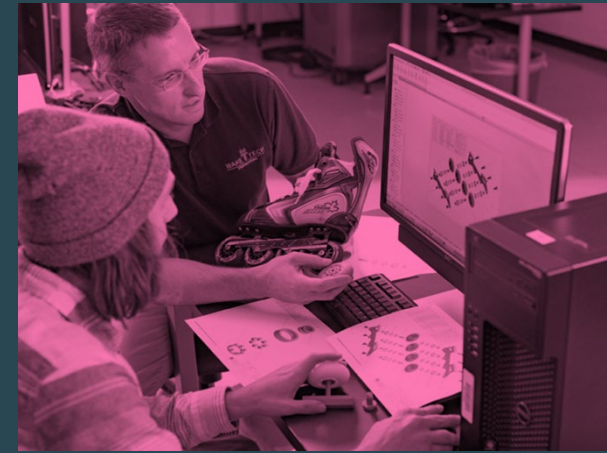


Beyond Engagement: Evidence-Based Strategies for Improving Self-Directed Learning in Online College STEM Courses

Hannah Cheever, SRI Education
Krystal Thomas, SRI Education



What is the Collaborative?

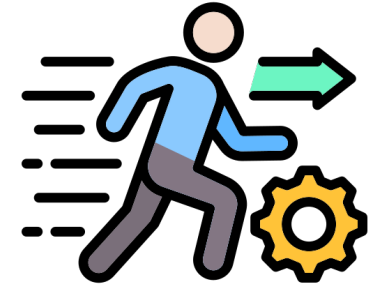
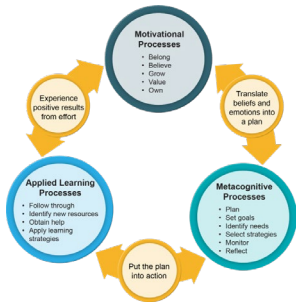
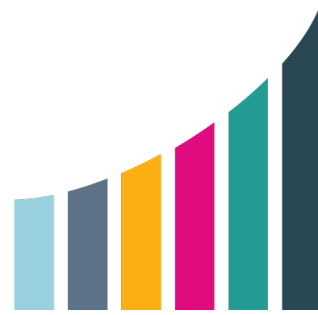


An Institute of Education Sciences (IES)-funded research and capacity-building center that aims to study and improve how faculty **teach** and use **technology** to help students apply and strengthen **self-directed learning** in online STEM courses.

SRI Education[™]
A DIVISION OF SRI INTERNATIONAL

CCRC COMMUNITY COLLEGE
RESEARCH CENTER
Teachers College, Columbia University

Today we will:



Share a brief overview of the Collaborative & our self-directed learning (SDL) framework

Introduce the SDL Instructional Model and share concrete resources to guide implementation

Describe initial research findings, including instructor and student perceptions

Discuss takeaways and next steps for implementation



Stop and jot



Jot down your top 3 changes you'd like to see in your students' academic behavior.



Why focus on self-directed learning (SDL) in online courses?



In the chat,



How familiar are you with self-directed learning?

- One: Never heard of it.
- Five: I'm an expert and should be co-presenting with you.



Online learning challenges



Student outcomes are generally worse in online courses and degree programs than in comparable face-to-face ones



Less engagement and interaction in online environments



Key factors: Greater demands on students' self-directed learning capacities; need for belonging and community

Students face particular challenges in STEM learning



Individual sink-or-swim culture

Content-heavy courses

Unclear personal relevance

Mismatched expectations about time commitment

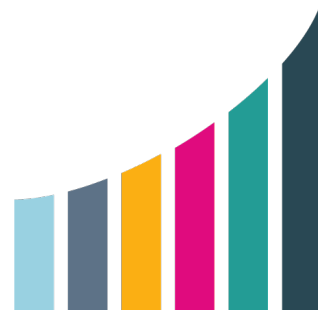


Belonging uncertainty

Stereotype threat

Feelings of isolation

Here's how these challenges show up in your online STEM course



Challenges

Students must manage deadlines and expectations more independently

Students may feel isolated or unsure they belong

Students may feel like it's harder to ask for help



Consequences

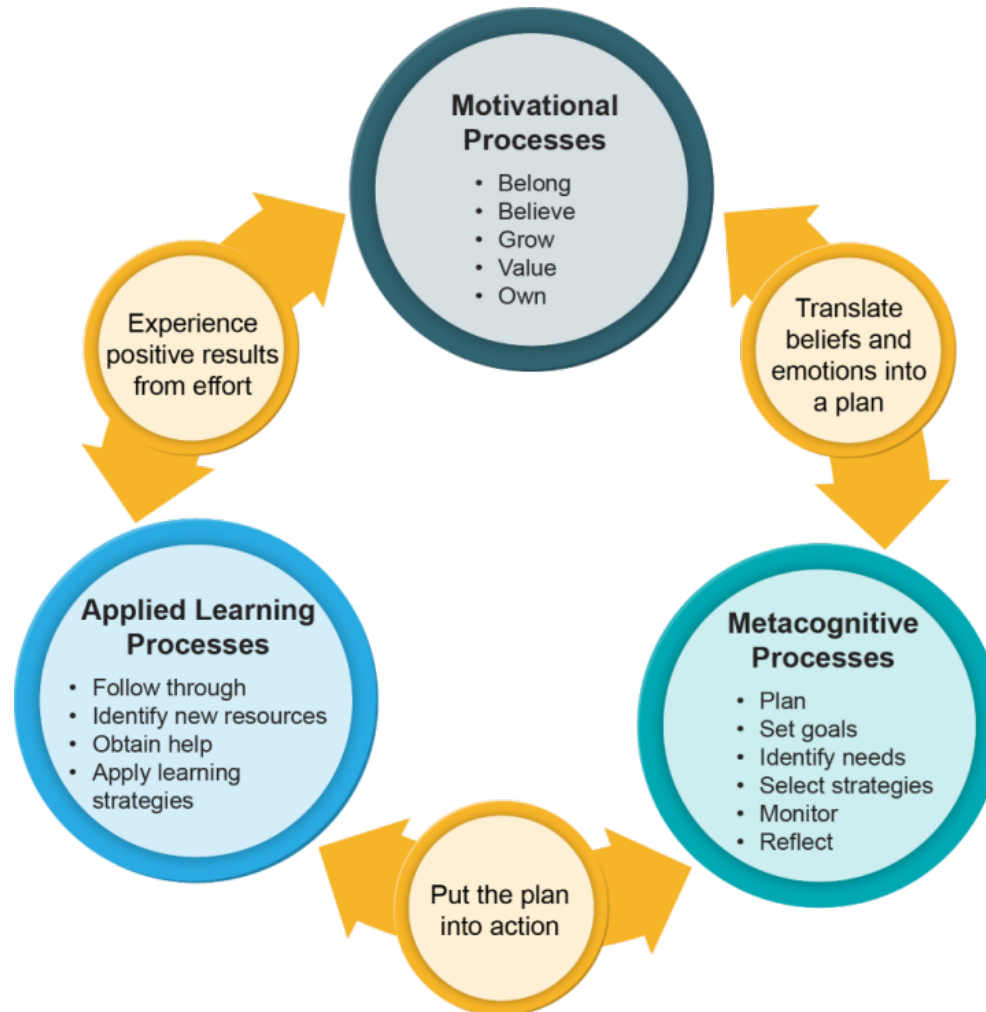
Easier to lose track or fall behind

Lower engagement

Small issues turn into big problems

(e.g., Murdock-Perriera, 2019; National Academies of Sciences, Engineering, and Medicine, 2023; Steele, 2010; Walton et al., 2023; Yarnall et al., 2023)

Framework for Self-Directed Learning (SDL)



Check out the Collaborative report, Teaching and Designing Online STEM Courses to Support Self-Directed Learning Skills, to learn more!





Supporting self-directed learning in online courses

In your role, what kind of strategies or resources do you use to:

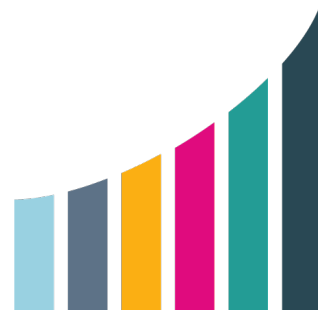
- Increase students' motivation?
- Help students reflect on and keep track of their learning?
- Help students study more effectively and efficiently?

Share out



Self-Directed Learning (SDL) Instructional Model

SDL Instructional Model



Three evidence-based strategies to help college students manage their online learning better:



Three short videos to boost sense of belonging, time management skills, and confidence through growth mindset

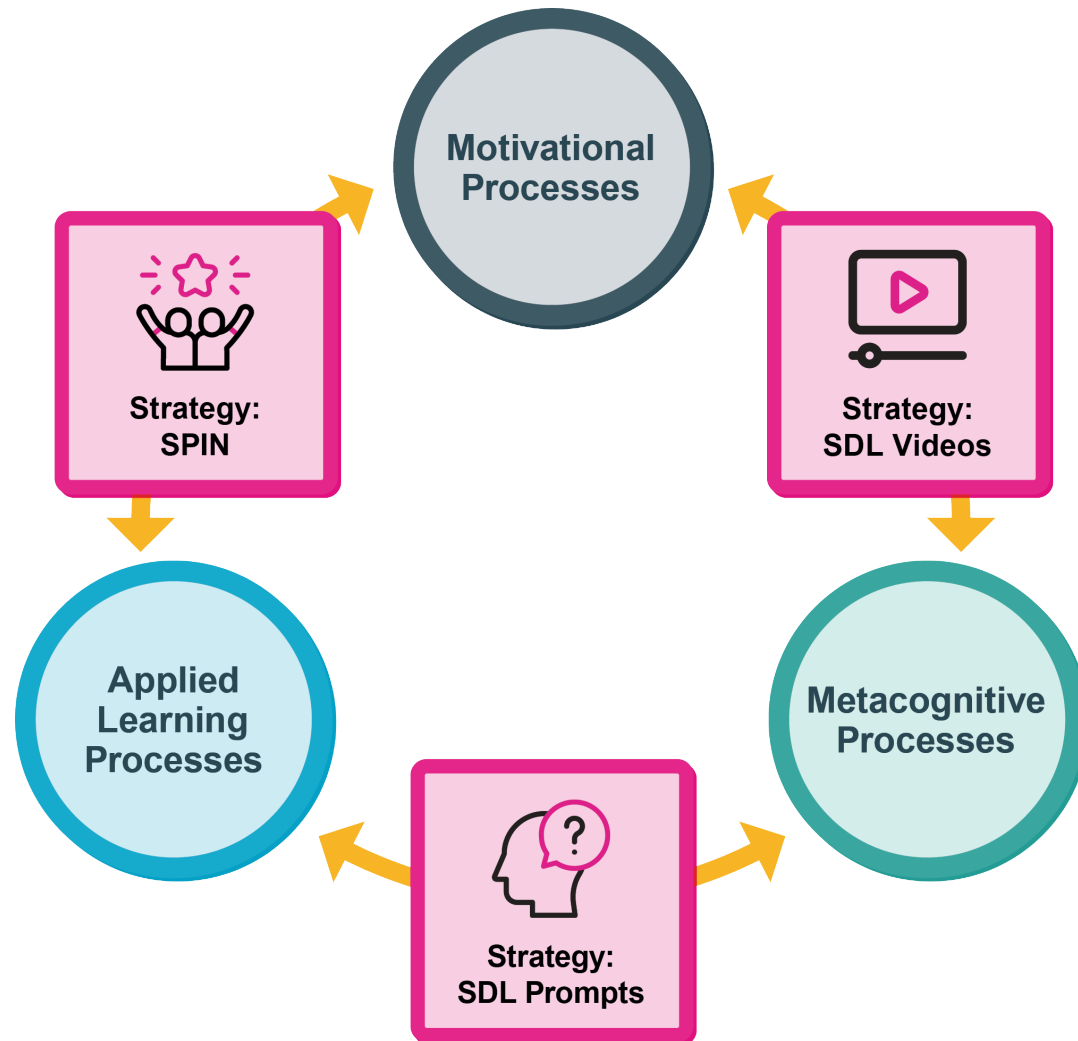
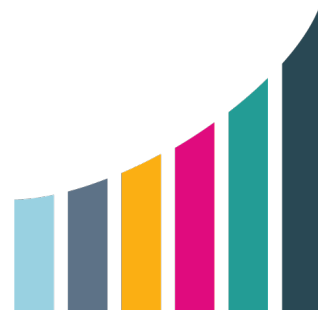


Questions to promote reflection, tasks planning, progress-monitoring, and help-seeking

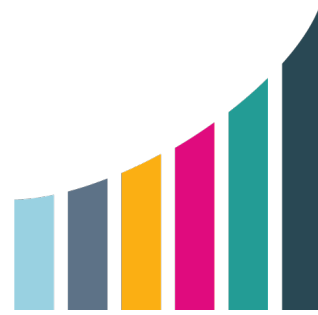


Introductory questionnaire and collaborative activities to foster belonging and promote help-seeking

Targets five student skills



An Instructional Model created in partnership



Faculty, staff, researchers, and experts across our partner institutions, advisor groups, and partner organizations:



Informed development and evaluation plans



Participated in formative pilot evaluations

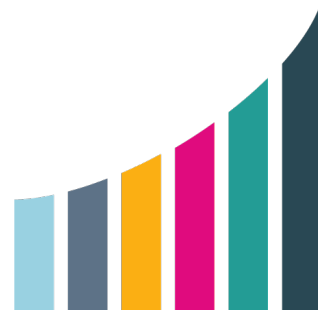


Co-designed strategies and supplemental materials

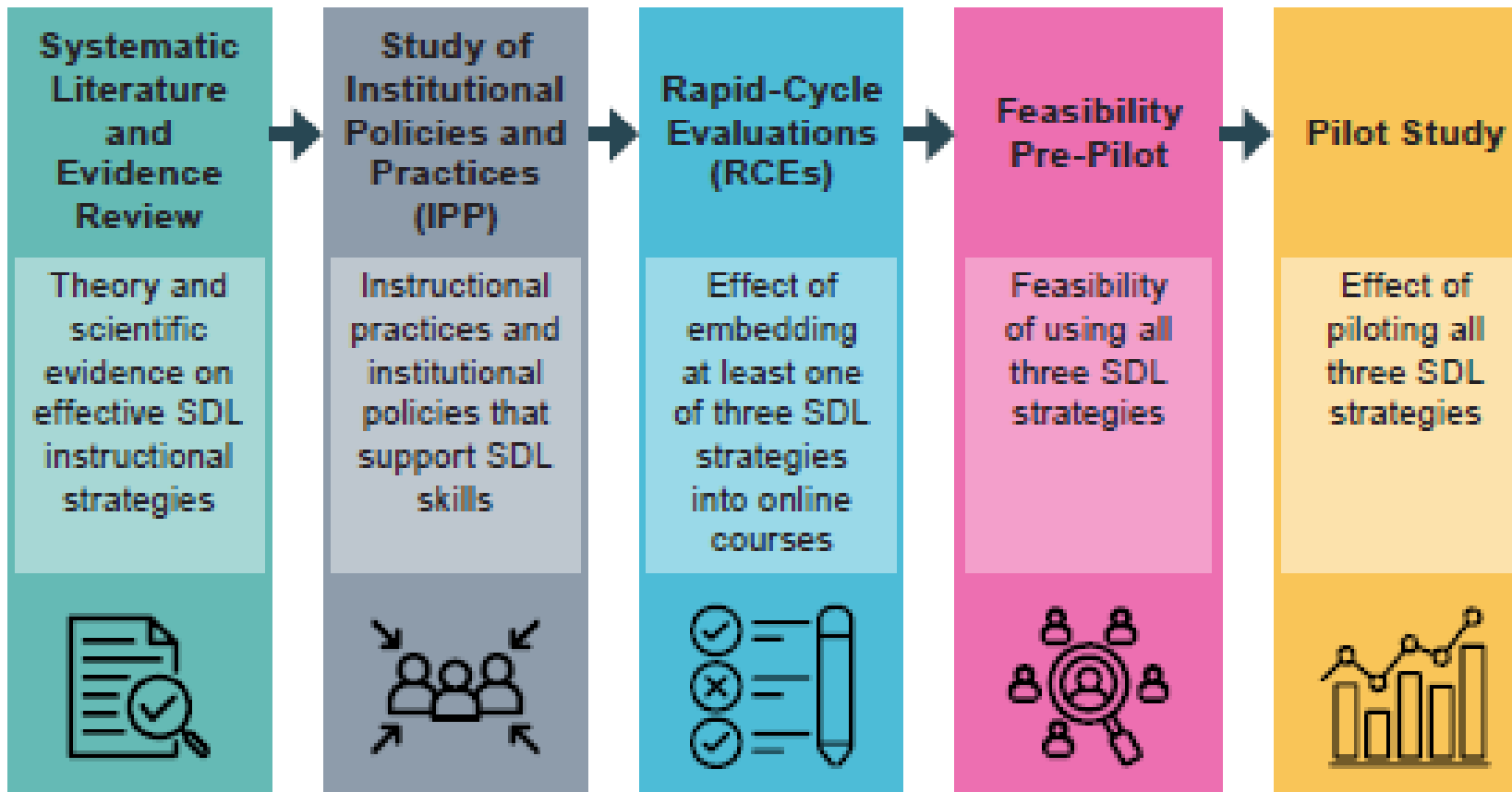


Offered feedback throughout design and evaluation process

Research activities



Multiple rounds of research, refinement, and testing, including:



Study portfolio for evaluating the SDL instructional model



Three complementary studies examined implementation, feasibility, and pilot effects.

Rapid-cycle evaluations (RCEs)

At least 1 of 3 SDL strategies

24 instructors
4 partner institutions
4 semesters
105 course sections
~2,200 students
~1,400 survey respondents

Feasibility Pre-Pilot and Pilot study

All 3 SDL strategies

Feasibility Pre-Pilot

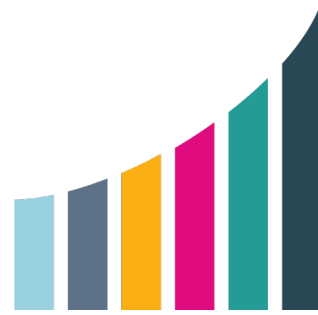
9 instructors
3 partner institutions
11 course sections

Pilot

24 instructors
5 partner institutions
50 course sections
~1,400 student
~300 survey respondents

Evidence-building sequence: Phase 1 (RCEs) tested individual SDL strategies; Phases 2 (Pre-pilot) and 3 (Pilot) examined whether instructors and students could use all three strategies together and what happened when they did.

Key findings



Feasible, free, and ready to use



Yields engagement from students



Valuable to instructors & students



Evidence of improving SDL skills

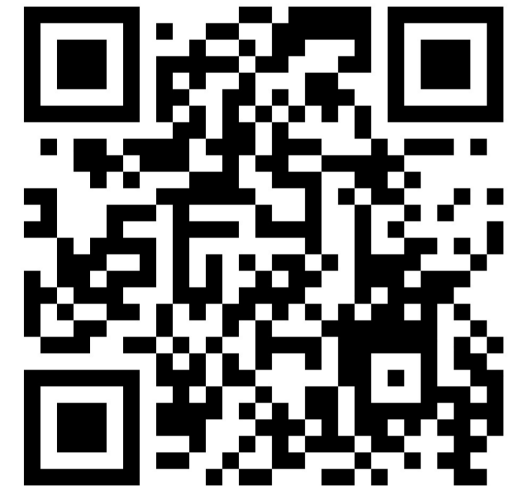
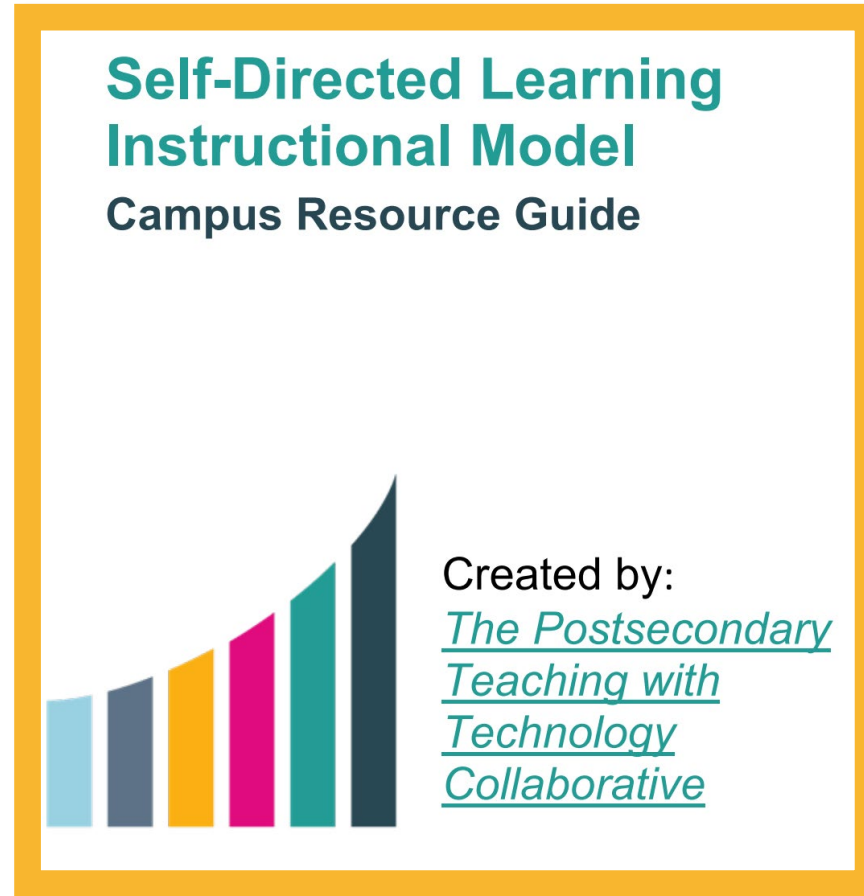
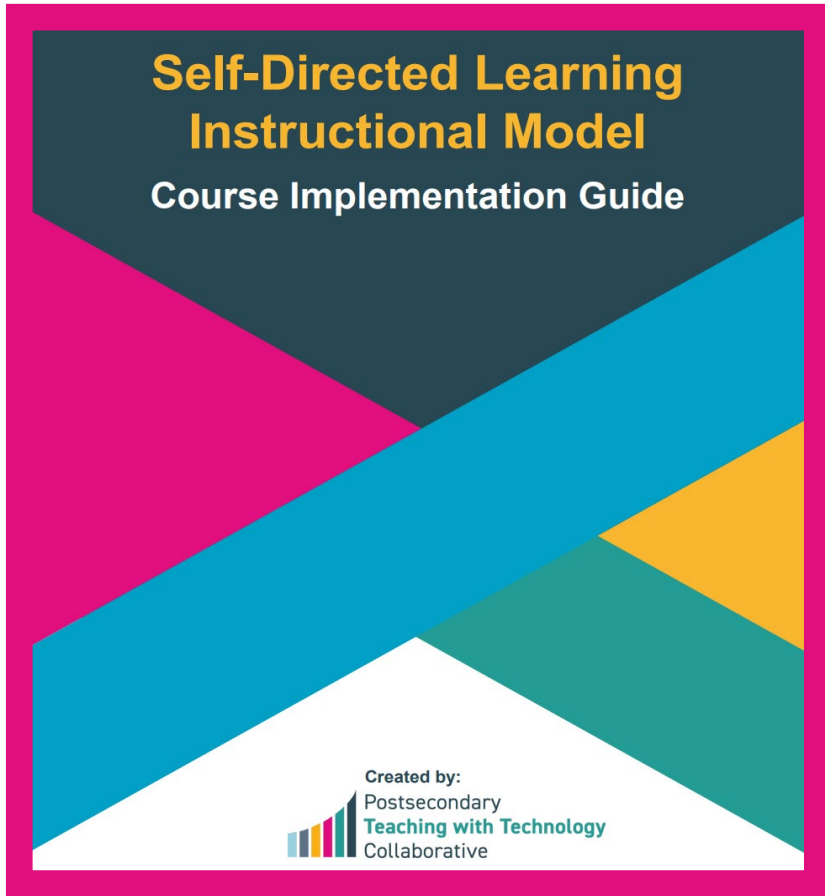


Likely to improve course grades



May offer particular benefits to some students




SDL Instructional Model guides



How to implement the strategies in your course

Three strategies



 SDL Videos	 SDL Prompts	 SPIN
Motivation, metacognition	Metacognition, applied learning	Motivation, applied learning
Three short videos to boost sense of belonging, time management skills, and confidence through a growth mindset	Questions to promote reflection, task-planning, progress-monitoring, and help-seeking	Introductory questionnaire and collaborative activities to foster belonging and promote help-seeking.

Pacing guide



Activity	SDL Strategy	Course Pacing	Estimated Time for Students
Introductory Questionnaire	SPIN	First week	10 mins
Sense of Belonging	Videos	First week	20–30 mins
Time Management	Videos	Within first 2 weeks	20–30 mins
Pre-Assessment	Prompts	One week before first major assessment/assignment	10–20 mins
Growth Mindset	Videos	After first major assessment/assignment	20–30 mins
Post-Assessment	Prompts	After first major assessment/assignment has been returned	10–20 mins
Reflective Prompts	Prompts	Flexible: At least twice during the course	10–20 mins
Collaborative Activity	SPIN	Flexible: At least twice during the course	Varies
Message to a Future Student	Prompts	Final weeks of the course	20–30 mins

SDL Video Series

SDL video series topics



Activity	Target SDL Skill	Course Pacing	Estimated Time for Students
<u>Sense of Belonging video</u>	Develop sense of belonging	First week of the course	20–30 mins
<u>Time Management video</u>	Plan for learning	Within the first 2 weeks of the course	20–30 mins
<u>Growth Mindset video</u>	Build confidence and self-efficacy as a college student	After the first major assignment or assessment	20–30 mins



SELF-DIRECTED LEARNING INSTRUCTIONAL MODEL

The Student Perspective on **SDL Videos**



Student experience: SDL Videos



“I was inspired by one of the videos to start [a WhatsApp group]....we were all a little bit confused..., so we collaborated together, and somebody was able to find a website that helped with that discussion.”

Student voice | Confidence • Belonging • Help-seeking

Also heard: “helped me gain confidence and allowed me to realize that if I put the work in and stay committed, I will succeed”

What students experienced

Initiative to seek help among peers
Peer connection when content felt difficult

What this shows

Short videos can normalize struggle and prompt help-seeking.

Why it matters for the model

The model uses brief instructor-created supports to build confidence, belonging, and persistence early in the course.

SDL Prompts



SDL Prompts

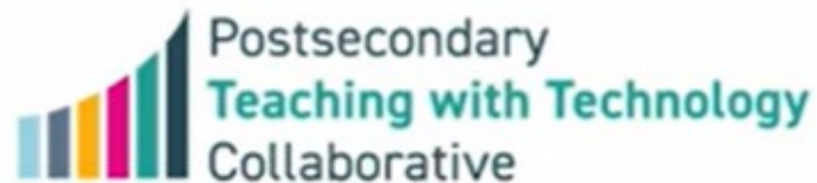


Activity	Target SDL Skill	Course Pacing	Estimated Time for Students
Reflective prompts consist of a set of three questions that can be assigned at any time during the course.	Engage in self-reflection Seek help	Twice during course	10–20 minutes
The assessment wrapper consists of a two-part activity that should be assigned a week before a major assessment or assignment (pre-assessment) and after the student has received their grade (post-assessment).	Plan for learning Engage in self-reflection	Once before and once after an assessment or assignment	30–40 minutes
The message to a future student invites students to reflect on their course performance and can be assigned as a written reflection or a video recording.	Engage in self-reflection Build confidence and self-efficacy as a college student	Final weeks of the course	20–30 mins



SELF-DIRECTED LEARNING INSTRUCTIONAL MODEL

The Student Perspective on **SDL Prompts**



Student experience: SDL Prompts



“... you are able to look back on if your study techniques gave you the goals that you want. You can also examine tips from fellow classmates and see if they have an idea that you haven't thought of or if they had a different technique that allows them to get a good grade.”

Student voice | Reflection • Monitoring • Strategy adjustment

Also heard: “You can look back on whether your study techniques helped you meet your goals.”

What students experienced

Reflection on learning choices
New ideas from classmates

What this shows

Prompts supported metacognition, progress monitoring, and peer learning.

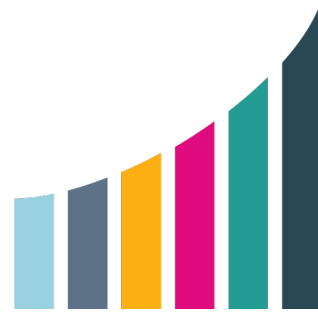
Why it matters for the model

The model makes self-directed learning visible by giving students regular structures to pause, reflect, and adjust.

Student-Peer Interaction and Networking



Student-Peer Interaction and Networking Activities



Activity	Target SDL Skill	Course Pacing	Estimated Time for Students
Introductory questionnaire	Build a sense of belonging	First week	10 minutes
Collaborative activities	Develop a sense of belonging Seek help	Flexible: At least twice during the course	Varies



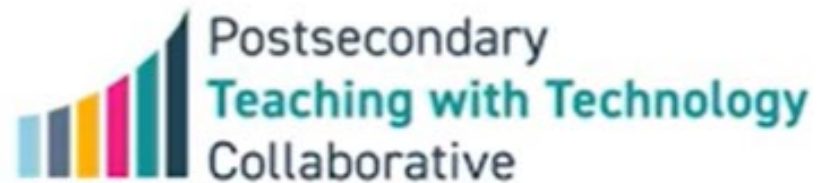
Online collaboration challenges: Best practices



- Incentivize participation
- Group students intentionally
- Explain the purpose of working in groups
- Support relationship-building
- Assign effective collaborative activities, with clear roles for each student
- Share best practices for team meetings
- Provide ongoing support

SELF-DIRECTED LEARNING INSTRUCTIONAL MODEL

The Student Perspective on **SPIN Collaborative Activities**



Student experience: SPIN Activities



“I later understood it gave my class more of a human aspect and gave us a chance to see who we are.”

Student voice | Belonging • Support • Collaboration

Also heard: “When I got stuck online, I needed clearer examples and support.”

What students experienced

Greater human connection
A need for clearer collaboration supports

What this shows

Peer activities can build belonging, but they work best with clear scaffolds.

Why it matters for the model

The model pairs connection-building with explicit support for productive online collaboration.

Discussion

Small-group discussion



- Think back to the behavior change you identified for your students. Which strategies (prompts, videos, SPIN, others) seem most promising to spur this change?
- In your experience in your online courses, do these instructional strategies seem feasible? How does it resonate with what you have tried or currently do in your online courses?
- How does your institution support instructors in their efforts to help students develop academically supportive behaviors and strategies such as SDL skills and mindsets?

Share out



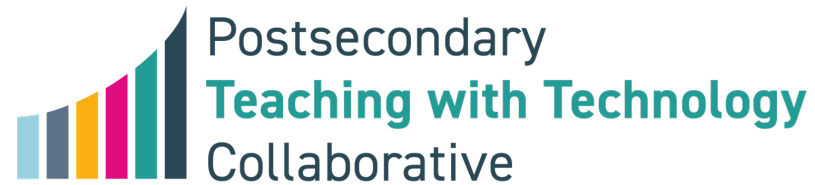
Thank you

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