

Assessment Tools & the PhysPort Data Explorer

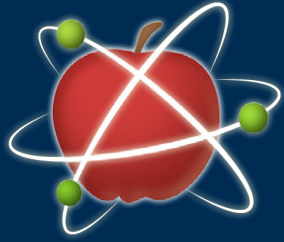
Eleanor C Sayre,
Sam McKagan,
Adrian M Madsen

Physics Dept Chairs Conference
4 June 2016

esayre@ksu.edu



DUE-1430967,
DUE-1347821,
DUE-1347728,
PHYS-1461251



PhysPort

Supporting physics teaching
with research-based resources

What is PhysPort?

A web resource to support physics professors in using research-based teaching and assessment in their classes

www.physport.org



PhysPort Team



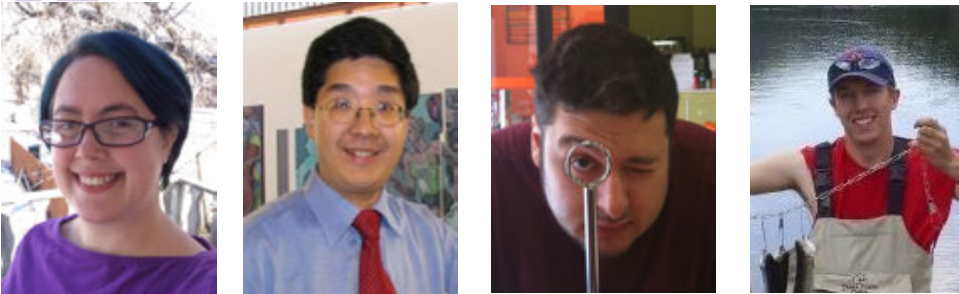
American Association of Physics Teachers



Sam McKagan (*Director*)
Adrian Madsen (*Assistant Director*)
Lyle Barbato (*development lead*)
Matt Riggsbee (*visual design*)



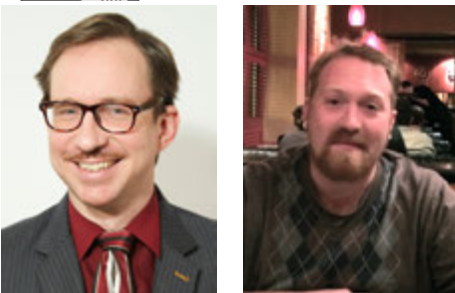
Kansas State University



Ellie Sayre (*Research Director*)
Bill Hsu (*development lead*)
Eugene Vasserman (*security lead*)
Josh Weese (*senior developer*)



Cognition Technology



Sandy Martinuk
Alex Bell
(*User Experience*)

Periscope Specialists



Rachel Scherr
Stephanie Chasteen

How do you know if students are learning?

Assessment is a gateway drug

Good teaching and assessment are important.

How to teach better?

How to help students learn more?

Faculty professional development

New Faculty Workshop

Periscope

PER can help.

Research-Based Assessments

Research-based teaching methods

Embedded in curricula

Assessment instruments

Published curricula

Curricular elements

Developer websites

Ask a colleague

Attend a workshop

PER resources are scattered.

How to compare teaching methods?

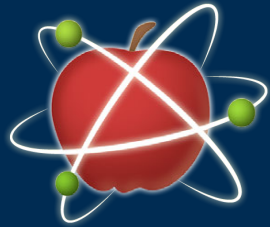
Which assessment should I use?

What works best for my context?

How do I support diverse learners?

course

program



PhysPort

PhysPort can help.

Finding
information
and advice

Supporting physics teaching
with research-based resources

Changing
department
practices

Synthesis
research

Faculty-centered
online resources

Synthesis research

Interpret the results of diverse PER studies

Weighted combination of data from published studies

More robust than single study

Vulnerable to publishing bias

100,000 students

Madsen, McKagan, & Sayre (2013). Gender gap on concept inventories in physics: What is consistent, what is inconsistent, and what factors influence the gap? *PhysRevST-PER*

Madsen, McKagan, & Sayre (2015). How Physics Instruction impacts students' beliefs about learning physics. *PhysRevST-PER*

Von Korff, *et al* (accepted). Secondary Analysis of Teaching Methods in Introductory Physics : a 50k - Student Study. *AmJPhys*

What are Research-based Assessments?

Force Concept Inventory (FCI)

Force & Motion Conceptual Evaluation (FMCE)

and 60+ more

These are:

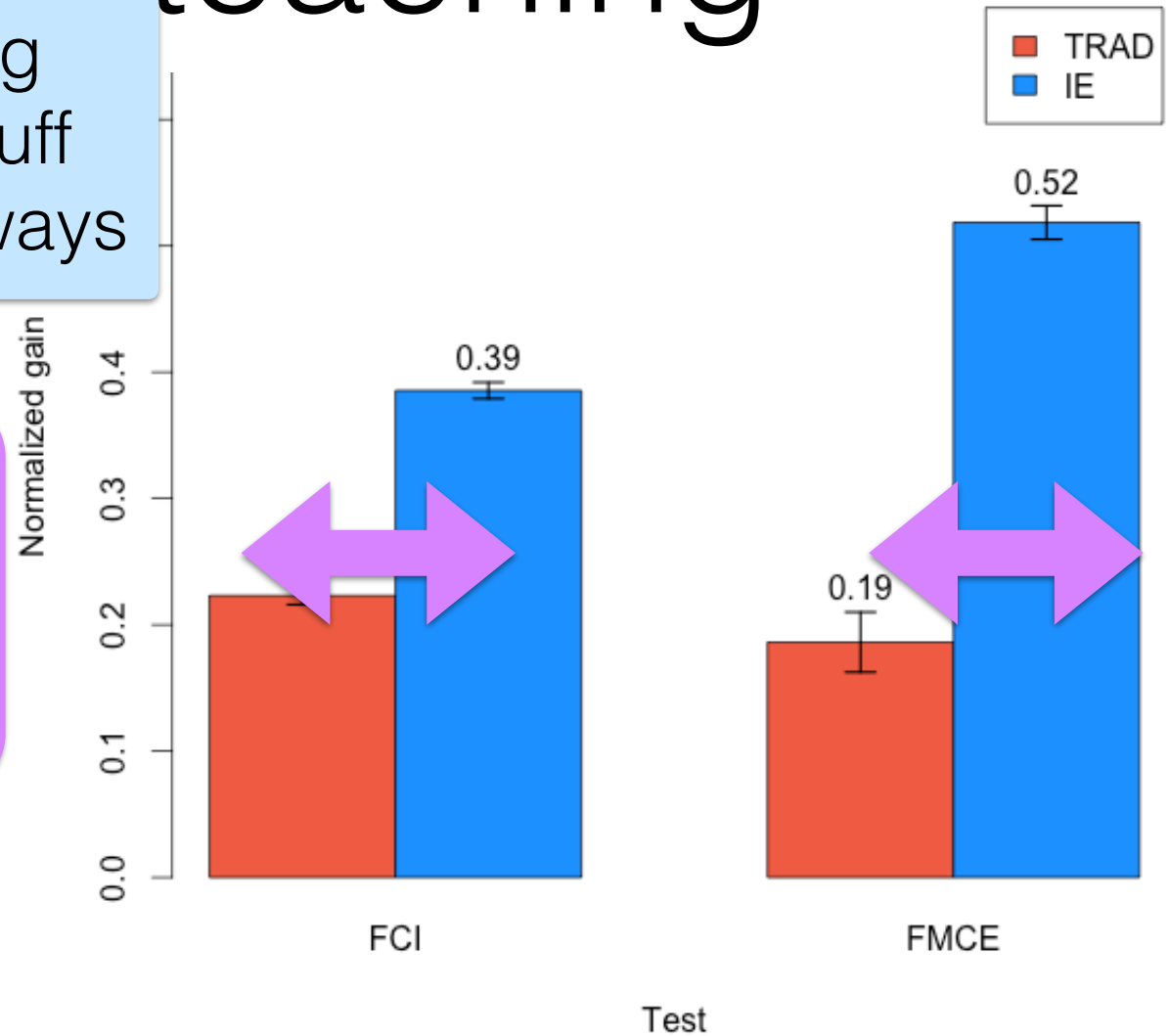
- Generally multiple-choice surveys
- Carefully crafted questions
- Conceptual topics across the physics curriculum
- Additionally: beliefs, problem-solving skills, affect

Mechanics teaching

active learning
students do stuff
many different ways

Interactive
engagement
is better than
traditional lecture

chalk-and-talk
sage on the stage
cookbook labs



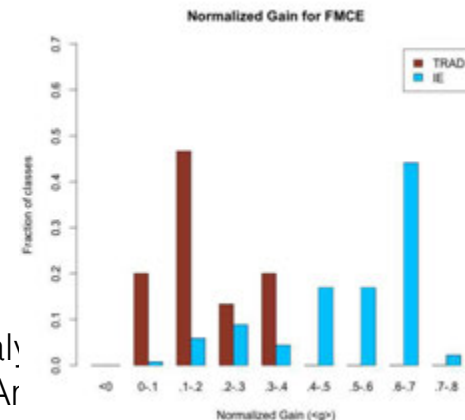
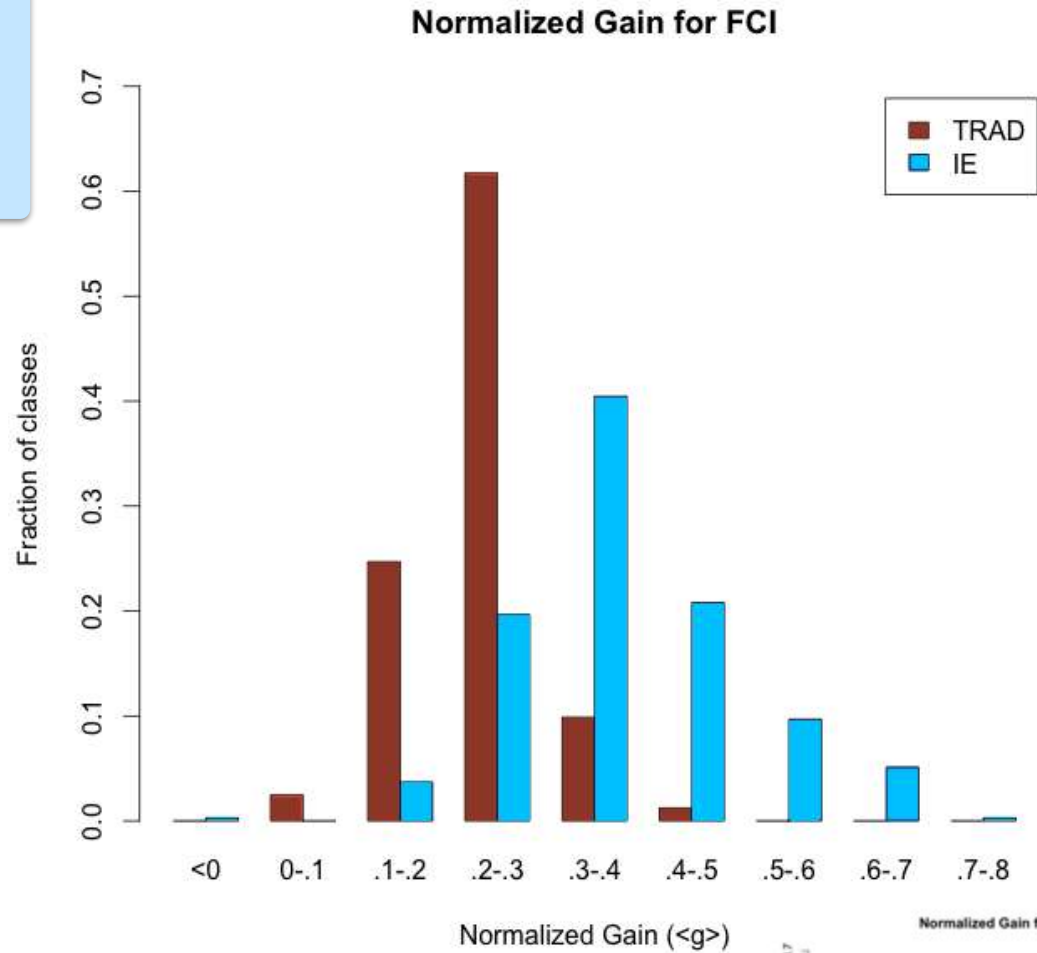
50,000 Students

Mechanics teaching

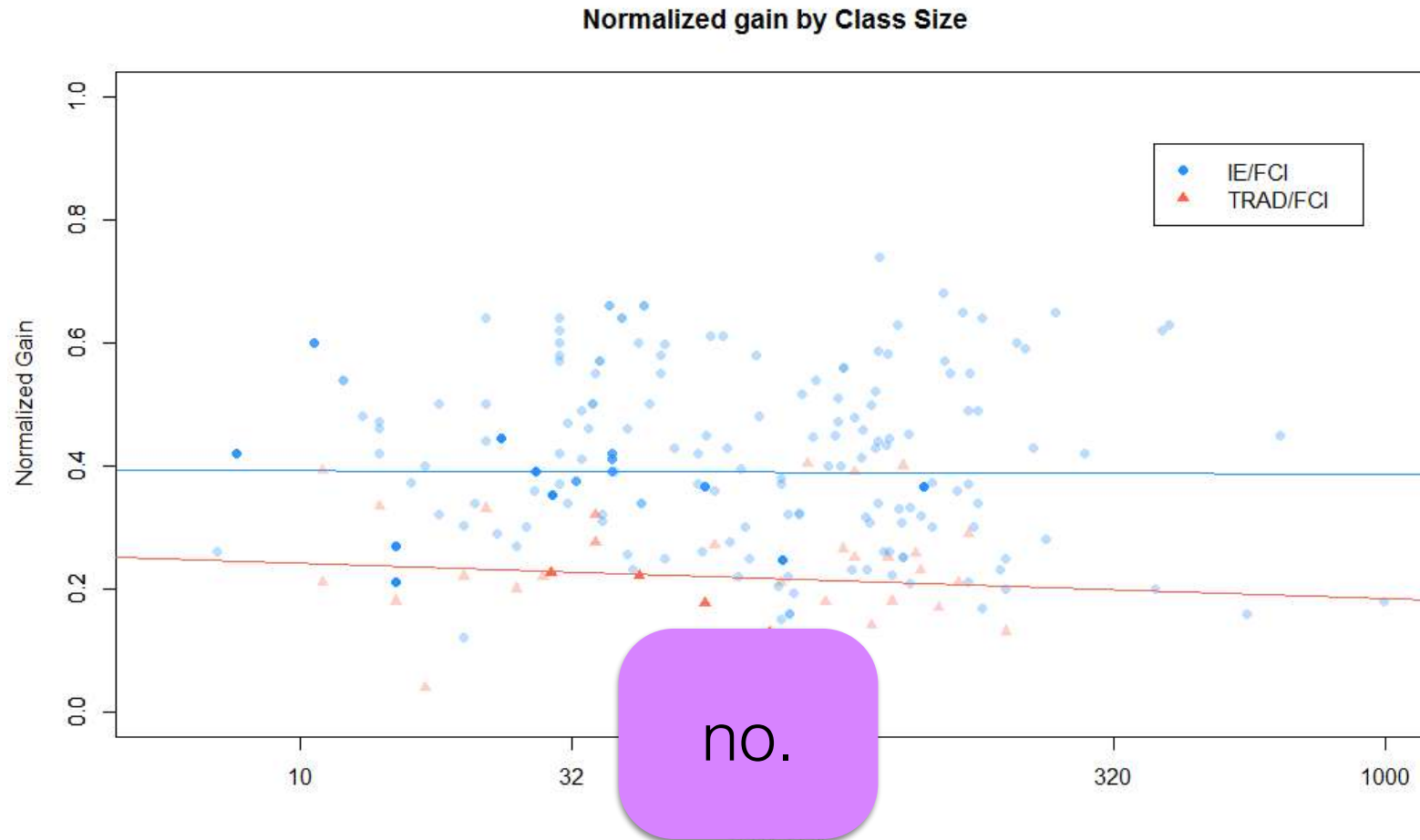
active learning
students do stuff
many different ways

Interactive
engagement
is better than
traditional lecture

chalk-and-talk
sage on the stage
cookbook labs



Does class size matter?



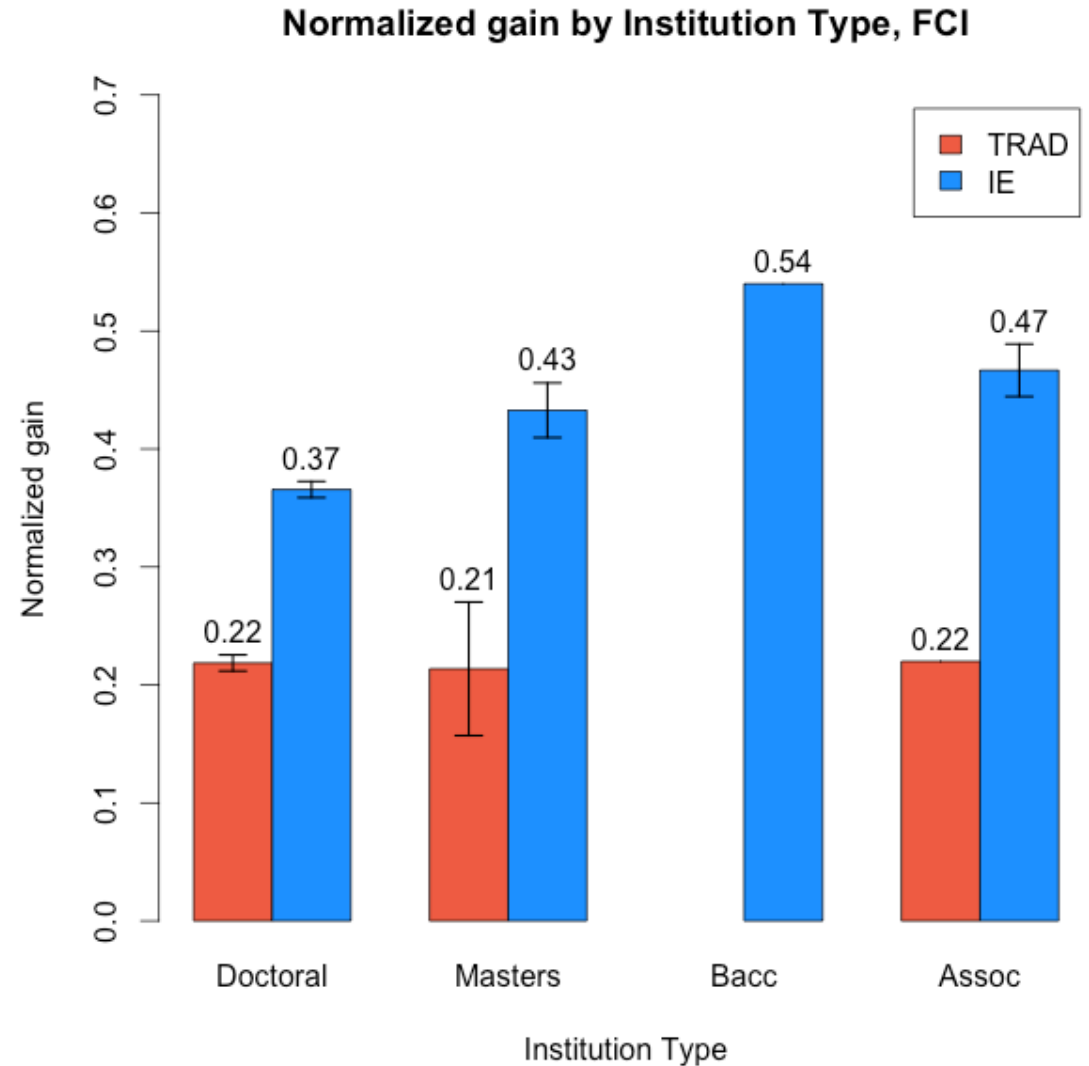
- Different sizes use different IE methods.
- Same trend for lecture and lab

Does institution type matter?

- Reduced Carnegie classification
- No Canadian schools

no.

- Highly dependent on publishing effect
- Data are mostly Doc institutions.



Student beliefs about physics

- How much do students' beliefs align with physicists?
- Measure **shifts** in physicist-like belief
- CLASS, MPEX

Survey

1. A significant problem in learning physics is being able to memorize all the information I need to know.

Strongly Disagree | 1 2 3 4 5 | Strongly Agree

2. When I am solving a physics problem, I try to decide what would be a reasonable value for the answer.

Strongly Disagree | 1 2 3 4 5 | Strongly Agree

3. I think about the physics I experience in everyday life.

Strongly Disagree | 1 2 3 4 5 | Strongly Agree

4. It is useful for me to do lots and lots of problems when learning physics.

Strongly Disagree | 1 2 3 4 5 | Strongly Agree

5. After I study a topic in physics and feel that I understand it, I have difficulty solving problems on the same topic.

Strongly Disagree | 1 2 3 4 5 | Strongly Agree

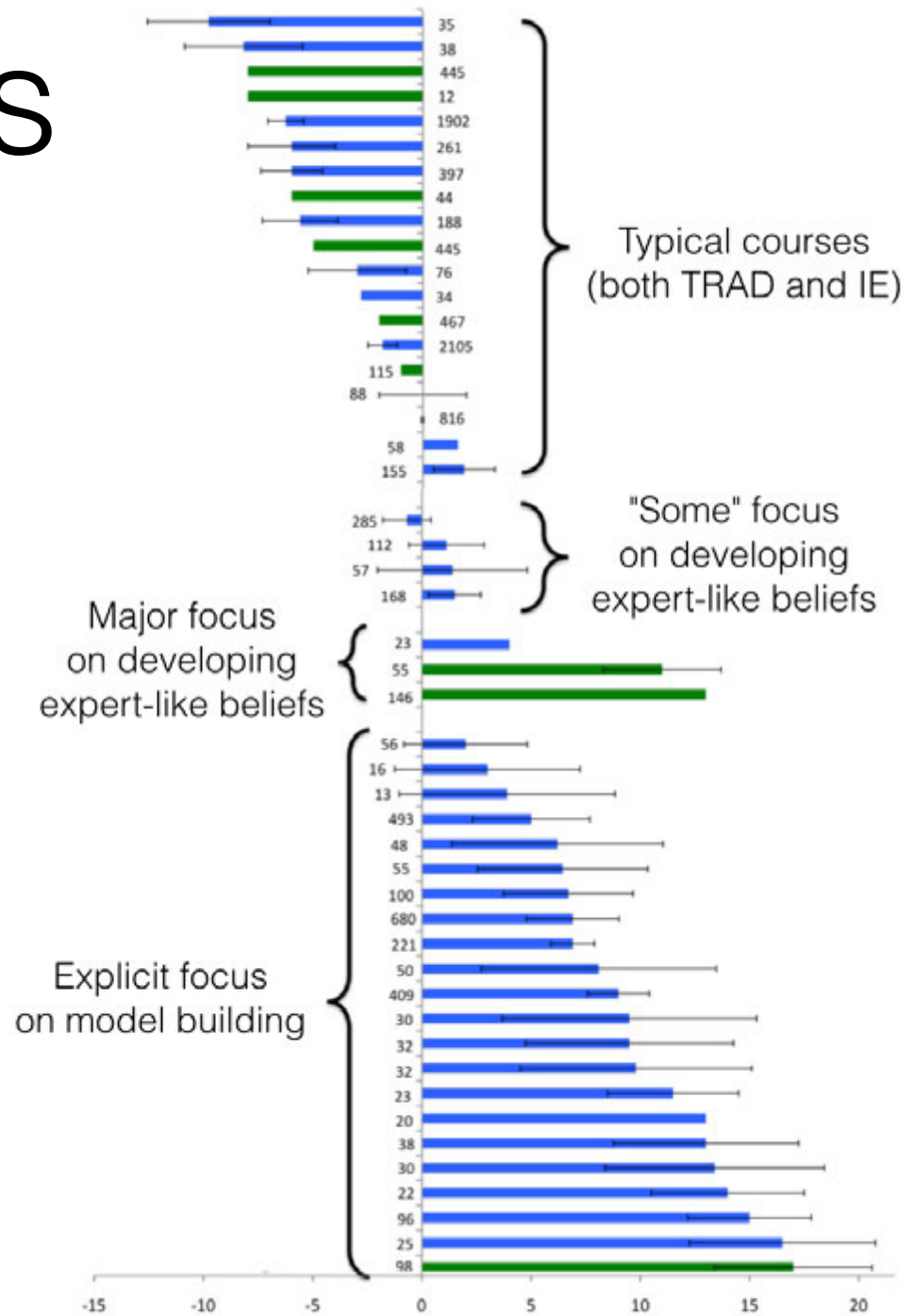
Adams, W. K., et al (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. *Physical Review Special Topics - Physics Education Research*, 2(1), 010101.

Student Beliefs

- 24 studies
- Teaching method, class size, student population

"Ordinary" IE is not enough.

Focus on connecting ideas and observations. ("model building")



Madsen, A. M., McKagan, S. B., & Sayre, E. C. (2015). How Physics Instruction impacts students' beliefs about learning physics. *Physical Review Special Topics — Physics Education Research*.

Gender gaps in learning physics

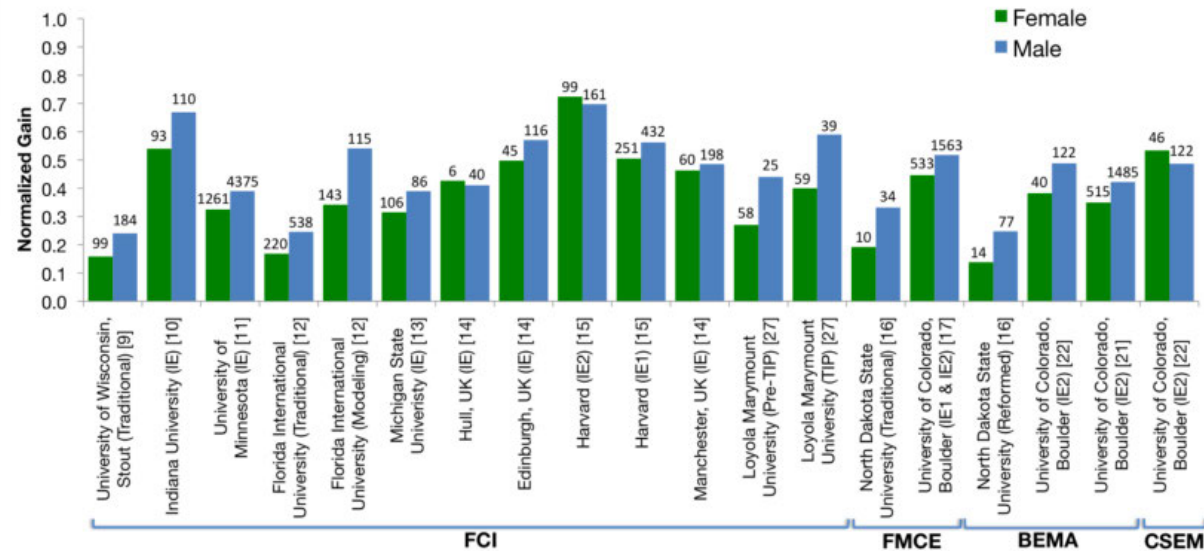
Men outperform women on RBAs

Mechanics: Men = .43; Women = .37

E&M: Men = .42; Women = .36

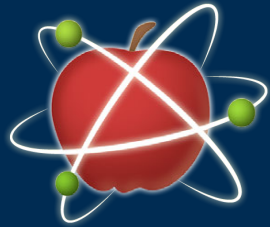
This is smaller than the Trad / IE gap.

There is no single factor which causes or maintains the gap.



Madsen, A., McKagan, S. B., & Sayre, E. C. (2013). Gender gap on concept inventories in physics: What is consistent, what is inconsistent, and what factors influence the gap? *Physical Review Special Topics - Physics Education Research*, 9(2), 020121.

Questions so far?



PhysPort

Supporting physics teaching
with research-based resources

Synthesis
research

Faculty-centered
online resources

Teaching Method
Resources

TM search

Faculty
Development

Periscope

Online
New Faculty
Workshop

Faculty-centered online resources

Assessment
Resources

Data Explorer

RBA search

Expert
Recommendations

Research and development process

Interview & survey
faculty and chairs

Synthesize
faculty needs

Build resources to
meet real users'
needs

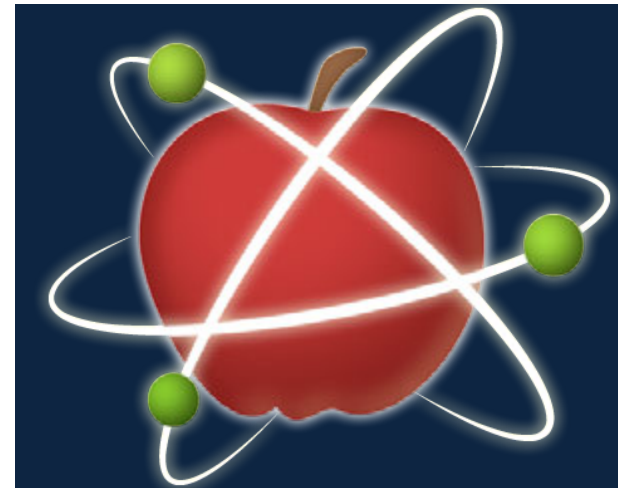
27 faculty
& chairs

50 LA video
project users

Faculty have
practical needs.

Faculty want
guidance.

Faculty consider
broader contexts.



PhysPort.org

Supporting physics teaching
with research-based resources

Start with the biggest needs of users.

Home

Expert Recommendations

Teaching Methods

Assessments

Workshops

Welcome to PhysPort (formerly known as the PER User's Guide), the go-to place for physics faculty to find resources based on physics education research (PER) to support your teaching. [Learn more...](#)

Teaching Methods

I want to...

- [find a new teaching method](#)
- [get implementation help](#)
- [learn more about research-based teaching](#)

Assessment

I want to...

- [interpret assessment results](#)
- [assess the impact of reforms](#)
- [assess advanced physics content or skills](#)

Troubleshooting

I need help with...

- [covering enough material](#)
- [supporting group work](#)
- [arguments for skeptical colleagues](#)

Expert Recommendations

Friendly articles that interpret and synthesize PER results for physics faculty.

physport.org/recommendations

The screenshot shows the PhysPort website interface. At the top, there is a dark blue header with the PhysPort logo (a red atom) and the tagline "Supporting physics teaching with research-based resources". To the right of the header are links for "Admin | My Account | Logout" and "About Us | Contact Us", along with the AAPT logo. Below the header is a navigation bar with buttons for "Home", "Expert Recommendations" (which is highlighted in red), "Teaching Methods", "Assessments", and "Workshops".

The main content area is titled "Expert Recommendations". Under the "FEATURED" section, there is an article titled "Effect size: What is it and when and how should I use it?" by Adrian Madsen, Eleanor Sayre, and Sam McKagan, dated March 18, 2016. The article includes four small graphs showing normal distributions with different effect sizes (d=0.5, d=1, d=2, d=3). The text explains that effect size compares pre- and post-test scores and normalizes the average raw gain by the standard deviation. It states that large effect sizes mean a significant difference.

Other articles listed include "How do I facilitate Tutorials in Introductory Physics?", "How can I get students to have productive discussions of clicker questions?", and "Arguments for skeptical colleagues". A "Most Popular" section features "What racial, gender, and sexual orientation bias still exists in physics and what can I do about it?" and "How do I facilitate a Periscope lesson for TA/LA training or faculty PD?".

Expert Recommendations

Friendly articles that interpret and synthesize PER results for physics faculty.

physport.org/recommendations

- Big Ideas
 - Ten results of physics education research that every physics instructor should know
 - Arguments for skeptical colleagues
 - What makes research-based teaching methods in physics work?
 - Recursos en Español / Research-based teaching resources in Spanish

Expert Recommendations

Friendly articles that interpret and synthesize PER results for physics faculty.

physport.org/recommendations

- Big Ideas
- Assessment issues
 - How do I get my students to take concept inventories seriously?
 - Guidelines for administering concept inventories online
 - How can I get my students' answers to concept inventories into electronic spreadsheets?
 - Effect size: What is it and when and how should I use it?
 - Normalized gain: What is it and when and how should I use it?

Expert Recommendations

Friendly articles that interpret and synthesize PER results for physics faculty.

physport.org/recommendations

- Big Ideas
- Assessment issues
- Teaching method help
 - Where can I learn more about research-based teaching in physics?
 - How can I get students to have productive discussions of clicker questions?
 - Which polling method should I use for Peer Instruction?
 - How do I facilitate Tutorials in Introductory Physics?

Expert Recommendations

Friendly articles that interpret and synthesize PER results for physics faculty.

physport.org/recommendations

- Big Ideas
- Assessment issues
- Teaching method help
- Teaching instructors
 - How can I train teaching assistants and/or learning assistants?
 - How do I facilitate a Periscope lesson for TA/LA training or faculty PD?
 - How can I teach a graduate class on the basics of physics education research?

Expert Recommendations

Friendly articles that interpret and synthesize PER results for physics faculty.

physport.org/recommendations

- Big Ideas
- Assessment issues
- Teaching method help
- Teaching instructors
- Broader issues
 - What racial, gender, and sexual orientation bias still exists in physics and what can I do about it?
 - How can I set up an effective mentoring program to support students in my department?

Have a suggestion?

Want to contribute?

esayre@ksu.edu

smckagan@aapt.org

Teaching Methods

Searchable, faculty-friendly guides to research-based teaching practices

physport.org/guides/browse.cfm




PhysPort
Supporting physics teaching with research-based resources

Admin | My Account | Logout
About Us | Contact Us

Home | Expert Recommendations | **Teaching Methods** | Assessments | Workshops

Browse Teaching Methods

Showing 55 out of 55 evidence-based teaching methods

 Indicates a research-demonstrated benefit

big redesign
coming soon

Peer Instruction	
Level	Intro College C
Setting	Large Lecture
Coverage	Many topics w
Effort	Low
Resources	None
Skills	Conceptual understanding of physics content, Connecting conceptual and mathematical understanding, more »

PhET Interactive Simulations (PhET Simulations)	
Level	Intro College Calc-based, Intro College Alg-based, more »
Setting	Large Lecture, Recitation, Lab, Small Class, more »
Coverage	Few topics with great depth, Many topics with less depth

- Type of method
- Level & Setting
- Coverage & Topics
- Instructor Effort
- Research validation
- Compatible methods
- Similar methods
- More information

Assessment Resources

physport.org/assessments

The screenshot shows the 'Assessments' section of the physport.org website. At the top, there is a navigation bar with tabs for 'Home', 'Expert Recommendations', 'Teaching Methods', 'Assessments', and 'Workshops'. Below the navigation bar is a 'Browse Assessments' section. A green box prompts users to 'Tell us about your course to find assessments relevant to you.' Below this are dropdown menus for 'Any Subject' and 'Any Level', and a 'Submit' button. On the left side, there are filters for 'Assessment Focus' (Content knowledge, Problem-solving, Scientific reasoning, Lab skills, Beliefs / Attitudes, Interactive teaching), 'Format' (Pre/post, Multiple-choice, Multiple-response, Agree/disagree, Short answer, Rubric, Observation protocol), 'Research Validation' (Gold star, Silver, Bronze, Research-based), and 'Translations'. The main content area displays '68 Research-Based Assessments' and lists four specific assessments: 'Force Concept Inventory (FCI)', 'Force and Motion Conceptual Evaluation (FMCE)', 'Test of Understanding Graphs in Kinematics (TUG-K)', and 'Energy and Momentum Conceptual Survey (EMCS)'. Each assessment entry includes a wrench icon, a star icon, a clock icon indicating duration, and details about levels and formats.

- Search for RBAs
- Get administration details
- See sample questions
- See typical results
- Download RBAs
- Download usage guides

project info





Browse Assessments

Tell us about your course to find assessments relevant to you.

Any Subject

Any Level

Any Setting

Save Course

[reset](#)

Assessment Focus

Any

- Content knowledge
- Problem-solving
- Scientific Reasoning
- Lab skills
- Beliefs / Attitudes
- Interactive Teaching


Format

Any

- Multiple-choice
- Multiple-response
- Short answer
- Pre / Post
- Agree / Disagree
- Observational Protocol

Research Validation

Any

-  Gold Star Validation
- Validated Level 2
- Validated Level 1
- Research-Based

Content




Force Concept Inventory (FCI)

Mechanics Content Knowledge (Kinematics, Forces)

Introductory College

Multiple-choice, Pre/post

 30 minutes



Representational Variant of the Force Concept Inventory (R-FCI)

Mechanics Content Knowledge (Kinematics, Forces)

Introductory College

Multiple-choice, Pre/post

 30 minutes



Test of Understanding Graphs in Kinematics (TUG-K)

Mechanics Content Knowledge (Kinematics, Graphing)

Introductory College

Multiple-choice, Pre/post

 30 minutes

Beliefs / Attitudes



Colorado Learning Attitudes about Science Survey (CLASS)

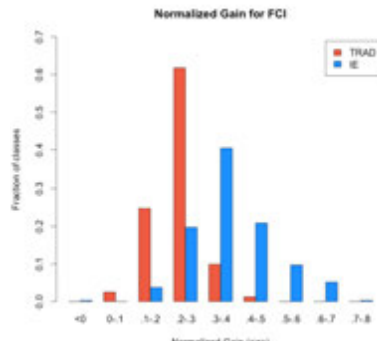
Beliefs / Attitudes

Force Concept Inventory (FCI)

developed by David Hestenes, Malcolm Wells, and Gregg Swackhamer
<http://modelinginstruction.org/researchers/evaluation-instruments/>

Format Multiple-choice, Pre/post
Duration 30 minutes
Focus Mechanics Content Knowledge (Kinematics, Forces)
Level Introductory

Typical Results



Explore
More
Results

Examples

Resources



Research



Translations

Variations

Example Question 1

A book is at rest on a table top. Which of the following force(s) is(are) acting on the book?

1. A downward force due to gravity
2. The upward force by the table
3. A net downward force due to air pressure
4. A net upward force due to air pressure

(A) 1 only

(B) 1 and 2

(C) 1, 2, and 3

(D) 1, 2, and 4

(E) none of these, since the book is at rest there are no forces acting on it.

Verified educators
can download.

Students cannot.

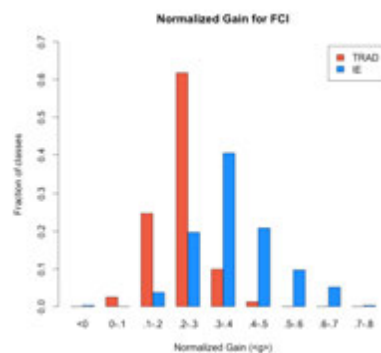
Force Concept Inventory (FCI)

developed by David Hestenes, Malcolm Wells, and Gregg Swackhamer
<http://modelinginstruction.org/researchers/evaluation-instruments/>



Format Multiple-choice, Pre/post
Duration 30 minutes
Focus Mechanics Content Knowledge (Kinematics, Forces)
Level Introductory

Typical Results



Explore More Results

Examples

Resources



Research



Translations

Variations

Example Question 1

A book is at rest on a table top. Which of the following force(s) is(are) acting on the book?

1. A downward force due to gravity
2. The upward force by the table
3. A net downward force due to air pressure
4. A net upward force due to air pressure

(A) 1 only

(B) 1 and 2

(C) 1, 2, and 3

(D) 1, 2, and 4

(E) none of these, since the book is at rest there are no forces acting on it.

Related Expert

[view all >](#)

Recomendations

[Best practices for administering concept inventories](#)

[Should I use the FCI or the FMCE?](#)

[Why use research-based assessment?](#)

Related Assessments

[Mechanics Baseline Test \(MBT\)](#)

[Force and Motion Conceptual Evaluation \(FMCE\)](#)

Related Teaching Methods

[view all >](#)

Modeling Instruction

Instruction organized around active student construction of conceptual and mathematical models in an interactive learning community

Force Concept Inventory (FCI)

developed by David Hestenes, Malcolm Wells, and Gregg Swackhamer
<http://modelinginstruction.org/researchers/evaluation-instruments/>

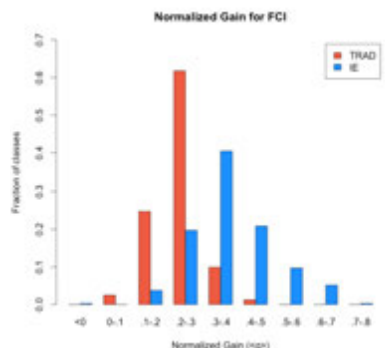
Multiple-choice, Pre/post

Duration 30 minutes

Focus Mechanics Content Knowledge (Kinematics, Forces)

Level Introductory

Typical Results



Explore
More
Results



Examples

Resources



Research



Translations

Variations

FCI Implementation and Troubleshooting Guide



This guide covers all the information teachers would need to **implement** this assessment in their course. It also includes **troubleshooting** information and links to **additional resources**.



Related Expert

[view all >](#)

Recomendations

Best practices for administering concept inventories

Should I use the FCI or the FMCE?

Why use research-based assessment?

Related Assessments

Mechanics Baseline Test (MBT)

Force and Motion Conceptual Evaluation (FMCE)

Related Teaching
Methods

[view all >](#)

Modeling Instruction

Instruction organized around active student construction of conceptual and mathematical models in an interactive learning community



[Home](#)

[Expert Recommendations](#)

[Teaching Methods](#)

Assessments

[Workshops](#)

Force Concept Inventory (FCI)

developed by David Hestenes, Malcolm Wells, and Gregg Swackhamer
<http://modelinginstruction.org/researchers/evaluation-instruments/>



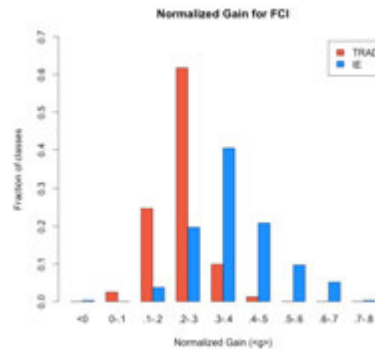
Multiple-choice, Pre/post

Duration 30 minutes

Focus Mechanics Content Knowledge (Kinematics, Forces)

Level Introductory

Typical Results



Explore
More
Results

[Examples](#)

[Resources](#)



[Research](#)



[Translations](#)

[Variations](#)

RESEARCH VALIDATION

Gold Star Validation

This is the highest level of research validation. This indicates that the assessment instrument has been thoroughly validated and researched.



RESEARCH VALIDATION SUMMARY

Based on Research Into:

Student thinking

Studied Using:

Student interviews

Expert review

Statistical analysis

Research Conducted

At multiple institutions

By multiple research groups

Related Expert

[view all >](#)

Recomendations

[Best practices for administering concept inventories](#)

[Should I use the FCI or the FMCE?](#)

[Why use research-based assessment?](#)

Related Assessments

[Mechanics Baseline Test \(MBT\)](#)

[Force and Motion Conceptual Evaluation \(FMCE\)](#)

Related Teaching
Methods

[view all >](#)

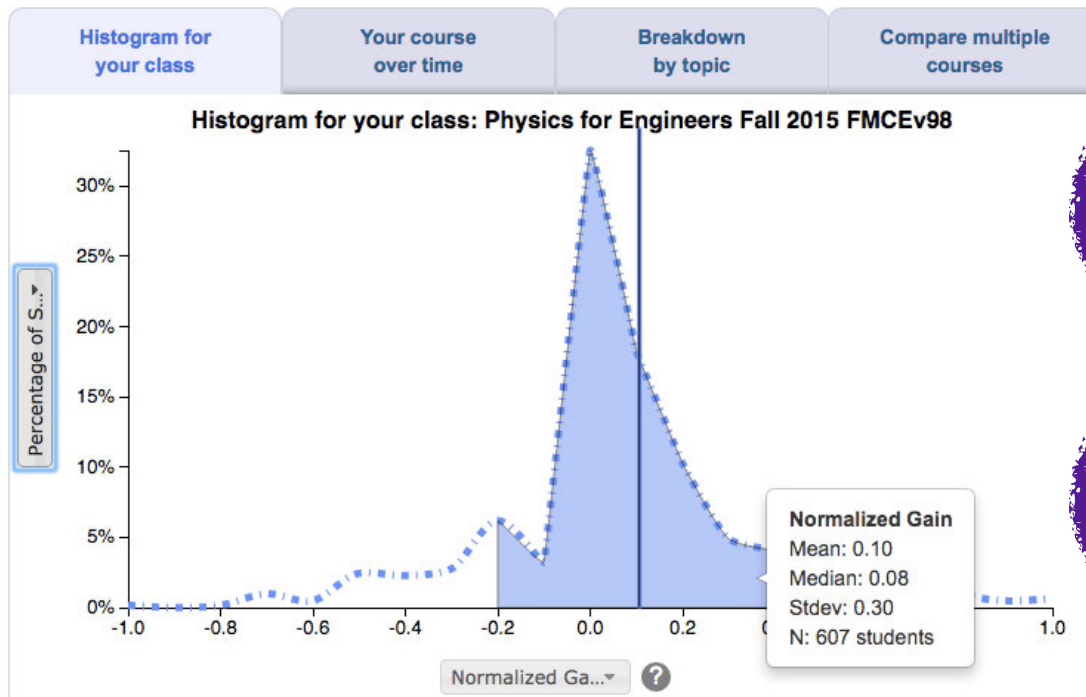
Modeling Instruction

Instruction organized around active student construction of conceptual and mathematical models in an interactive learning community

Data Explorer

Visualize and compare your students' performance from 50+ research-based assessment instruments.

physport.org/DataExplorer



Upload your data

Explore your data

Download a report

Data Explorer



Secure

We use the same security measures used by banks and financial institutions

so you can have the utmost confidence that your data is safe.

- Your identity is protected
- Your students' identities are protected
- We use one-way, cryptographically-secure transformations
- We report on aggregate data

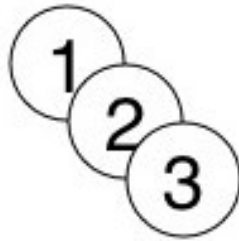
Data Explorer



Secure

We use the same security measures used by banks and financial institutions

so you can have the utmost confidence that your data is safe.



Easy.

Our guided process makes it easy to upload your data, and our visualization

engine is tailored to assessments, making charting a snap.

- We match pre- and post-data for you
- You can upload the files you already have*: no need to use a template

* .csv, xls, or .xlsx; one assessment per file; one row per student

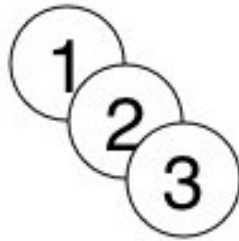
Data Explorer



Secure

We use the same security measures used by banks and financial institutions

so you can have the utmost confidence that your data is safe.



Easy.

Our guided process makes it easy to upload your data, and our visualization

engine is tailored to assessments, making charting a snap.



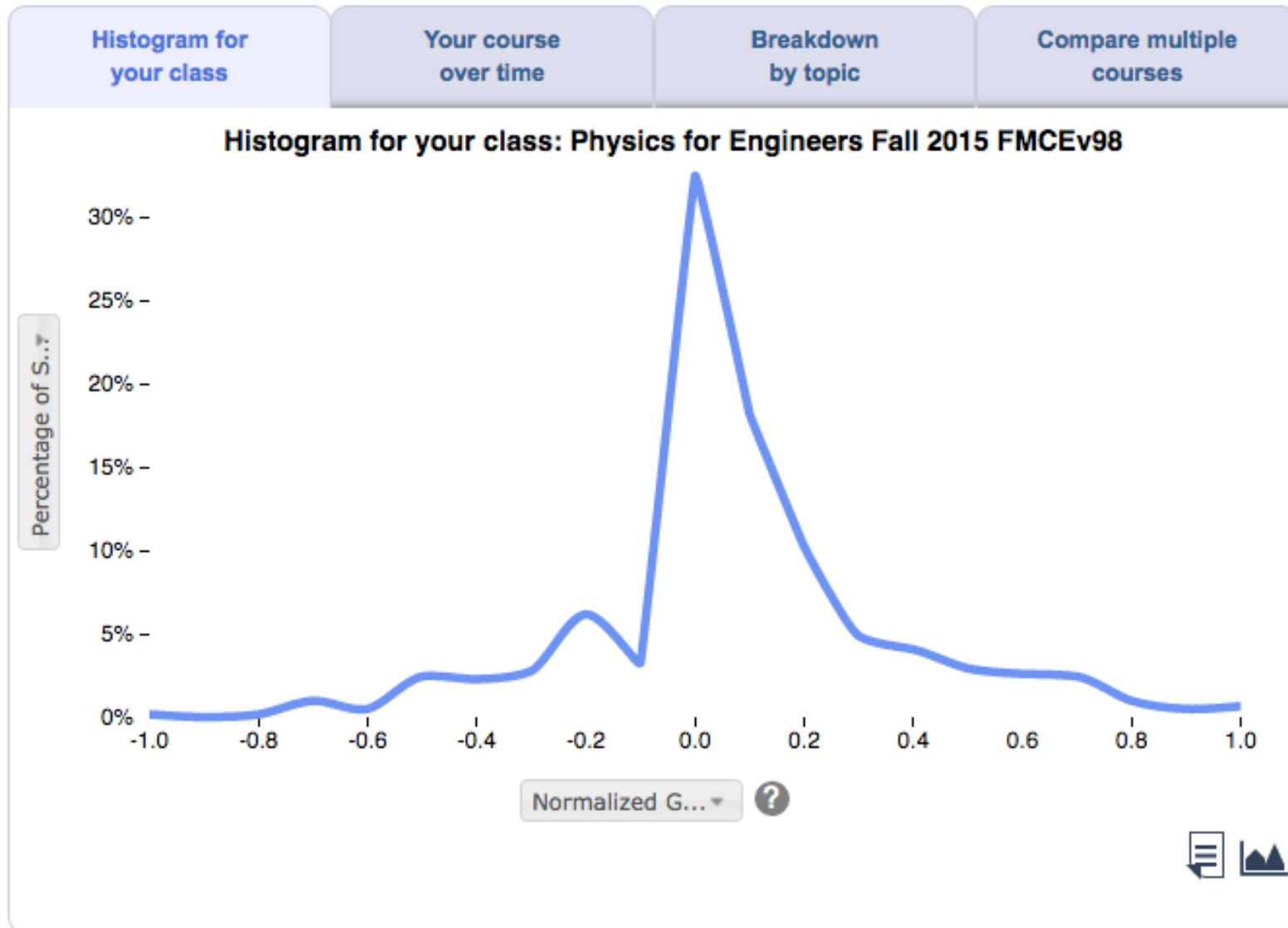
Powerful

With one click, you get a comprehensive analysis of your results, allowing you

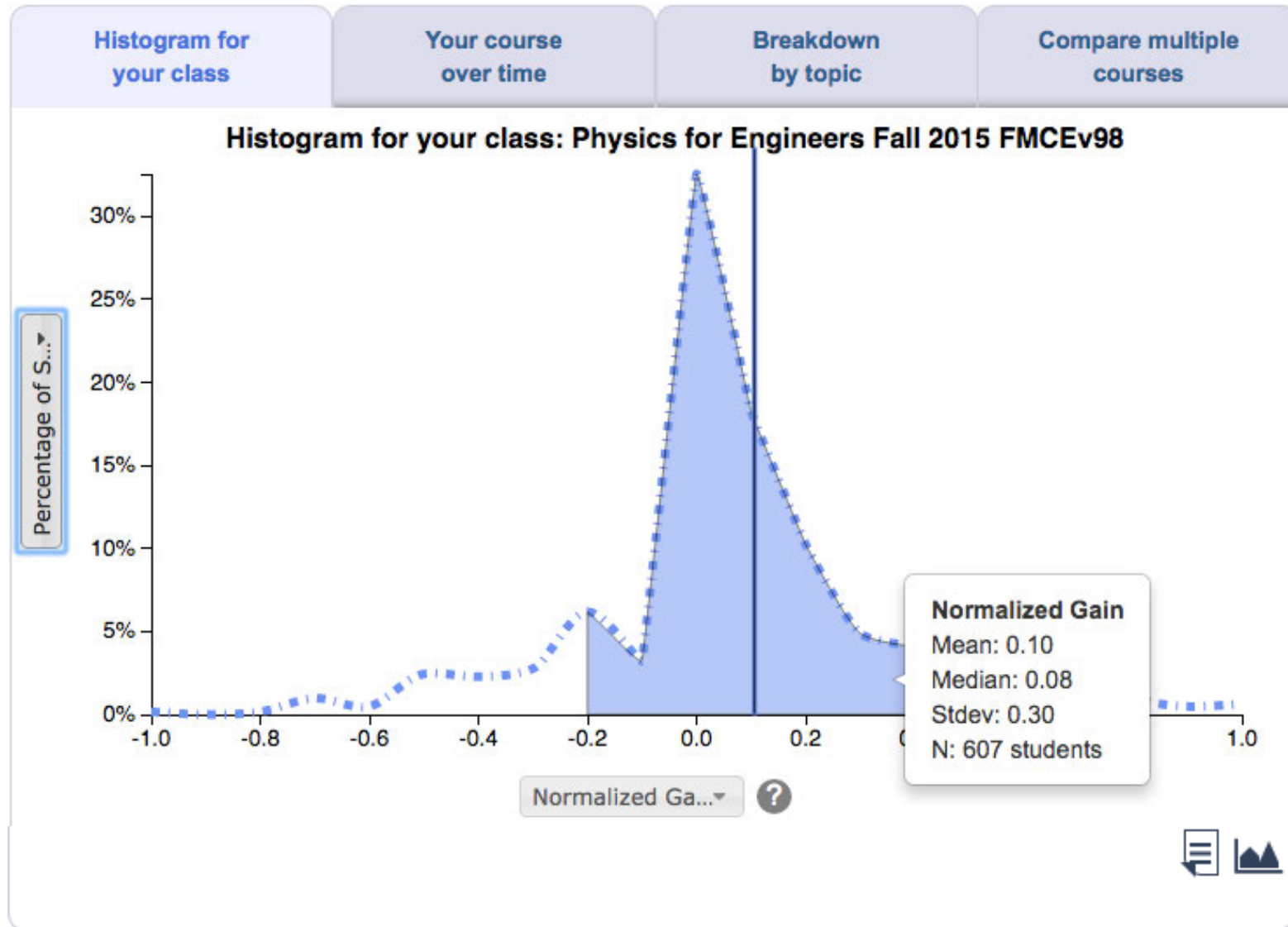
to compare your data with classes and teachers in similar institutions nationwide.

- Explore responses on by questions or clusters
- Track your classes over time
- Split data by demographics
- Rigorous statistics done for you in the background

physport.org/DataExplorer



physport.org/DataExplorer



physport.org/DataExplorer

Histogram for
your class

Your course
over time

Breakdown
by topic

Compare multiple
courses

Summary

Average
Gain ?
0.10
 ± 0.01

Your students' average normalized gain of **0.10 \pm 0.01** is near the bottom of the range for traditional lecture classes . See [typical results](#).

Effect Size ?
0.61

The effect size of the change between pre and post for your class is **0.61**. This is a moderate effect size

Average
Score ?
Pre 18%
 $\pm 1%$
Post 30%
 $\pm 1%$

Your students' average score increased from **18% \pm 1%** on the pre-test to **30% \pm 1%** on the post-test. See [typical results](#).

N (matched)
607

You have 607 "matched" students (who took both the pre- and post-test) in your class. All calculations are based on matched students.

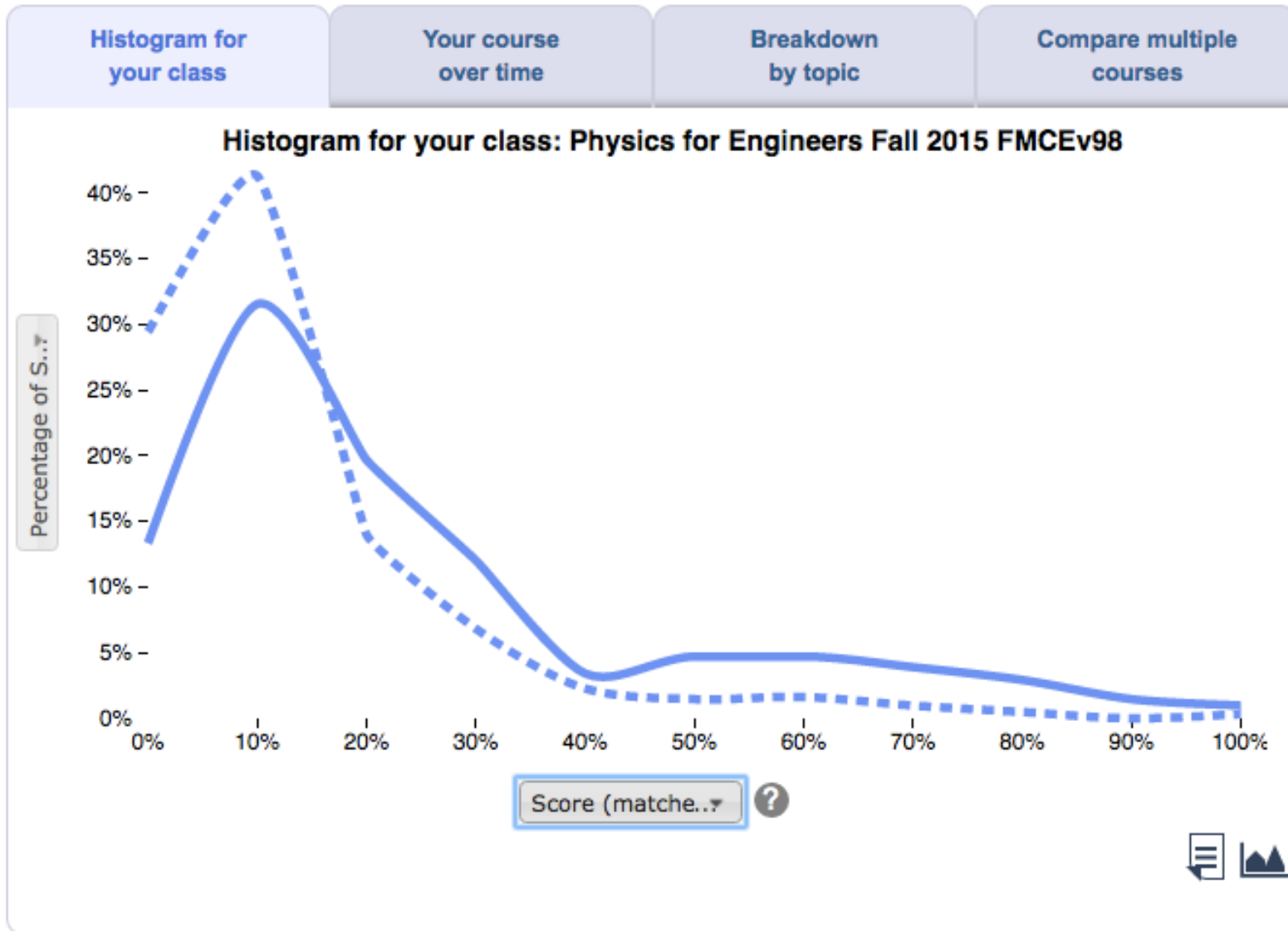
Recommendations

Courses that are taught using interactive engagement techniques tend to have higher normalized gains than those using traditional lecture. The key to these methods is getting students actively engaged in constructing their own understanding and not just passively listening.

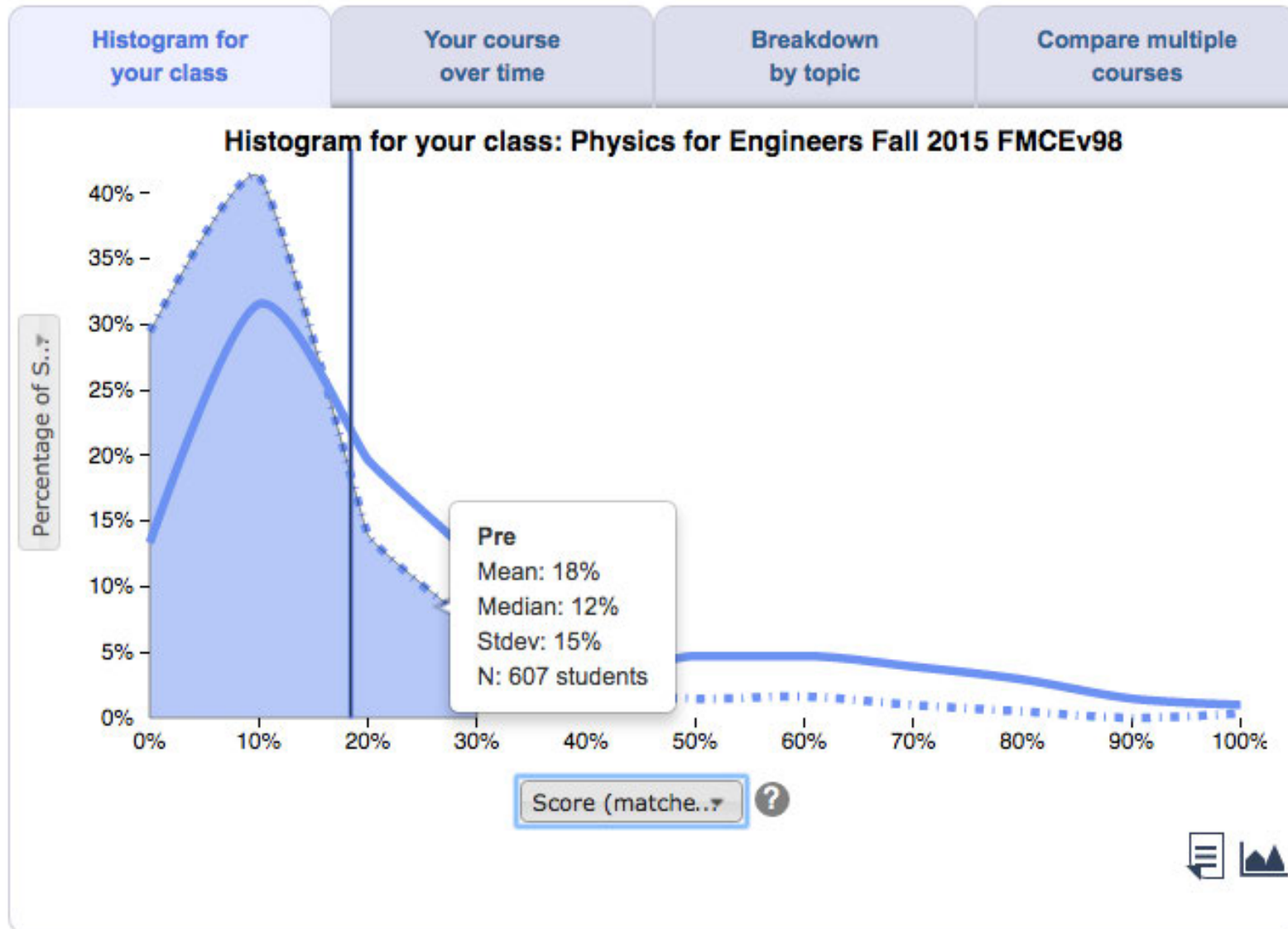
This can be accomplished in many ways. Popular methods that you could try include: [Peer Instruction](#), [PhET Interactive Simulations](#), [Interactive Lecture Demonstrations](#), and [Just In Time Teaching](#).

As we collect more data on how teaching practices correlate with learning gains, we will eventually provide more customized recommendations.

physport.org/DataExplorer



physport.org/DataExplorer



physport.org/DataExplorer

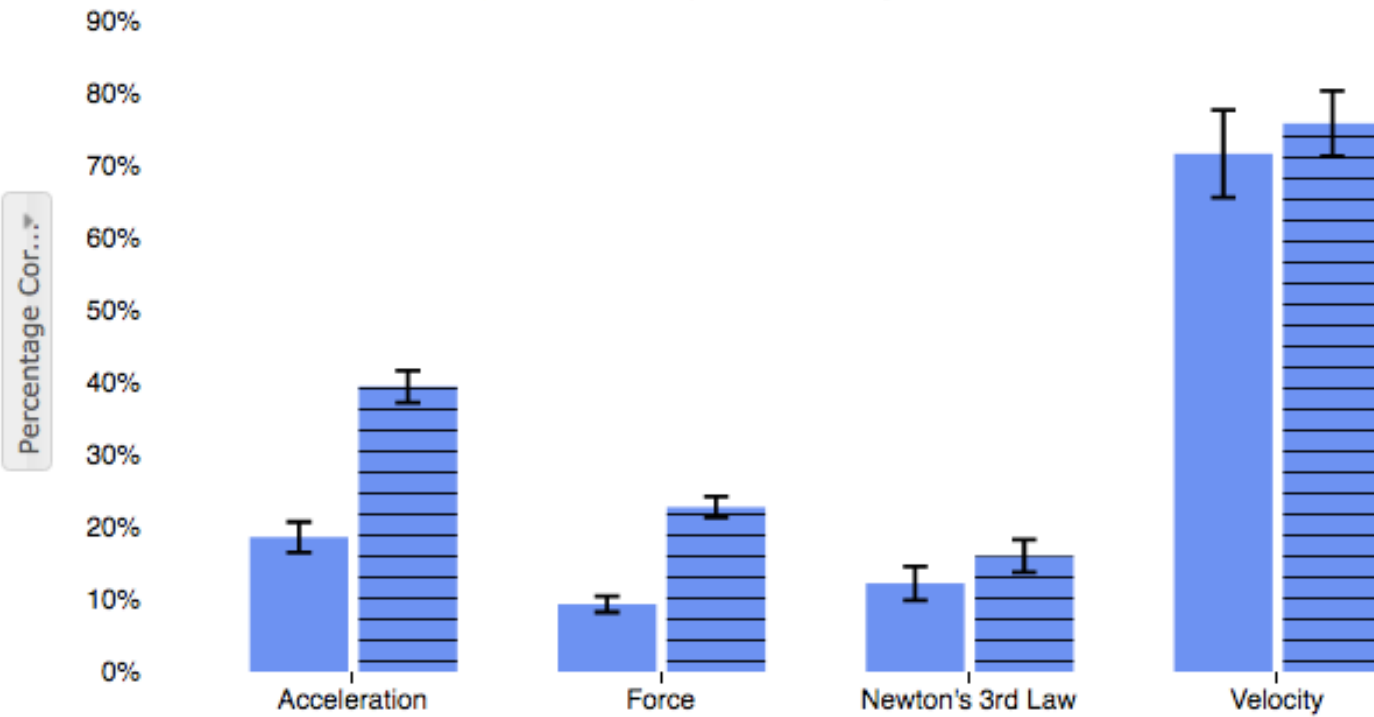
Histogram for
your class

Your course
over time

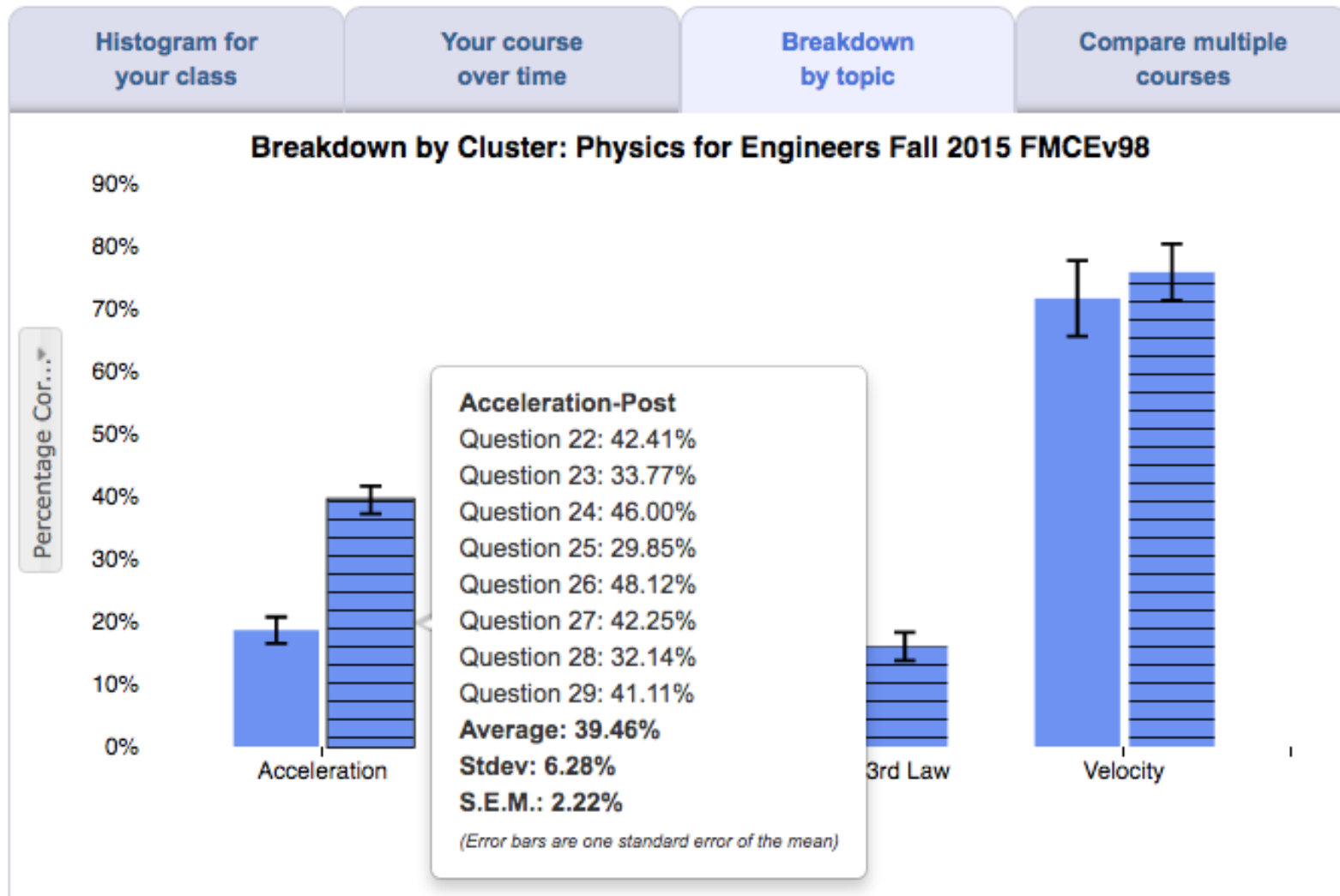
Breakdown
by topic

Compare multiple
courses

Breakdown by Cluster: Physics for Engineers Fall 2015 FMCEv98



physport.org/DataExplorer



physport.org/DataExplorer

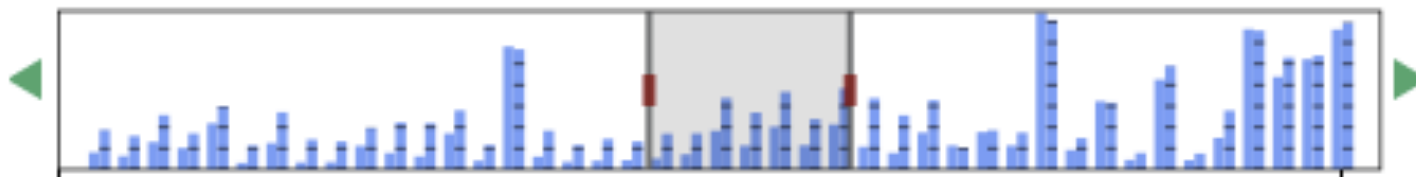
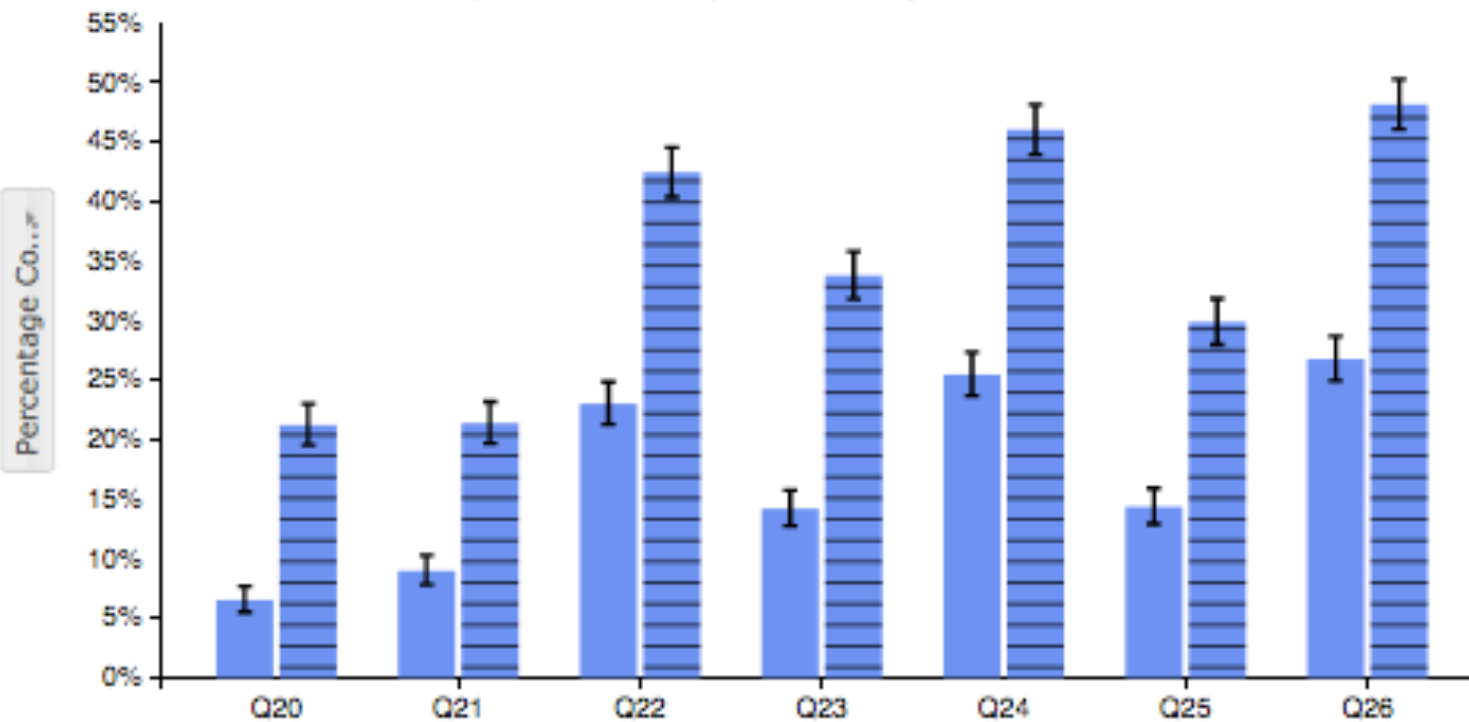
Histogram for
your class

Your course
over time

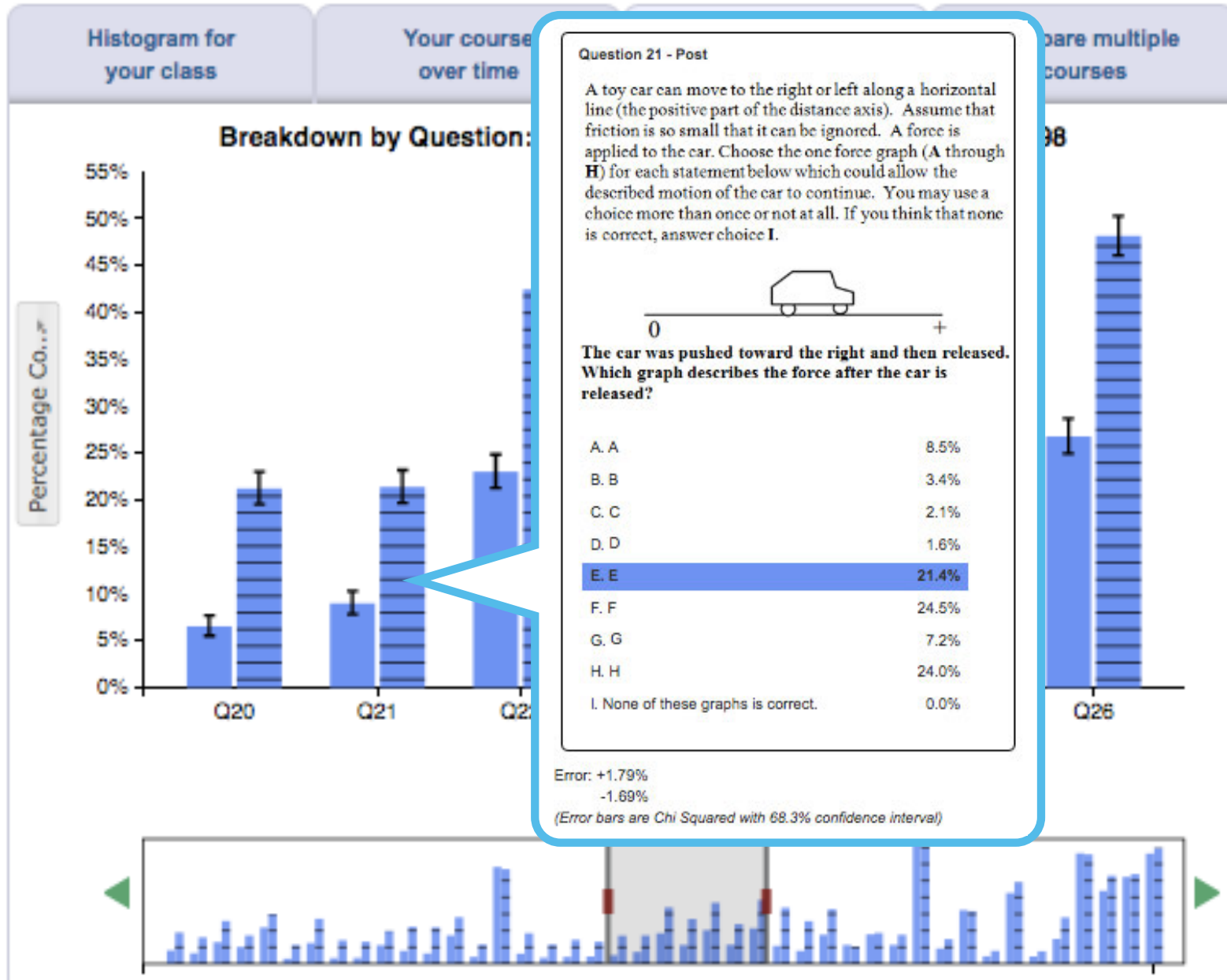
Breakdown
by topic

Compare multiple
courses

Breakdown by Question: Physics for Engineers Fall 2015 FMCEv98



physport.org/DataExplorer



Data Explorer

Visualize and compare your students' performance from 60+ research-based assessment instruments.

physport.org/DataExplorer

- Compare multiple courses
- Track your courses over time
- Group and split by gender, major, section, instructor, etc
- Easy to upload
- Coming soon:
 - Download PDF assessment report
 - Compare to national averages

Available now!

FCI, FMCE
CSEM, BEMA
CLASS, MPEX

Available F'16!

50+
research-based
assessments

Online workshops

Video workshops for training teaching assistants and faculty professional development in best practices

physport.org/workshops



What is Periscope?

Find the Periscope video collection at <http://PhysPort.org/periscope>

Periscope: Looking into Learning

What is Periscope?
A collection of lessons for faculty and LAs/TAs to:

- watch and discuss videos of best-practices physics classrooms
- apply lessons learned to actual teaching situations
- practice interpreting student behavior
- become more effective teachers

[View Collection](#)



New Faculty Workshop - Introduction

Virtual New Faculty Workshop

What is the Virtual New Faculty Workshop?
Videos of presentations from the live Workshop for New Faculty in Physics and Astronomy feature:

- leaders in physics education research and curriculum development
- teaching techniques proven to work in many environments
- cutting-edge developments in physics/astronomy curriculum and pedagogy

[View Collection](#)

Periscope

Videos of students working with handouts for training TAs and faculty in best-practices.


How can I facilitate students working well in groups? I


Part of the Periscope collection 

What is Periscope?

[View Facilitators Guide](#) ▼

 1 Watch classroom video

 2 Discuss in small groups

 3 Discuss with whole group

Group work is an important part of many physics classes. As instructors we may be hoping that during group work students will validate each other's correct ideas, refute each other's incorrect ideas, raise important questions, and generally provide each other with a safe and productive mini-environment for learning. However, it's hard to know whether groups are really accomplishing these things, especially when we're not there. How can we facilitate students working well in groups?

[Open Source Tutorials, E&M, electrostatics, University of Maryland](#)

Self Study

You can also use Periscope lessons for self-study by watching the video episode and reflecting on the sample discussion prompts. In this case, we recommend printing out the handout so that you can easily refer to it while watching the episode, or opening both the episode and the handout on a large screen.



This episode shows a group of students in a tutorial discussing possible microscopic mechanisms by which objects become charged. Sample discussion prompts are about what they do in this discussion, what supports them in having a good discussion, and what instructors can do to promote productive group work.

physport.org/periscope

Periscope

Videos of students working with handouts for training TAs and faculty in best-practices.

How can I facilitate students working well in groups? I

What is Periscope?



1 Watch classroom video



2 Discuss in small groups

Group work is an important part of many physics classes. As instructors we may be hoping that during group work students will validate each other's correct ideas, refute each other's incorrect ideas, raise important questions, and generally provide each other with a safe and productive mini-environment for learning. However, it's hard to know whether groups are really accomplishing these things, especially when we're not there. How can we facilitate students working well in groups?

[Open Source Tutorials, E&M, electrostatics, University of Maryland](#)

Periscope
Looking into learning
in the classroom through video
and discussion

Episode 103: "Jump up"

Chris at the University of Maryland
using Open Source Tutorials

2:03

Open handout in new window

This episode shows a group of students in a tutorial discussing possible microscopic mechanisms by which objects become charged. Sample discussion prompts are about what they do in this discussion, what supports them in having a good discussion, and what instructors can do to promote productive group work.

HANDOUT

How can I facilitate my students working well in groups? I

Introduction

Group work is an important part of many physics classes. As instructors we may be hoping that during group work students will validate each other's correct ideas, refute each other's incorrect ideas, raise important questions, and generally provide each other with a safe and productive mini-environment for learning. However, it's hard to know whether groups are really accomplishing these things, especially when we're not there. How can we facilitate students working well in groups?

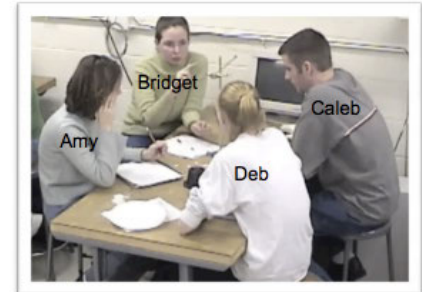
This episode shows a group of students in a tutorial discussing possible microscopic mechanisms by which objects become charged. Sample discussion prompts are about what they do in this discussion, what supports them in having a good discussion, and what instructors can do to promote productive group work.

Task for students

(from *Open Source Tutorials in Physics Sense-Making*)

Stick two pieces of tape to a smooth surface, one on top of the other, each with a bit folded over to make it easier to grab. Label the bottom tape "B" and the top tape "T." Peel them off the surface together, then uncharge the pair together by rubbing them on your lip. Finally, pull the two tapes apart.

- Which tape is charged: the T tape, the B tape, neither, or both? Give evidence.
- Draw a T tape and a B tape that are separated halfway. Use "+" and "-" symbols to indicate the parts of the tapes that are charged and the type of charge.



Episode: "Jump up"

physport.org/periscope

Periscope



The header of the PhysPort website features the logo on the left, navigation links (Admin, My Account, Logout, About Us, Contact Us) on the right, and a menu bar with buttons for Home, Expert Recommendations, Teaching Methods, Assessments, and Workshops.

Workshops » Periscope

Periscope: Looking into Learning

What is Periscope?

[View Facilitators Guide](#)



1 Watch classroom video



2 Discuss in small groups



3 Discuss with whole group

What do you want to do?

- I want to....
 - lead a weekly TA/LA seminar
 - lead a half-day TA/LA workshop
 - teach TAs/LAs what ideas students have about a particular physics topic
 - teach TAs/LAs about a particular instructional method

Periscope



The header of the PhysPort website features the logo on the left, navigation links (Admin, My Account, Logout, About Us, Contact Us) on the right, and a menu bar with buttons for Home, Expert Recommendations, Teaching Methods, Assessments, and Workshops.

Workshops » Periscope

Periscope: Looking into Learning

What is Periscope?

[View Facilitators Guide](#)



1 Watch classroom video



2 Discuss in small groups



3 Discuss with whole group

What do you want to do?

- I want to....
- I want to....
 - prepare colleagues to use best practices
 - prepare colleagues to design learning environments
 - prepare colleagues to train TAs/LAs

Periscope



Workshops » Periscope

Periscope: Looking into Learning

What is Periscope?

View Facilitators Guide ▼



1 Watch classroom video



2 Discuss in small groups



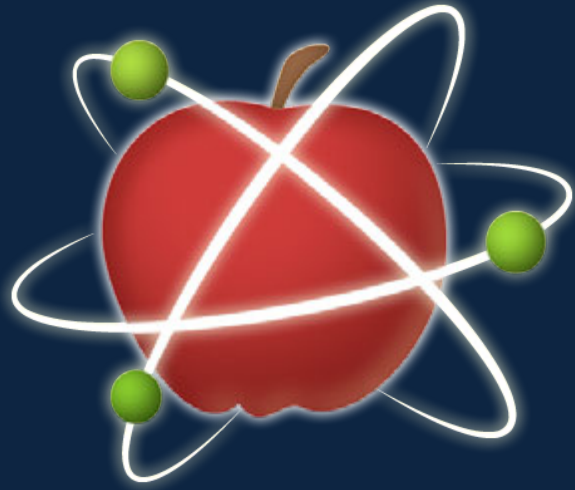
3 Discuss with whole group

What do you want to do?

- I want to....
- I want to....
- I want to....
 - support underrepresented groups
 - improve my own teaching

Guided suites of lessons by topic

physport.org/periscope



PhysPort

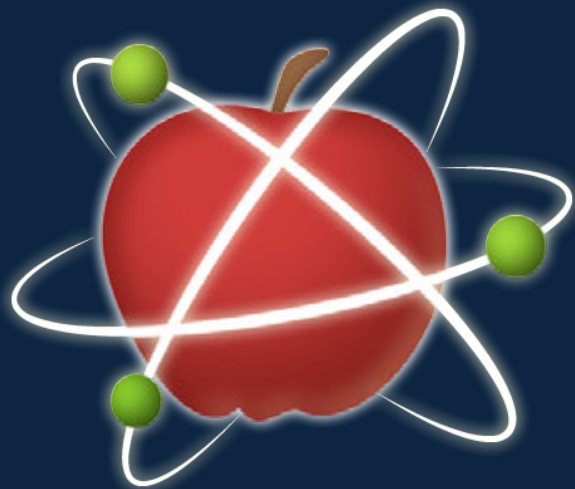
Supporting physics teaching
with research-based resources

physport.org

Resources

- Synthesis research
- Expert recommendations
- Teaching method search
- Assessment search
- Data explorer
- Online workshops





PhysPort

Supporting physics teaching
with research-based resources

physport.org

Join us!

Be a verified educator!

Download assessments

Take online workshops

Be a Data Explorer beta-tester!

if you have assessment data for:

FCI, FMCE, BEMA, CSEM, CLASS, MPEX

Email us to learn more:

smckagan@aapt.org

esayre@ksu.edu

