# If you build it, they will break it

## Undergraduate students' novel use of study technology

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01 Undergraduate students and digital tools

02 Themes in novel study technology use

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04 The unknown unknown

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01

# Undergraduate students and digital tools

Instructional activities and assessments varied substantially by class.

Instruction is locally idiosyncratic and has local effects on how students engage in their coursework (Brown, 2017)

| | | | |
|---|---|---|---|
| Instructional | Curriculum, exams, and instructional technology are shared | | |
| | | ...bed/Peer ...uction | Traditional Lecture |
| | | ... slides w/ less ...t, more often visualizations | 5-7 slides with substantial text |
| Pre-Lecture preparation | Pre-Lecture video by instructor | Pre-lecture video from Flip It Physics | NA |
| Class Time | Peer instruction w/ practice analytical and conceptual problems; Weekly Python lab in different lecture hall | Peer instruction w/ practice analytical and conceptual problems | Traditional lecture with occasional practice problem completed in groups |
| Homework | Digital homework system provided through online textbook | | |
| Out-of-class Activities | Virtual Python Programming | Clicker Qs during Pre-lecture Videos | NA |

## Students' day to day academic work and technology

Reflects instructors' preferences and institutional infrastructure (Jones, 2012).

The arrangement of digital resources complicates undergraduate students lives in unexpected ways– they push back (Selwyn, 2015)

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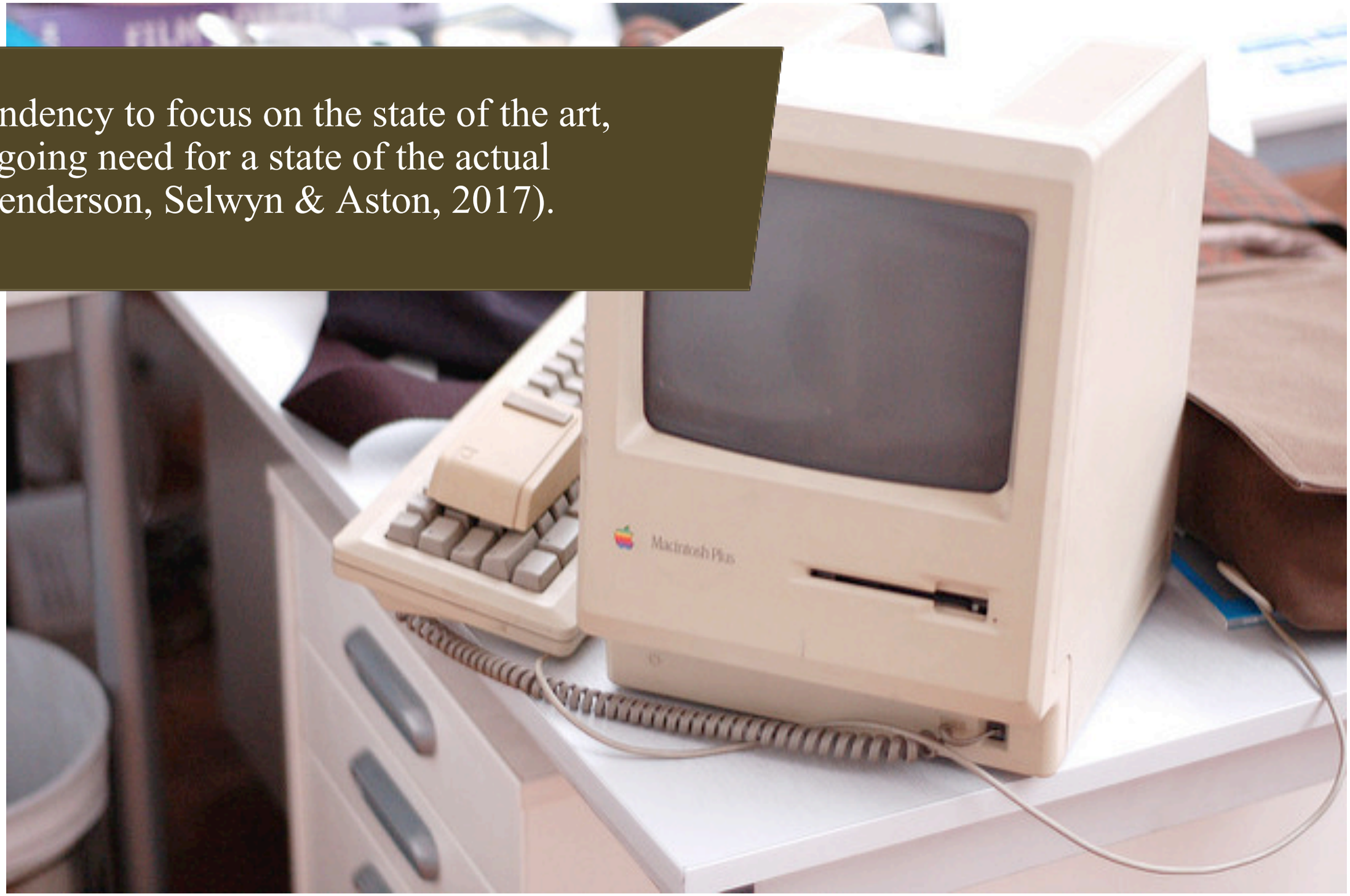
Tendency to focus on the state of the art, ongoing need for a state of the actual (Henderson, Selwyn & Aston, 2017).

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02

# Students’ study strategies

# Self-determination and out of class study behavior

Students respond to incentives differently given their motivations, and beliefs. Limits our ability to anticipate the influence of

- Performance feedback
- External contingencies
- Social expectations

among students in classrooms and courses.

# Self-determination and out of class study behavior

Out of class study behavior  is driven in large part by inherent interest, individual preferences, and perceived cost of academic tasks (Perez, et al., 2014)

Instructors frequently rely on external contingencies of enforcement (Neimec & Ryan, 2009)

Curricula and course materials are not often designed with intrinsic motivation in mind (Ryan & Deci, 2000)

# Self-determination and out of class study behavior

Coursework that promotes autonomy effectively facilitates intrinsic motivation (Froiland & Worrell, 2016)

Students perceptions of their own competency precedes internal motivation and mediates external motivation (Ryan & Deci, 2017)

Close relationships and peer interactions can influence changes in students' study strategies (Brown, 2017).

03

# Themes in novel study technology use

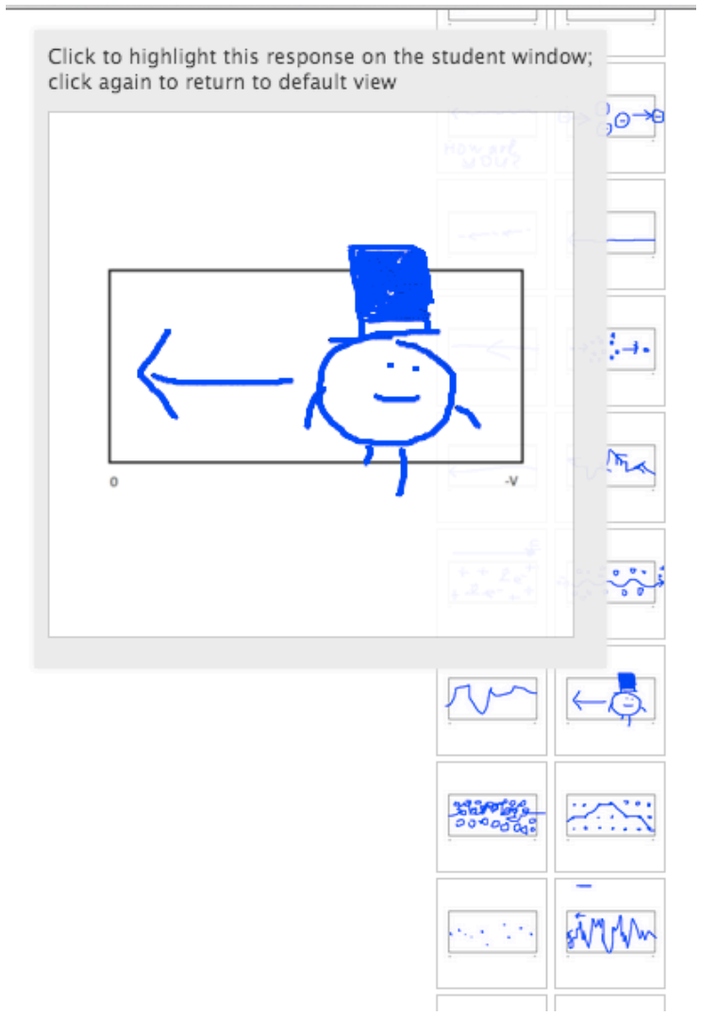
# Research design

Daily observation of instruction in four introductory science courses at three institutions (residential and commuter)

Retrospective interviews with students in each course about their use of digital study technology as part of coursework (n=73)

Digital study technology refers to a broad spectrum of web enabled tools that students use as part of their preparation for lecture and for course assessments

# *Learning how to use something new*




**Round 1**

36 responses

- WUTANG
- air resistance
- add the effects of air drag
- Stop the ball from falling through the floor properly
- Add Drag
- be smarter
- understand what the questions are asking
- air resistance
- learn python
- air resistance
- be taught how to use python
- try harder (ツ)
- adding air resistance
- Add air drag
- include air resistance
- Add an if statement to stop ball from bouncing
- AirResistance
- learn python
- add spin
- air resistance
- inlude air resistance
- add air resistance
- Ehem, AIR DRAG
- add air resistance
- air resisistance
- add air resistance
- add air resistance
- With Players!

**Round 1**

gsin(theta): **15%**

g*sin(theta): **65%**

a = g*sin(theta): **3%**

m*g*sin (theta): **3%**

gsintheta: **3%**

a = fgravity*sin(theta): **3%**

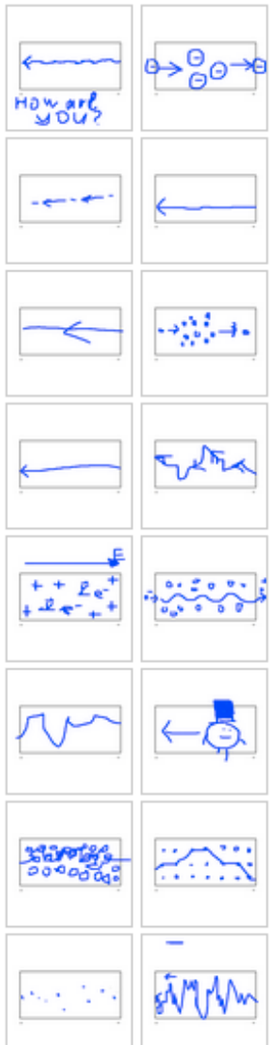
gsin(theta)/m: **3%**

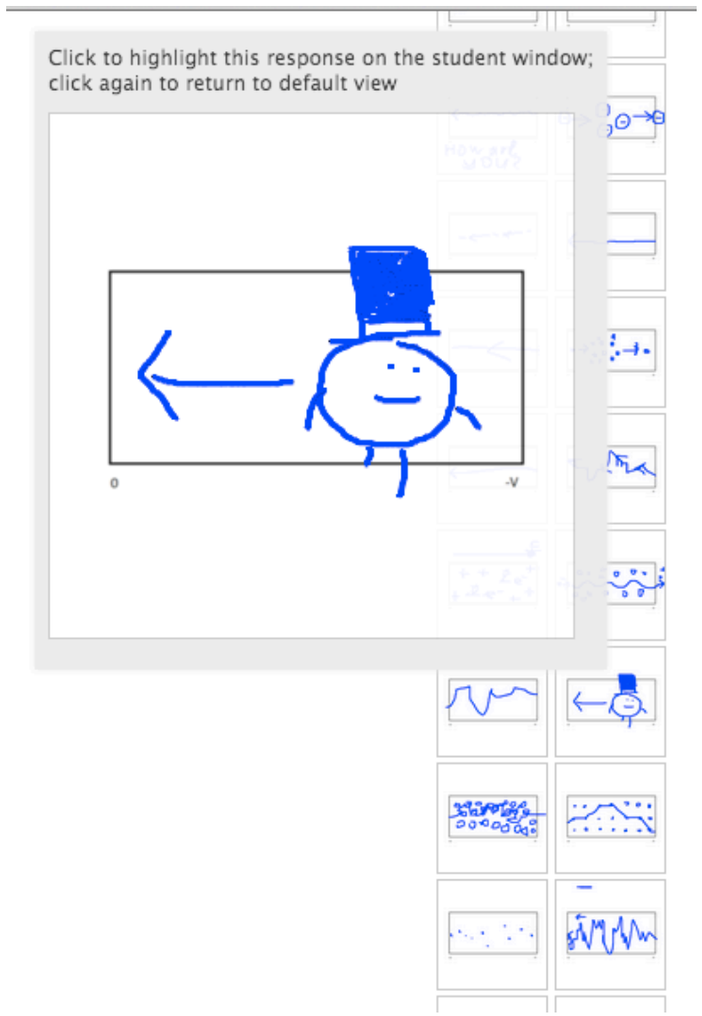
g*sin(\theta): **3%**

gsin*(theta): **3%**

✔ **4** get it now
✖ **0** still don't get it

# *Playing with affordances*





# *Testing boundaries and expectations*

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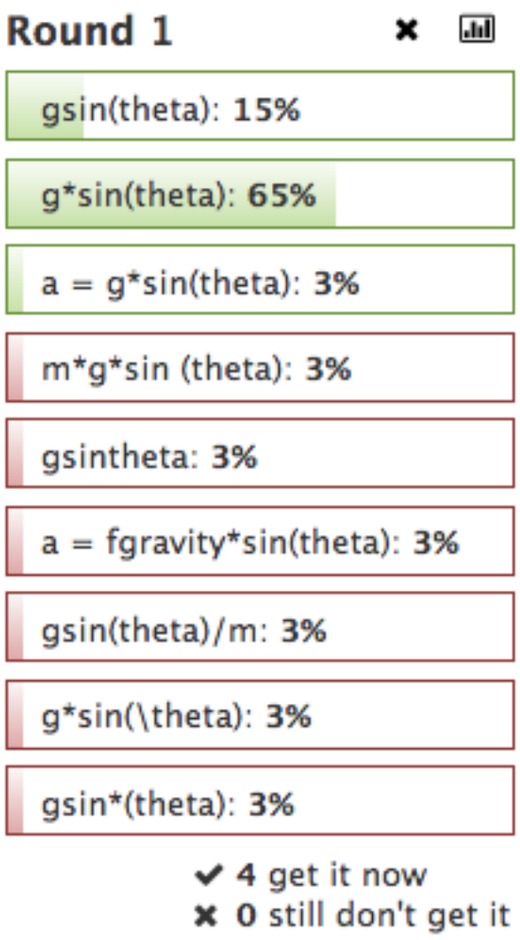
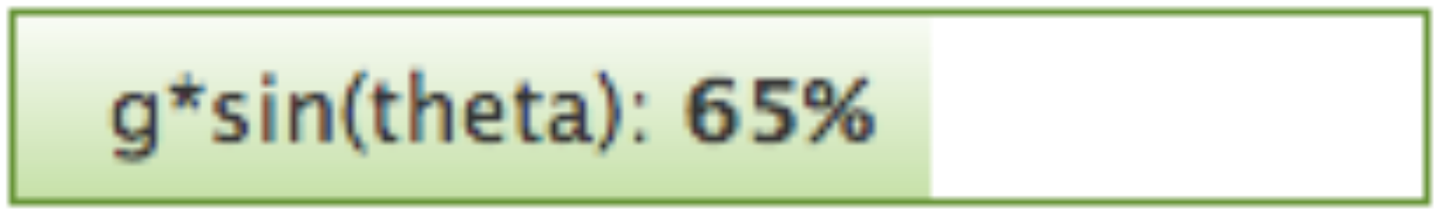
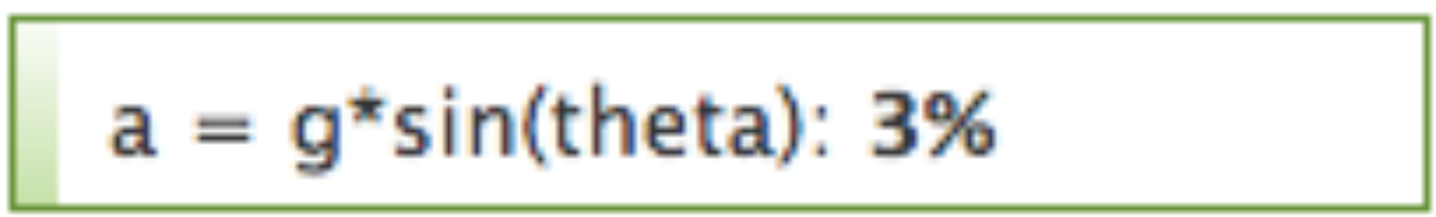
# *Clear objectives*



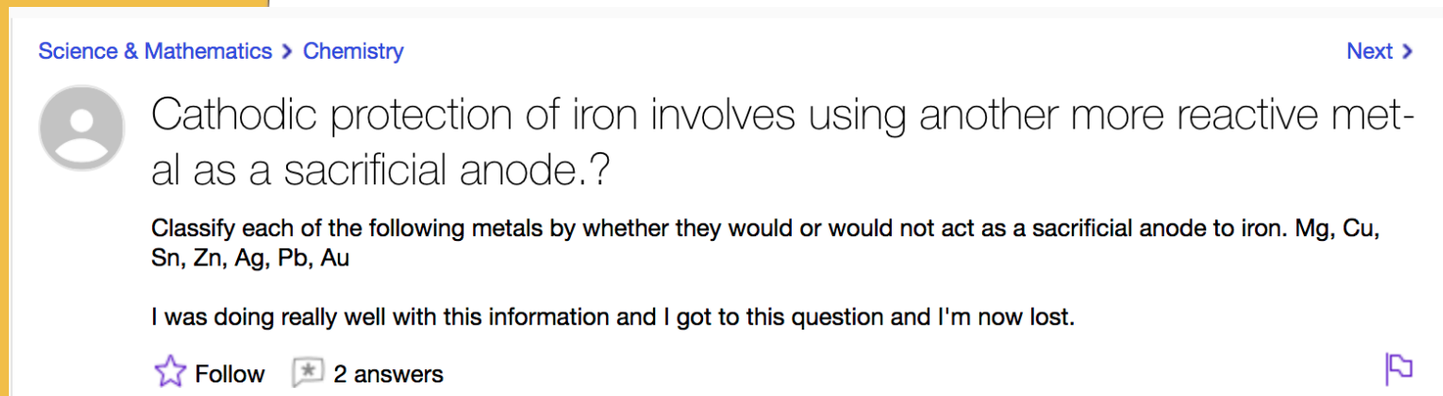




# *Looking elsewhere for clarity*

"When I don't understand something, first, I go to the internet." (Second Year, Engineering, Commuter Campus)


Science & Mathematics › Chemistry

Next ›

Cathodic protection of iron involves using another more reactive metal as a sacrificial anode.?

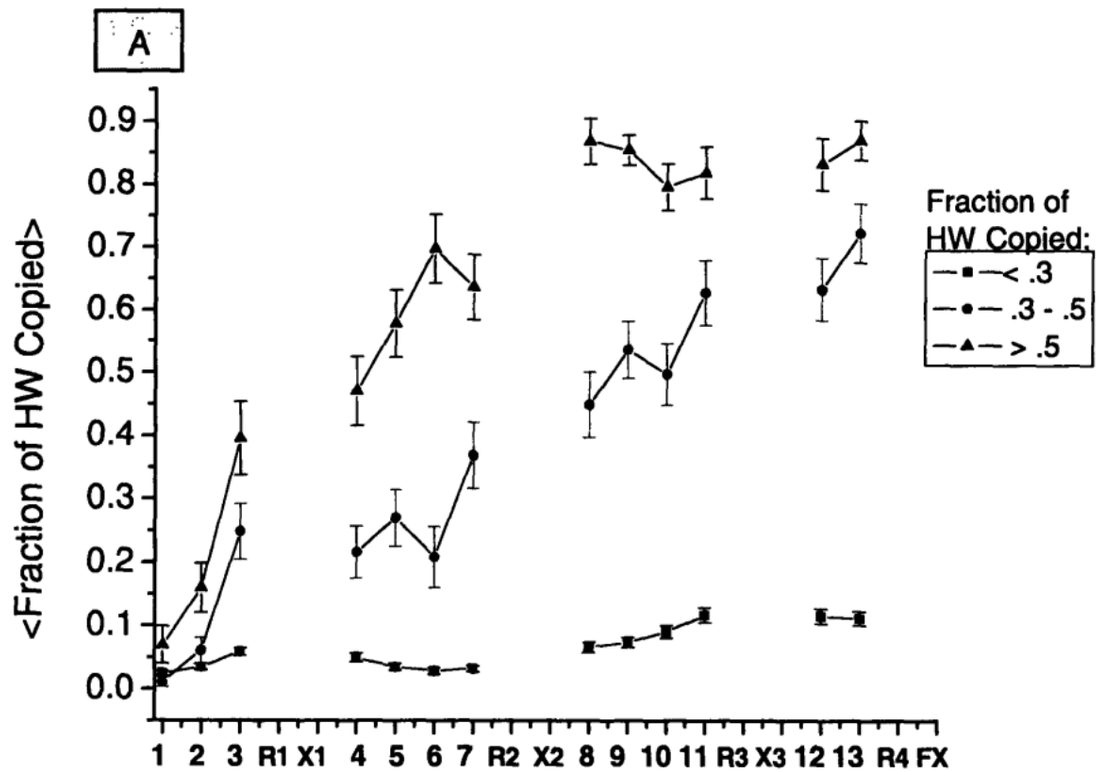
Classify each of the following metals by whether they would or would not act as a sacrificial anode to iron. Mg, Cu, Sn, Zn, Ag, Pb, Au

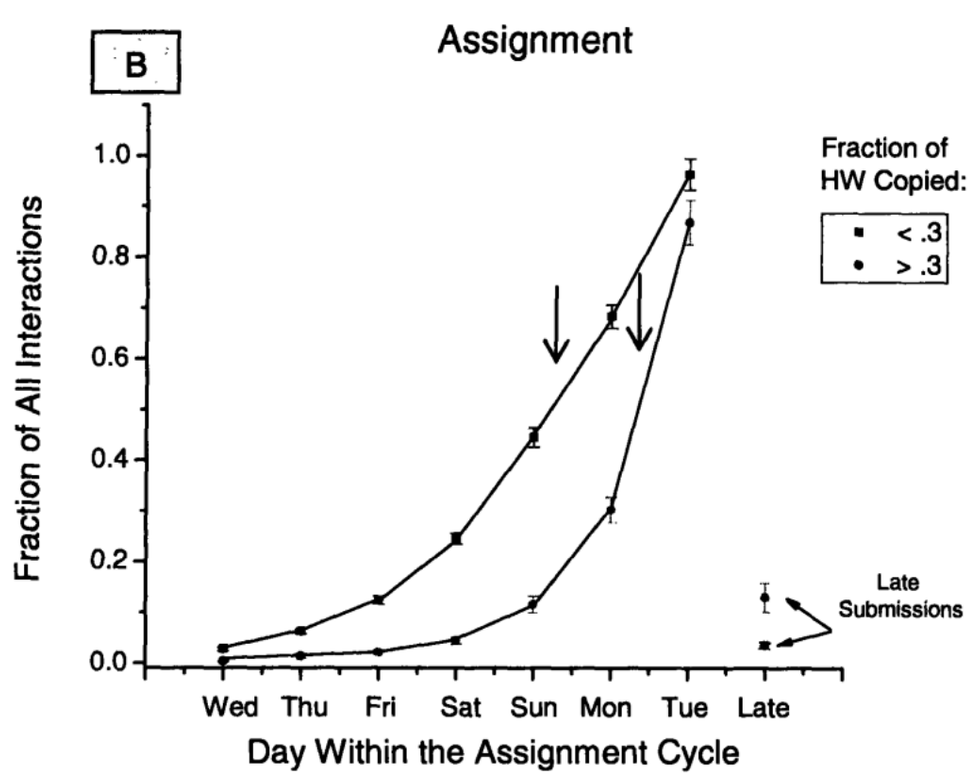
I was doing really well with this information and I got to this question and I'm now lost.

Follow 2 answers

# Copying, cheating, and academic performance

(Palazzo, 2006; Palazzo, et al., 2010)



# *Looking elsewhere for clarity*

The internet makes no differentiation between good and bad advice

Web searches return information based on relevance

The most relevant answers are specific instead of general

# *Looking elsewhere for clarity*

Reinforcing learning:


What the Internet does best:

# *Looking elsewhere for clarity*

Students end up looking for a solution instead of an explanation

Students trained to look for specificity as an indicator of quality.

Websites like Chegg muddy the waters.

Unclear boundaries between cheating vs help-seeking.

## *Learning about tech*

“I wish I had known…I use it now, and it’s like ’Why didn’t I use this?’

(First Year, Engineering, Residential Student)

## *Out of class collaboration*

We get together, and I'm like "THROW IT UP". [My study partner] puts the questions on the screen and we work through them."

(First Year, Engineering, Residential Student)

# Most study technology only addressed one domain of self determination theory

Bring Your Own Device (BYOD) approaches and searching the web promoted autonomy

Practice problem web applications allowed students to test their competence

Using the web to search for study resources increased perceived competence, but not necessarily understanding

Designers and instructors may be overlooking the value and utility of promoting relatedness

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**Individual eco-systems**

Students are working in individual tech ecosystems. They play, explore, and test as part of configuring tools for study strategies. Tools have to integrate into their practices. They rarely adopted resources that didn't 'fit'.

**Always on resources**

Students study strategies are 24/7. They look for 'always on' resources, and they tend not to trust the textbook. They end up reviewing specific applications instead of conceptual explanations.

**What and When**

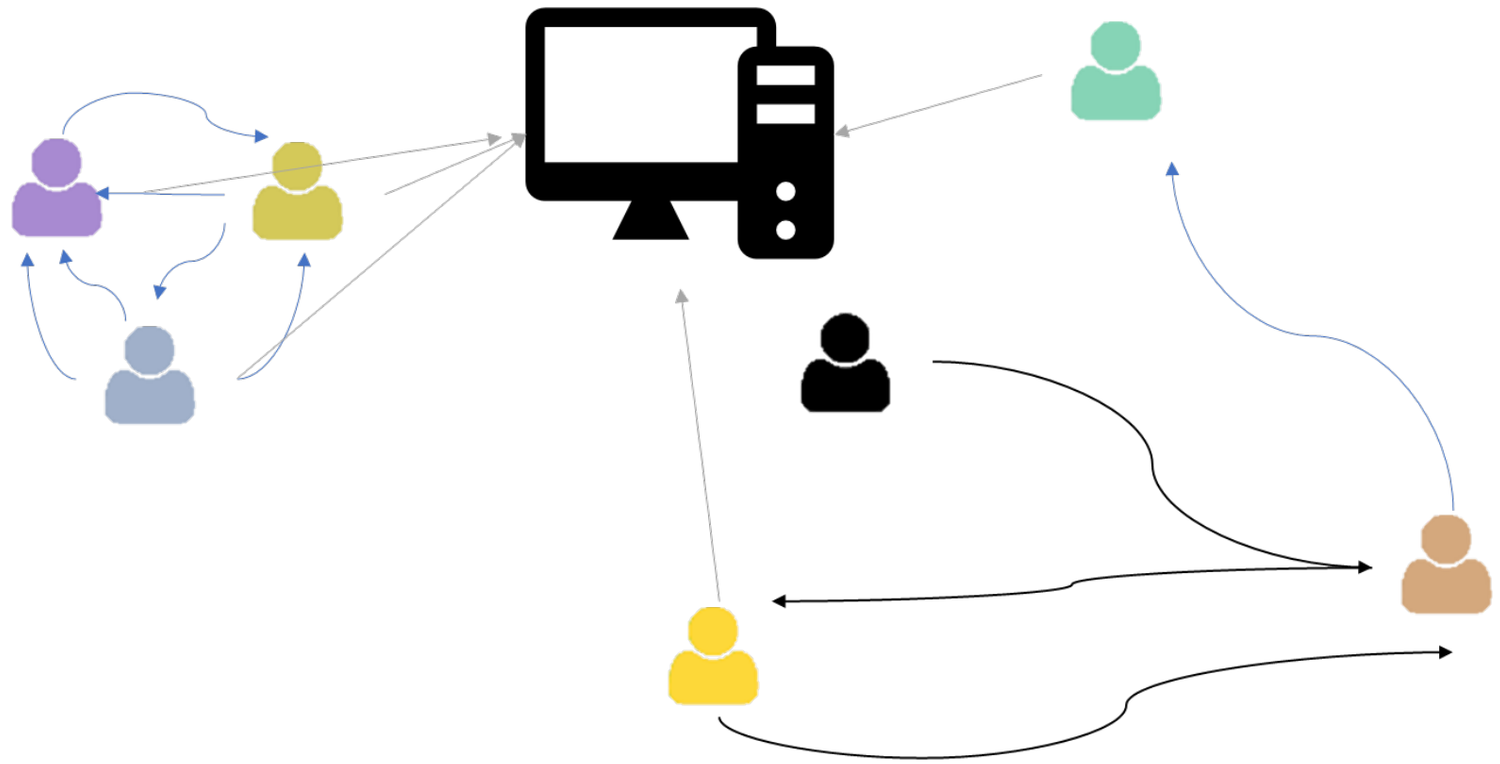
Students need help understanding when and in what ways they should use digital learning resources.

**Socio-technical systems and socio-academic integration**

04

# Faculty, large courses, and out of class study technology

# Student centered instruction does not mean the instructor is de-centered



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## How is the work of teaching and learning organized in your course?

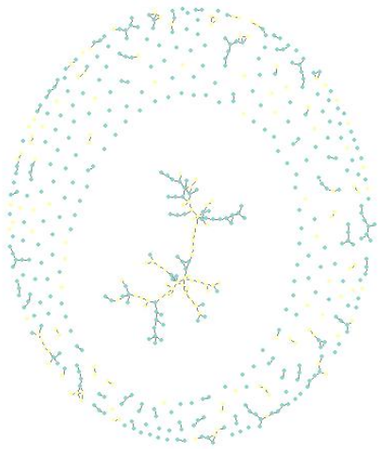
Focus on goal and problem formation in the development of instructional tools and in the framing of tools for student use.

Identify the value of these tools for other outcomes– students make these evaluations on their own. You can reinforce them.

Successful learning activities  incorporate a students' understanding of the things they need to acquire to understand and apply their knowledge (Engeström, 2001)

# Student centered does not mean that the instructor is de-centered

Instructors could capitalize on the social networks in their class. Frame technologies as sociable tools for study.



Identify resources that allow students to connect around their coursework- when students connect they are exposed to alternative strategies

# Student centered does not mean that the instructor is de-centered

Timing matters.

Students respond dynamically to performance feedback.

Instructors should consider what students need to know and when they need to know it.

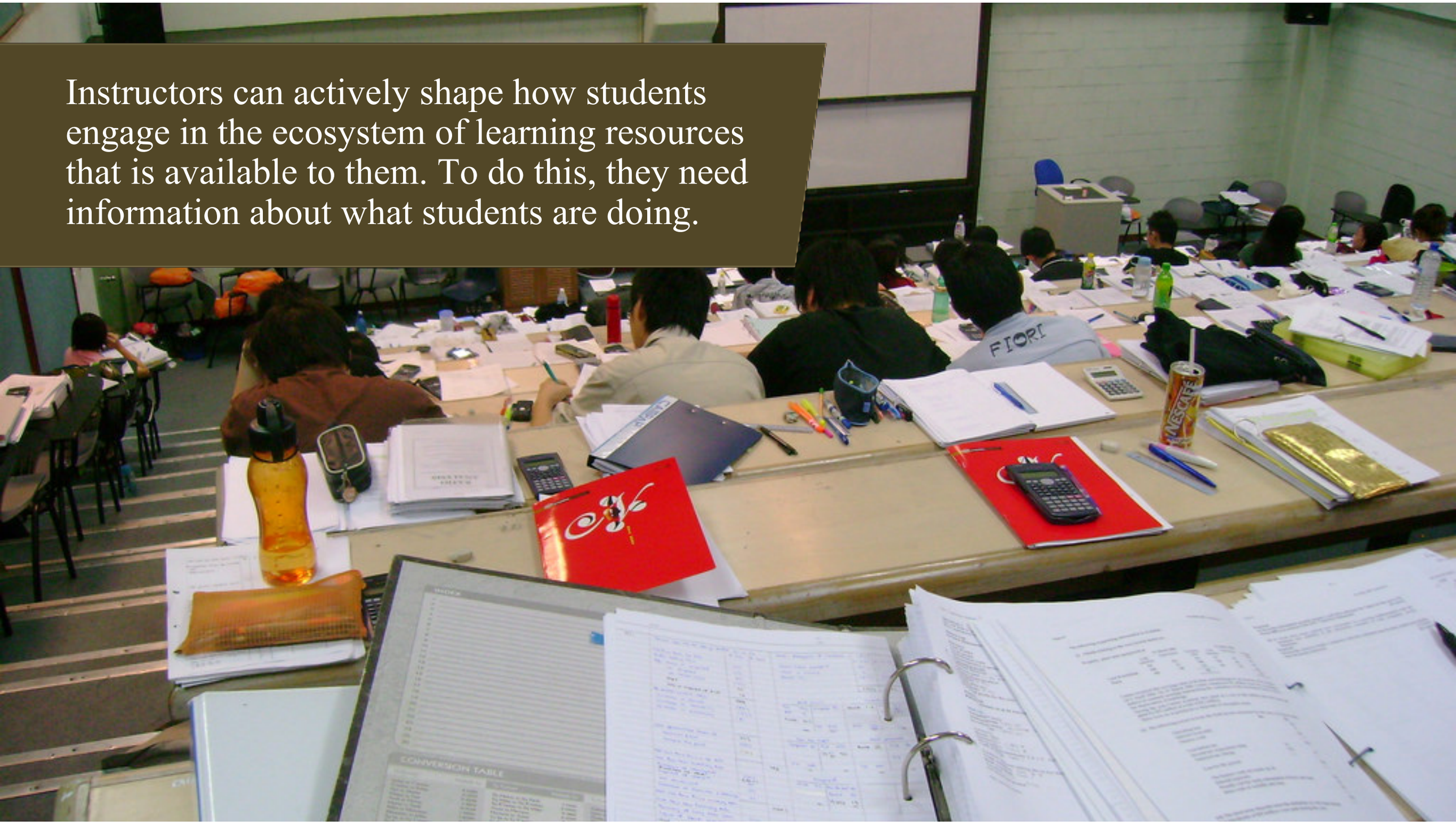
# Student centered does not mean that the instructor is de-centered

Direct students towards resources that reinforce general models of conceptual understanding.

Students needs need an alternative to the frictionless path.

Help them identify expert resources beyond the textbook, and helping them identify expert ways to use the textbook.

Instructors can actively shape how students engage in the ecosystem of learning resources that is available to them. To do this, they need information about what students are doing.



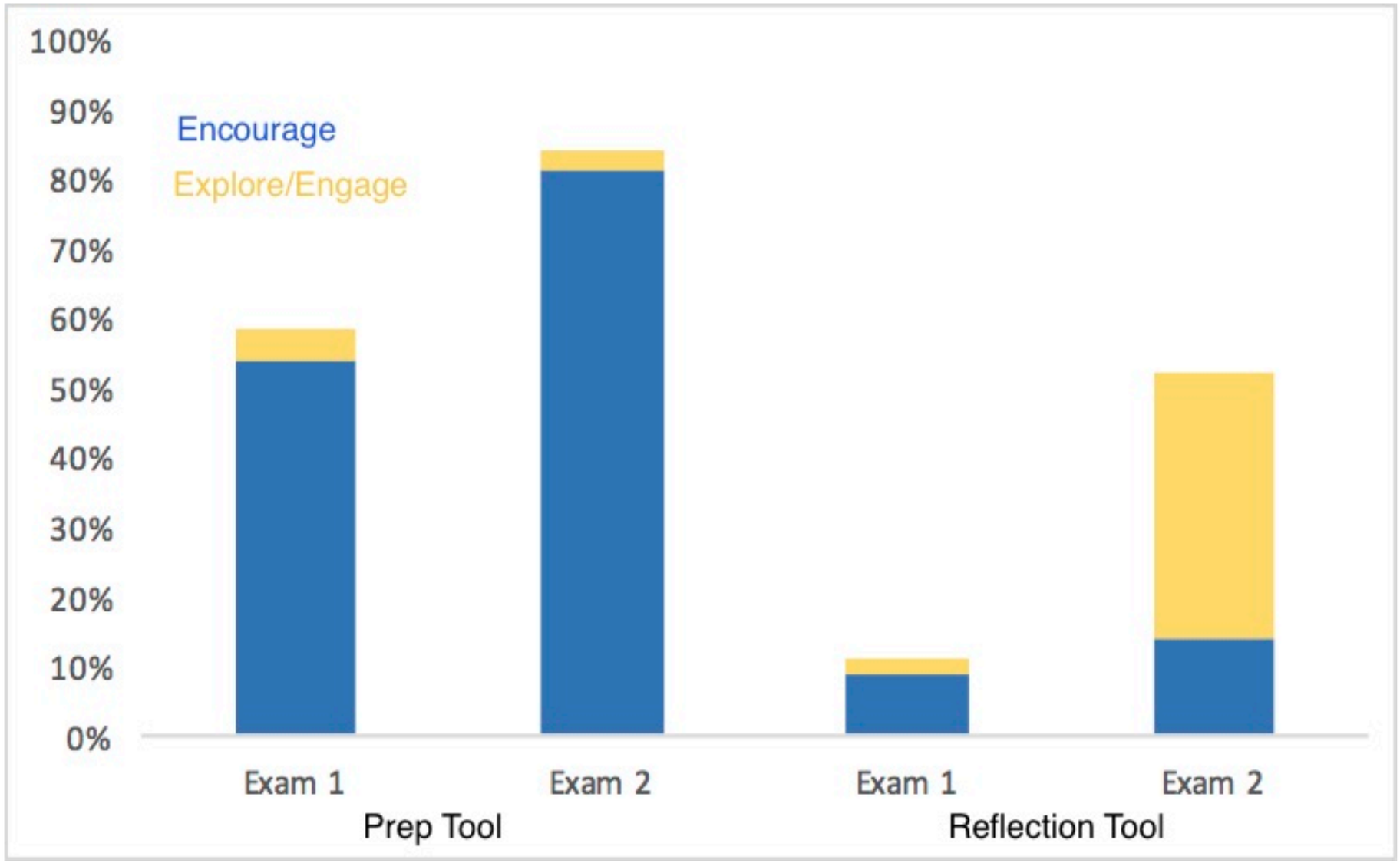
05

# The Unknown
# unknown

## *Questions for small groups*

- In large lecture courses, what do faculty know about how students prepare for class and assessments? What don't they know?
- What do faculty need to know to make changes to instruction and to facilitate student success?
- How can we capture the kind of data that would answer question 2?

# *Using data to surface meaningful trends about student behavior*




(Brown, DeMonbrun, & Teasley, 2016)

*You are an omniscient instructor*

In small groups, if you were to build a feedback system for instructors in large courses, what information would you want to include?

*If you are an instructor, think about what you wish you knew about what your students were doing.*

*You are an omniscient instructor*

How will you present the information you think is relevant?

*If you are an instructor, think about what kind of information about student behavior you find compelling. What might make you change your instructional strategies?*

*You are an omniscient instructor*

What sources of data would you use to inform the system?

*If you are an instructor, think about what data about student behavior you might have access to. What data would you have in an ideal world where time and cost are not concerns?*

*You are an omniscient instructor*

How might you analyze or transform that data to provide valid inferences?

*If you are an instructor, what kind of information do you find credible about student performance? What makes something a sound metric?*

*You are an omniscient instructor*

Take your second sheet of paper!

*Based on what you've discussed, what would a feedback system for instructors look like?*

*How is it organized?*

*What information does it deliver (and when)?*

*Who is involved in the system and what are their roles?*

*Who beyond the instructor is receiving feedback?*

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*You are an omniscient instructor*

What did you observe about other groups' systems?

What would you want to add to or change about your system?

Make sure you identify what roles are part of the system and where different roles come into play.