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Technology-enabled active learning in gen ed courses

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Technology-Enabled Active Learning in Gen Ed Courses

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Asynchronous online courses tend to lack a true “lecture”.

Textbook reading



Videos

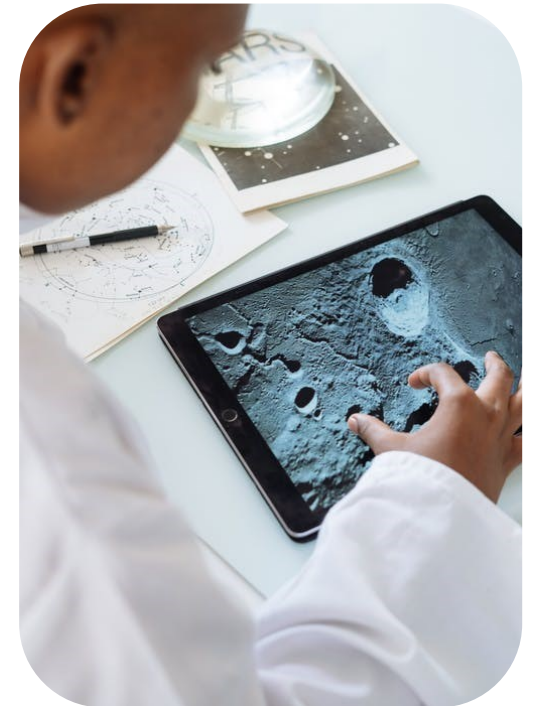


In STEM, when communication of content engages students, learning is more effective.

[Bada & Olusegun \(2015\)](#)

[Cotner et al. \(2013\)](#)

[Freeman et al. \(2014\)](#)



Engagement can take several forms.

Active – students interact with content but do not generate new material or information

Constructive – students generate material based on information received

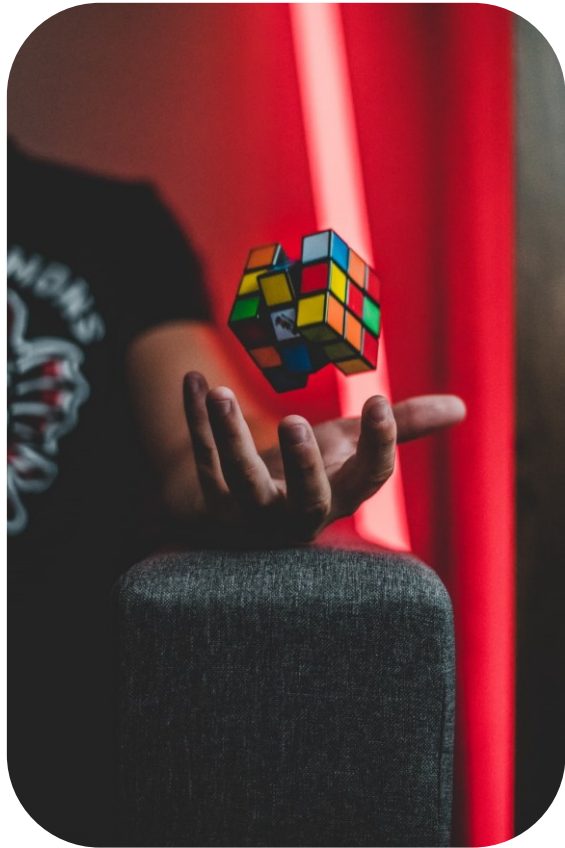
Interactive – students exchange ideas with all contributing



Personalization and engagement must be intentionally created. Online courses offer unique opportunities.

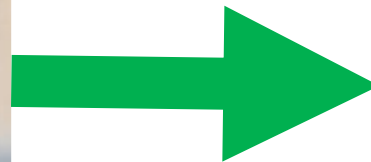


&



H5P is an ed tech tool that can help!

Instructor-generated HTML5 assets to promote self-paced, self-directed active learning.



You can still present *your* content.

- Text
- Video or audio
- Images
- Hyperlinks

The components of some mixtures can be easily identified while others cannot.

Homogeneous

Uniform composition



Copper + Zinc = Brass

This homogeneous mixture is called a **solution** because its constituents are evenly distributed and will not separate out over time.



Orange Juice

Heterogeneous

Varied composition



Sand, magnified

This heterogeneous mixture is called a **suspension** because its constituents will separate out over time ... that's why you shake dressing!



Homemade Salad Dressing

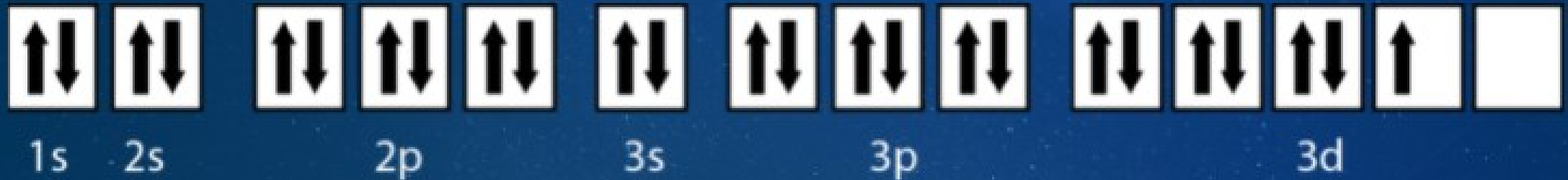


...while also embedding active engagement.

- Drag & Drop
- Drag the Word
- Multiple choice
- Image hotspot
- Fill in the blank (basic and advanced)
- T/F
- Image sequencing
- Mark the words
- Essay
- Image pairing

The screenshot shows an interactive learning interface titled "Drag and Drop" with the instruction "Match the images under the labels". The interface is set against a dark blue background. At the top, three labels are displayed in white text: "Pure Substance", "Homogeneous Mixture", and "Heterogeneous Mixture". Below each label is a light blue rectangular placeholder box. In the center, three image cards are shown, each with a white border and a shadow. The first card shows a bowl of colorful cereal and is labeled "Cereal". The second card shows a stack of metal bars and is labeled "Steel (iron and carbon)". The third card shows a piece of gold and is labeled "Gold". At the bottom left, there is a blue button with a white checkmark and the text "Check". At the bottom center, there is a navigation bar with a series of small circles, the first of which is highlighted in blue, and the text "6 / 36". At the bottom right, there are icons for a star and a double-headed arrow.

Drag the grey bullet to where there is a violation of
Aufbau's Order of Filling.



Check

Knowledge checks with immediate feedback and unlimited attempts provide constructive engagement.

There are ___ valence electrons in an aluminum atom.

↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑

1s 2s 2p 3s 3p

3

✘ 5

Aluminum tends to form an ion with a +3 charge so it can achieve the electron configuration of neon. Now we see why!

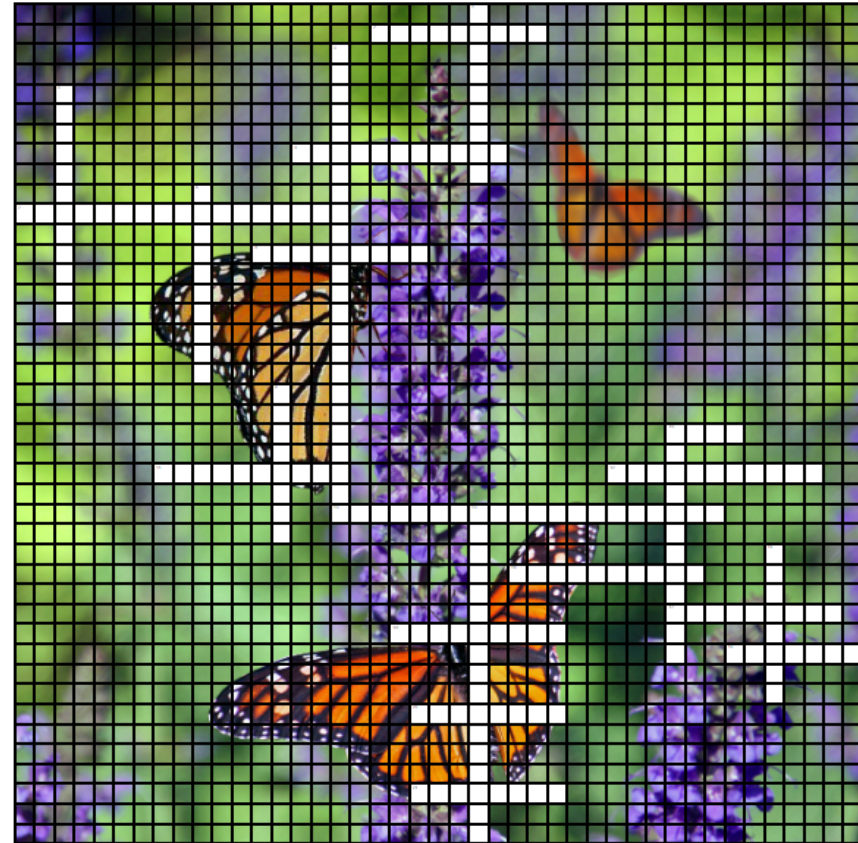
2

★ 0/1

◀ 16 / 26 ▶

H5P is versatile beyond content presentation.

- Vocab practice (crosswords)
- No-stakes practice (question set)
- Interactive instructions
- Branching scenarios
- Timelines



Across

2 Relationship between species where there is a close physical association and at least one benefits (9)

5 Ecosystem's ability to produce resources and absorb wastes (11)

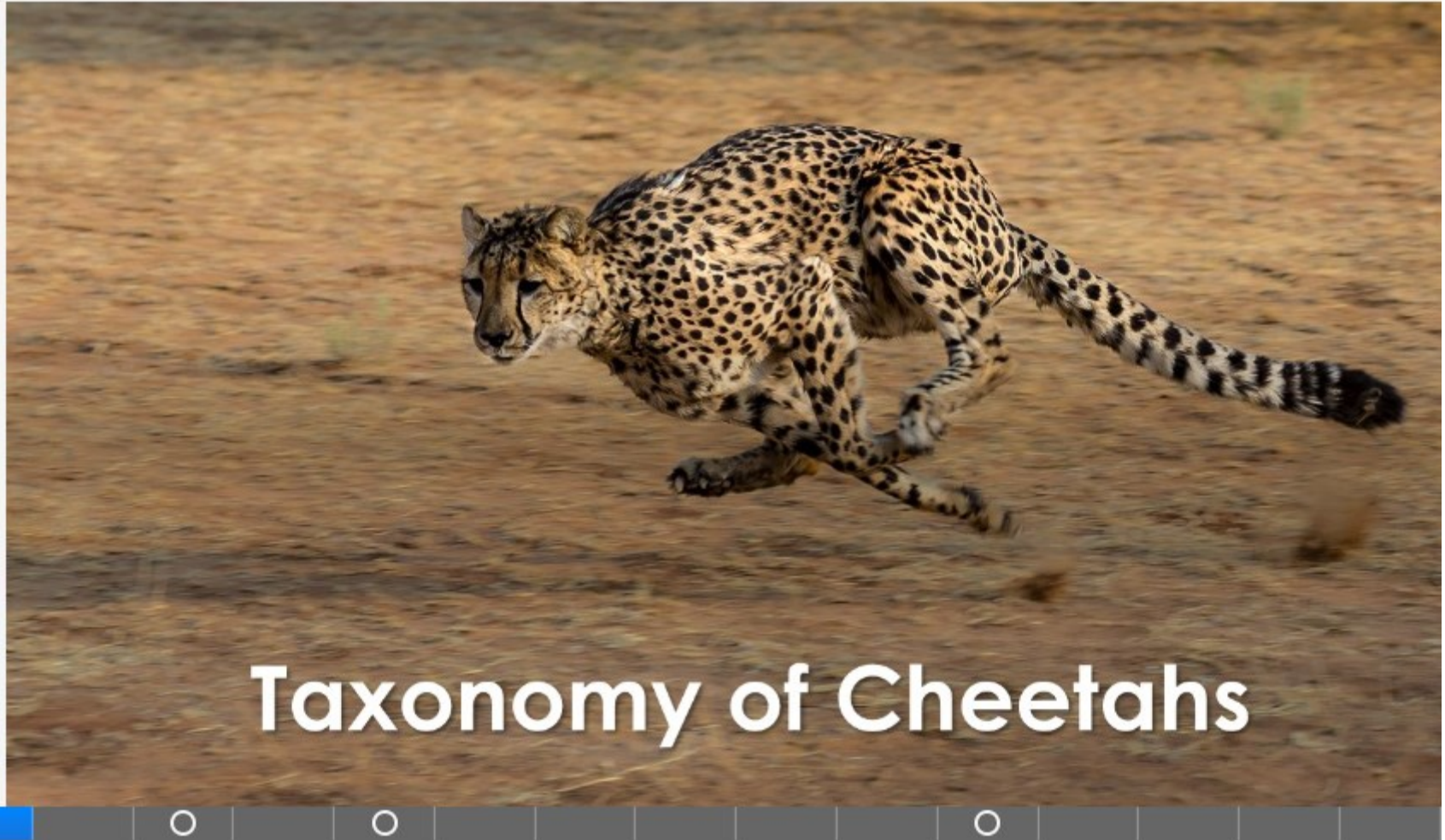
7 Potential geographic distribution of a species (11,5)

8 Dispersion pattern where individuals are attracted to each other for varying reasons (9)

10 Organism that interferes with the activities and desires of humans, their possessions, or the environment (4)

11 Group of organisms of the same species that roughly occupy the same geographical area at the same time (10)

12 Life history strategy where organisms of that species have many clutches of progeny over their lifespan (11)



Taxonomy of Cheetahs



H5P is fairly simple to use, but there are tips to make it even easier.

Generate slides outside of H5P, upload image of each slide, then add interactivity.

Do not use the confusion indicator if you did not create the content.

Share your embed codes!

But do students like them?

Other Studies

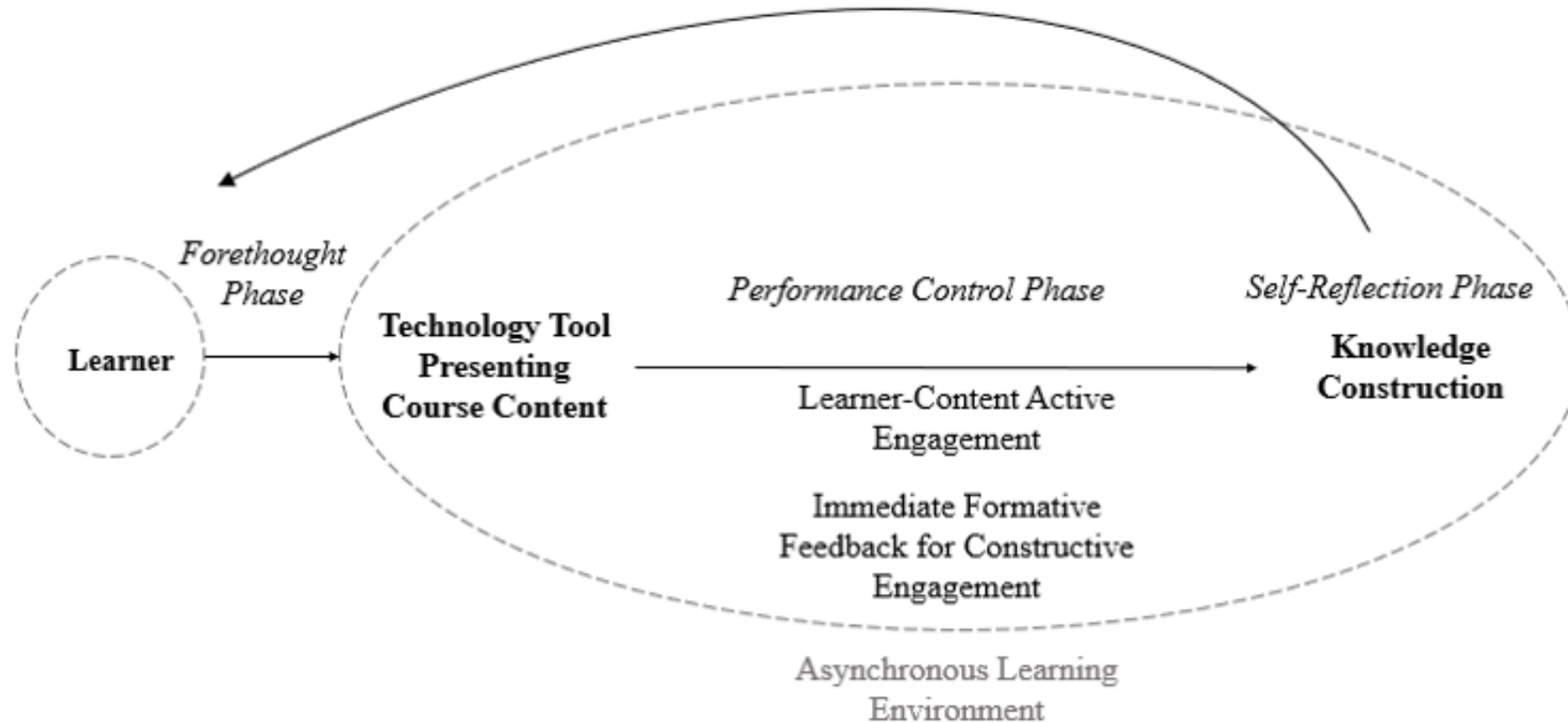
- ✓ 60% consistently use the resources
- ✓ Enhanced knowledge
- ✓ More time than traditional content delivery

Anecdotal evidence from my classes

How helpful have the following supports I have provided been?



Engaged learning allows students to refine self-regulated learning.



In STEM, students that demonstrate certain SRL behaviors perform better on summative assessments ([Lawanto et al., 2017](#) and [Jo et al., 2014](#))

This in-progress study is using the following methods:

H5P design

- Align with course learning outcomes
- Chunked information
- Modified assertion evidence style
- Interactive components and knowledge checks

LTI integration with Canvas

- Drill Down Report
- Embed *ungraded* participation in Canvas

IRB – Exempt (Approval #22-115)

Population, Sample, and Data Collection:

General Chemistry 1 (August & October 2022)

Learner Analytics:

- Canvas data (e.g. Drill Down Reports, course grades)

Survey

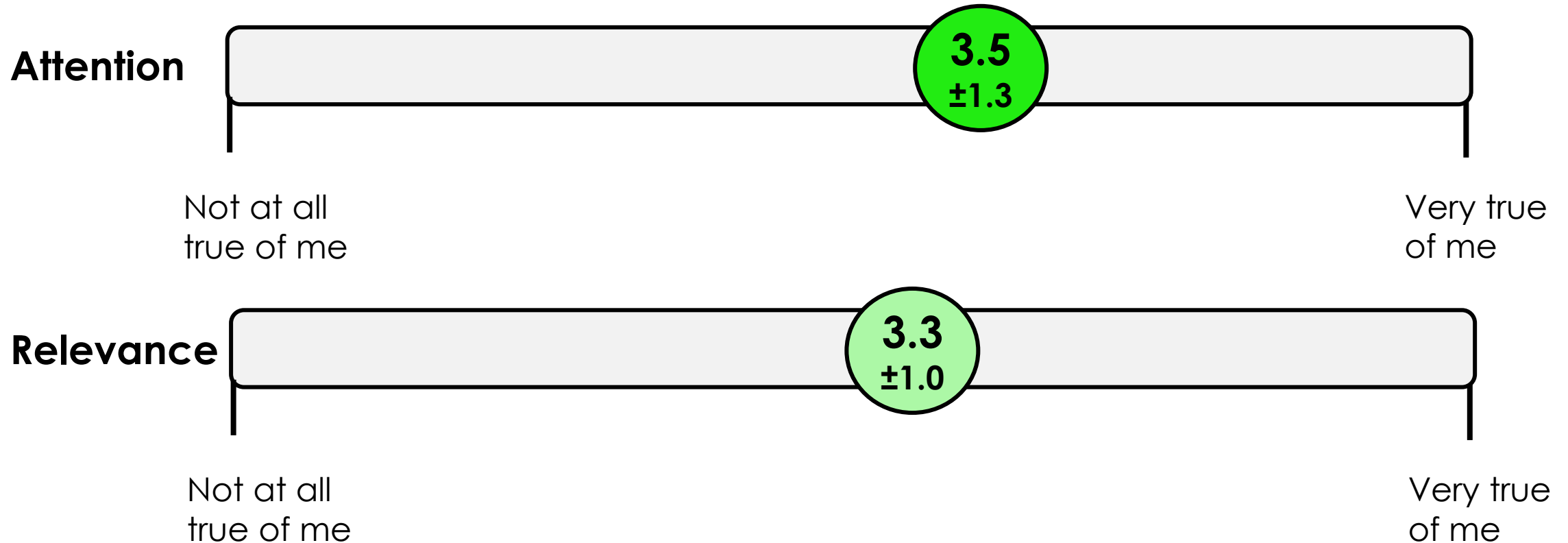
- Self-selection sampling
- One-time survey
- Confidential
- Incentivized (\$5 Amazon e-card)
- Motivation and Self-Regulated Learning Questionnaire (MSLQ)
- Partial use of the Reduced Instructional Materials Motivation Survey (RIMMS)

I don't have answers to these questions yet ...

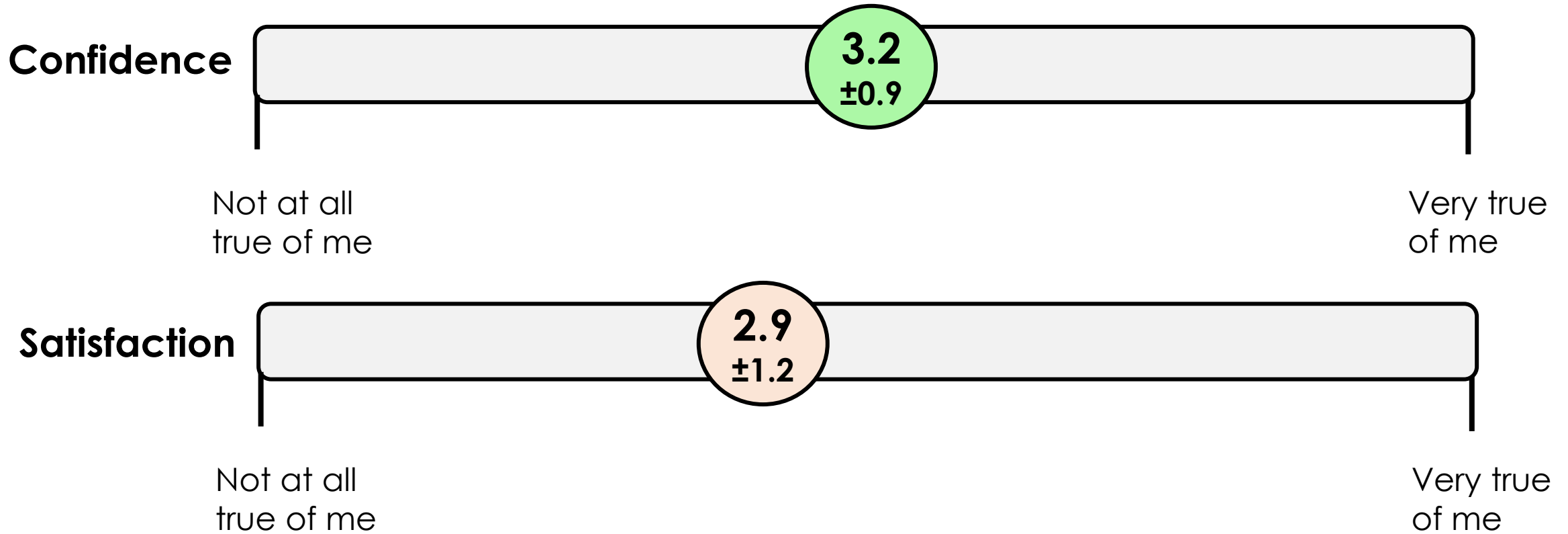
1. Do students have a **positive opinion** of the H5P tool for presenting course content?
2. Do students using H5P resources **demonstrate self-regulated learning behavior(s)**?
3. Does a learner's **perspectives** of their self-regulated learning predict measurable self-regulated learning **behaviors**?
4. How well do learner's self-regulated learning perspectives and behaviors **predict performance**?



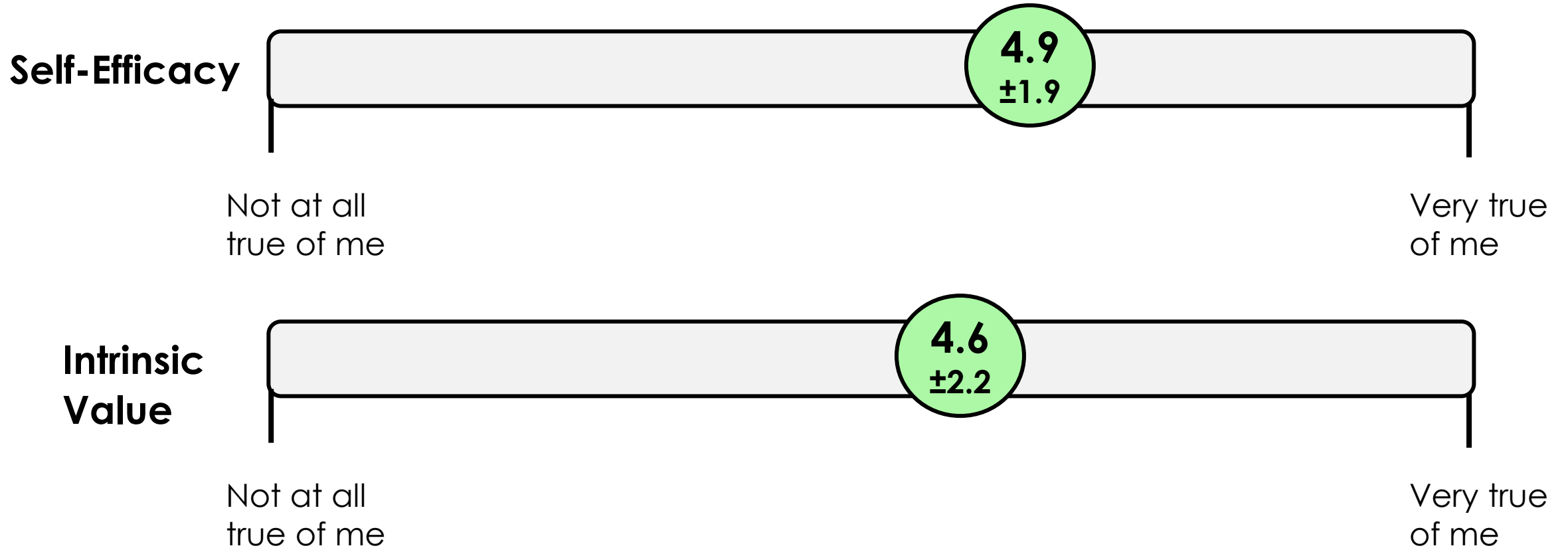
RQ: Do students have a **positive opinion** of the H5P tool for presenting course content? ***n* = 5**



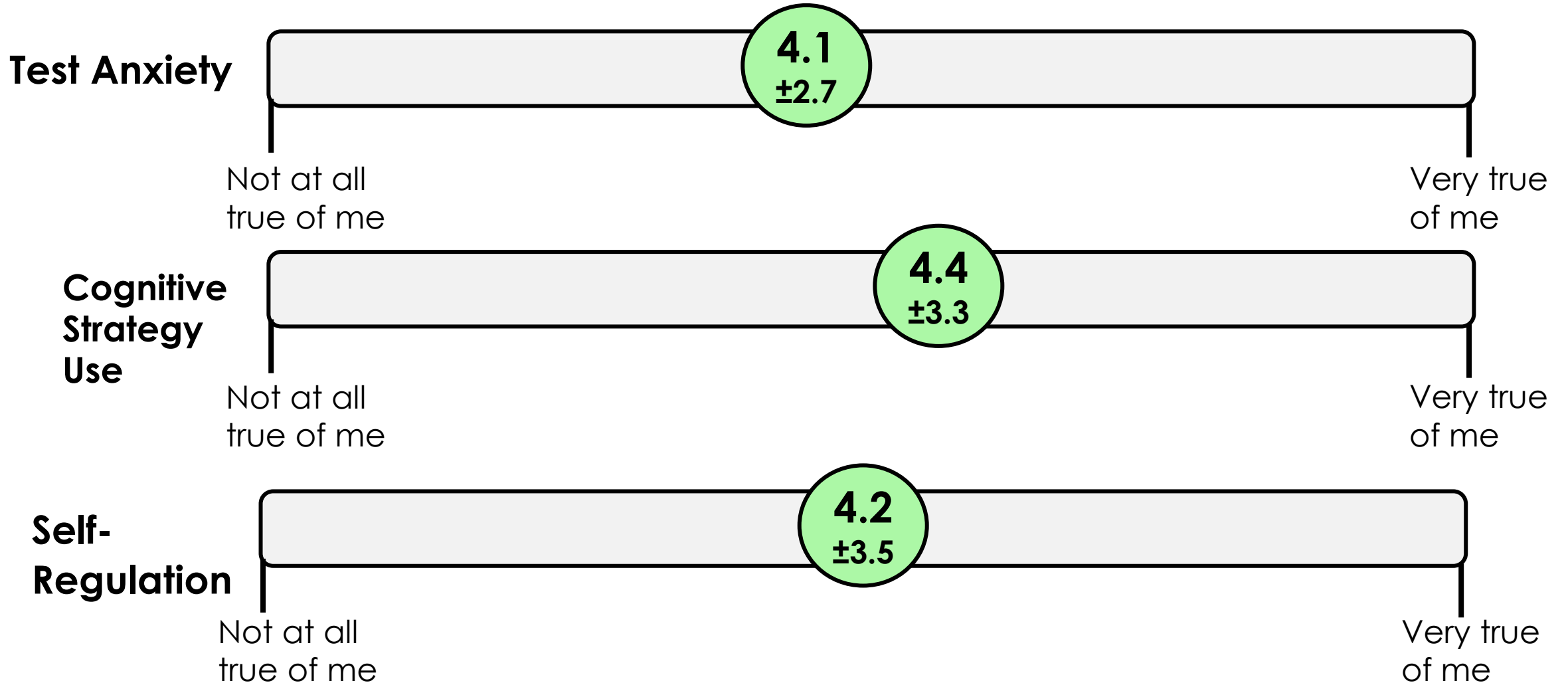
RQ: Do students have a **positive opinion** of the H5P tool for presenting course content? ***n* = 5**



RQ: Do students using H5P resources report strong perceived **self-regulated learning behavior(s)**?



RQ: Do students using H5P resources report strong perceived **self-regulated learning behavior(s)**?



It is early to explore correlations, but some hypothesized correlations are present in the preliminary data.

↑ Intrinsic Value ↓ Test Anxiety (-0.48)

↑ Self-Regulation ↓ Test Anxiety (-0.28)

All H5P question categories have moderate to strong positive correlations (Attention, Relevance, Confidence, Satisfaction)

Some interesting trends between MSLQ and RIMMS

↑ Self-Efficacy ↑ Confidence from H5P Use (0.88)

↑ Self-Efficacy ↑ Satisfaction with H5P (0.76)

↑ Intrinsic Value ↑ Attention, Relevance, Confidence, Satisfaction with H5P
(0.42) (0.68) (0.61) (0.62)

RQ: Do students using H5P resources **demonstrate self-regulated learning behavior(s)**?

Very little documented self-reflection behavior (access H5P after 1st attempt)



Let's take the temperature –
what are your “warm” and
“cool” thoughts on H5P
and its support of active
and self-regulated
learning?

Mentimeter – collect open-ended “warm” and
“cool” feedback on use of H5P as a tech tool to
support student-directed active learning. Discuss.

