

Finding helpful information about teaching: PhysPort and ComPADRE

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NFW
June 2019

K SUPER



How do students learn physics?



How to help faculty teach better?



How do people learn to research?



Whoa, that was a lot of info.

When I get home, how do I...?

NFW is overwhelming.

I need ideas about...

I want to try...

Good teaching is important.

How to help students learn more?

How do you know if students are learning?

PhysPort can help.

Find information and advice

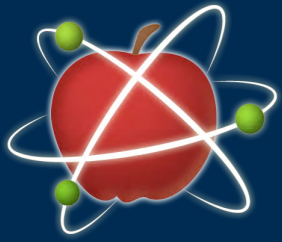
Change your teaching

free

friendly

powerful

research-based



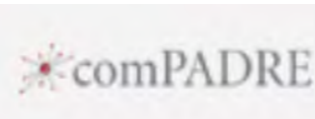
PhysPort

Supporting physics teaching with research-based resources

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

www.physport.org

Applied research into faculty needs
Synthesis research into best practices
Enable research into student learning





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

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](#)



NEW - PhysPort Data Explorer



[Explore assessment data](#)

Where can I find good questions to use with clickers or Peer Instruction?

by Sam McKagan, PhysPort director

September 26, 2016



Many research-based teaching methods in physics, including Peer Instruction, CAE Think-Pair-Share, Technology Enhanced Formative Assessment, and teaching with clickers, involve having your students discuss and answer multiple-choice conceptual questions. A challenge of using these methods is finding and writing good questions. This recommendation helps you find and write questions for your

class.

Tutorials in Introductory...



Expert Recommendations

physport.org/
recommendations

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

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 text "PhysPort Supporting physics teaching with research-based resources". To the right of the logo 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 "Addressing common concerns about concept inventories" by Adrian Madsen, Sam McKagan and Eleanor Sayre, dated July 8, 2016. The article includes a small image of a hand pointing at a document and a short introductory paragraph. Below the paragraph is a "Read more »" link and a list of tags: "assessment", "concept inventories".

To the right of the featured article are two more article teasers:

- "Where can I find good activities for small group discussions?" by Sam McKagan, PhysPort director.
- "Where can I find good questions to use with clickers or Peer Instruction?" by Sam McKagan, PhysPort director.

Below these is another teaser: "How can I get students to have productive discussions of clicker questions?" by Jenny Knight and Sarah Wise, University of Colorado - Boulder.

On the right side of the page, there is a "Most Popular" section with a blue header. It lists three popular articles:

- "Normalized gain: What is it and when and how should I use it?"
- "Arguments for skeptical colleagues"
- "How can I design an effective in-class student worksheet for PhET simulations?"

Below these articles is a "View all »" link.

At the bottom right, there is a "Tags" section with a blue header. It lists several tags: "active learning", "assessment", "best practices", "clickers", "concept inventories", "cooperative groups", "Peer Instruction", "PhET Interactive Simulations", "physics education", "research", and "teaching".

Expert Recommendations

[physport.org/
recommendations](https://physport.org/recommendations)

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

Related Expert Recommendations

How can I help students become more expert learners, so they engage in active learning?

How can I help students feel intrinsically and extrinsically motivated to engage in active learning?

How can I help students work well in small groups, so they are more likely to engage?

+6 more...

How can I set up an effective

Have a suggestion?

Want to contribute?

esayre@ksu.edu

smckagan@aapt.org

active learning classrooms?

45
available
now!

Find expert recommendations

- Thinky-researchy alone time (7 mins)
- Make a group of three (2 mins)
- Take turns to talk about the results of your investigation. (9 mins)

Expert Recommendations

physport.org/
recommendations

- By yourself, on your phone or laptop
- Identify an expert recommendation that speaks to you
 - Helps with an issue in your teaching
 - Helps with a question sparked by NFW
 - Helps with your challenge from the last session
- Use the expert recommendation to better articulate your question (and start to solve it?) (7 mins)

The screenshot shows a web browser window with the URL <https://www.physport.org/recommendations/>. The page header features the PhysPort logo (a red atom) and the text "PhysPort Supporting physics teaching with research-based resources". Navigation links include "Home", "Expert Recommendations" (highlighted in red), "Teaching Methods", "Assessments", and "Workshops". In the top right, there are links for "Login | Register" and "About Us | Contact Us", along with the AAPT logo. The main content area has a large blue heading "Expert Recommendations". Below this, there are two columns: "FEATURED" with a link "What racial, gender, and sexual" and "Most Popular" with a link "How do I help students".

Expert Recommendations

[physport.org/
recommendations](https://physport.org/recommendations)

- Make a group of three. Longest hair goes first.
- Take turns and play "yes, and"
- Person 1 presents their new question
 - Persons 2&3 think about how they share that question
 - Everyone brainstorms around this topic: what do you want to know? which NFW presentations gave you ideas? how does this connect to your institution?
- Cycle to person 2 then person 3.
- 3 mins focus on each person.

PhysPort can help.

How to help students learn more?

How do you know if students are learning?

free

friendly

powerful

research-based

Find information and advice

Change your teaching

Teaching methods

physport.org/
methods

PhysPort
Supporting physics teaching with research-based resources

Login | Register
About Us | Contact Us

AAPT

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

Teaching Methods and Materials

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

Any Subject | Any Level | Any Setting | Submit

Student Skills Developed ?

Any

- Conceptual understanding
- Problem-solving skills
- Lab skills
- Making real-world connections
- Using multiple representations
- Designing experiments
- Building models
- Metacognition

Instructor Effort Required ?

57 Research-Based Methods

Sort by: Popularity

Peer Instruction

Small group discussion of conceptual questions interspersed with lectures, increasing engagement and providing formative feedback on student thinking.

Subject
+7

Level
MS HS IC IM UL GS O

Setting
+2

Teaching methods

physport.org/
methods

What works for my
context?

57
methods
available

Student Skills Developed ?

Instructor Effort Required ?

Resources Needed ?

Any

Any

Conceptual understanding

Low

Exclude methods requiring the
following:

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

Any Subject

Any Level

Any Setting

Submit

representations

- Designing experiments
- Building models
- Metacognition

Silver validation

Bronze validation

Research-based

Simple lab equipment ?

Advanced lab equipment ?

Cost for students

Tables for group work

Studio classroom ?

Highly skilled instructors ?

Teaching methods

physport.org/methods

What works for my context?

How does it work?
Where can I get it?

The screenshot shows the PhET Interactive Simulations website. At the top left is the PhET logo with the text "INTERACTIVE SIMULATIONS" and "University of Colorado Boulder". To the right of the logo is the title "PhET Interactive Simulations" and the text "developed by: PhET Interactive Simulations, University of Colorado - Boulder". Below the title is a "Level" filter bar with a green slider set to "High school". Under the slider are buttons for "middle school", "High school", "intro college", "intro graduate", "upper level", and "grad school". To the right of the slider are icons for "other", "math", "alg", and "connectors". Below the level filter is a "Topics" section with icons for a wrench, lightning bolt, sine wave, thermometer, atom, and a "+3" button. To the right of the topics is a "Setting" section with icons for a group of people, two people, a person, a gear, a document, and a network of nodes.

Teaching methods

[physport.org/
methods](https://physport.org/methods)

What works for my
context?

How does it work?
Where can I get it?

Get it at compadre.org

- Collections of teaching materials
- Free.
- Intro, upper division, astro, IPLS.... etc
- Simulations, tutorials, clicker questions, ebooks.... etc

Open Source Physics

www.compadre.org/osp/

OSP
open source physics

Welcome Eleanor Sayre (le@zaposa.com) - [my profile](#) - [AAPT link](#) - [logout](#)
[filling cabinet](#) - [suggest a resource](#) - [administrate](#)

Search the OSP Collection.

SIMULATIONS

EJS MODELING

CURRICULUM

PROGRAMMING

TOOLS

JS/HTML MATERIALS

BROWSE MATERIALS

RELATED SITES

DISCUSSION

ABOUT OSP

Computational Resources for Teaching

The **OSP Collection** provides curriculum resources that engage students in physics, computation, and computer modeling. Computational physics and computer modeling provide students with new ways to understand, describe, explain, and predict physical phenomena. Browse the [OSP simulations](#) or learn more about our tools and curriculum pieces below.

Tracker

The Tracker tool extends traditional video analysis by enabling users to create particle models based on Newton's laws. Because models synchronize with and draw themselves right on videos of real-world objects, students can test models experimentally by direct visual inspection.

[Learn more about Tracker](#)

EJS Modeling

Student modeling, the guided exploration of physical systems and concepts, is a powerful approach to engaged learning. Easy Java Simulations provides the computational tools for students and faculty to explore physics without the need for learning details of java programming.

[Learn more about EJS](#)

Programming

Open Source Physics provides extensive resources for computational physics and physics simulations. Included are:

- An Eclipse environment for OSP
- OSP Source Code Libraries
- OSP best practices
- Documentation

Newest OSP Materials

May 26 [Physlet@ Waves and Oscillations Problems Package](#)

May 24 [Physlet@ Physics Periodic Motion Problems JS Package](#)

May 13 [Solar and Lunar Eclipse JS Model](#)

Apr 24 [Celestial Sphere with Analemma JS Model](#)

Recently Updated Materials

Jun 10 [STP Textbook Chapter 9: Critical Phenomena](#)

Jun 10 [STP Textbook Errata supplement](#)

May 8 [Two-Body Orbits JS Model](#)

Mar 20 [Open Source Physics Users Guide supplement](#)


Recent Library Comments

Jun 08 - 2:22 PM EST
Jason Diemer posted [Physlets won't...](#) to the

Science SPORE Prize
November 2011

The Open Source Physics Project is supported by NSF DUE-0442581.

Featured Tracker Package



[Projectile Motion with Angry Birds](#)

Advanced Labs

www.compadre.org/advlabs/

The screenshot shows the homepage of the AAPT Advanced Labs website. The header is dark blue with the AAPT logo and the text "Advanced Labs". Navigation links include "Home", "Lab Manuals", "Software", "Supplements", "Forums", "Conferences", "ALPhA", "Listserv", and "About". A search bar is located in the top right, with "Search" and "Advanced" buttons. Below the header, there are four main content areas: "Information Exchange" with links to Lab Manuals, Software, and Supplements; "News and Events" featuring a banner for the "AAPT Summer Meeting 2017" in Cincinnati, Ohio; "Featured Folders" listing workshops from 2010 to 2013; and "Recently Added Materials" with a list of recent uploads and an RSS Feed link.

AAPT Advanced Labs [my profile](#) - [logout](#)
[filing cabinet](#) - [suggest a resource](#) - [administrate](#)
Search the Library... **Search** **Advanced**

Home | Lab Manuals | Software | Supplements | Forums | Conferences | ALPhA | Listserv | About

Information Exchange

- [Lab Manuals](#)
- [Software](#)
- [Supplements](#)

News and Events

AAPT Summer Meeting 2017

Preparations are underway for the AAPT Summer meeting in Cincinnati, Ohio (July 22-26, 2017). The meeting will be held at the RiverCenter Convention Center. The main conference hotel is the Marriott Cincinnati RiverCenter. .

Featured Folders

- [AAPT 2013 Advanced Labs Workshop](#)
 - Low-Cost Capacitance Profiling of a Semiconductor
 - Multimode fiber optics
 - Temperature Dependent Lifetime Measurements of Fluorescence from a Phosphor
 - Cosmic Ray Statistics using LabVIEW
 - 532 nm Laser Lab
- [AAPT 2012 Advanced Labs Workshop](#)
- [AAPT 2011 Advanced Labs Workshop](#)
- [AAPT 2010 Advanced Labs Workshop](#)

Recently Added Materials

- May 10 [Interferometric Faraday effect magnetic field measurements](#)
- May 10 [Interferometric Faraday effect magnetic field measurements](#)
- May 10 [Spin Noise Spectroscopy in Rb Vapor](#)
- May 10 [2016 AAPT-ALPhA Award Lab Manual](#)
- Apr 26 [2016 AAPT-ALPhA Award - The Hong-Ou-Mandel Effect](#)
- Apr 25 [2015 AAPT-ALPhA Award - Mechanical Chaotic Oscillator](#)
- Apr 25 [Investigating student ownership of projects in an upper-division physics lab course](#)

[RSS Feed](#)

Other Services

- [BFY Proceedings](#)
- [advlabs-l](#)

Teaching methods

[physport.org/
methods](https://physport.org/methods)

Which method
should I choose?

How does it work?
Where can I get it?

What else can I do?

Compatible Methods

Peer Instruction

Tutorials in Introductory Physics

Just-in-Time Teaching

+49 more...

Similar Methods

Physlets

Open Source Physics Collection

CPU Computer Simulators

57
methods
available

Teaching methods

[physport.org/
methods](https://physport.org/methods)

Which method
should I choose?

How does it work?
Where can I get it?

What else can I do?

I need
more help

Related Expert Recommendations

How do I use PhET simulations in my physics class?

How do I increase student interactivity when using PhET simulations in lecture?

How can I design an effective in-class student worksheet for PhET simulations?

+3 more...

Look it up

- Cruise through the teaching methods pages
- Find something:
 - You already do
 - You learned about here at NFW
 - You're curious about trying next fall
- Imagine:
 - What do I need to know to do this in my class?
 - What resources do I need to implement it?
 - Who else do I need to talk to?
- Bookmark:
 - There SO MUCH information here.
 - Put a pin in it to come back later.

PhysPort can help.

How to help students learn more?

How do you know if students are learning?

free

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powerful

research-based

Find information and advice

Change your teaching

Assessment Resources

physport.org/assessments

PhysPort
Supporting physics teaching with research-based resources

Admin | My Account | Logout
About Us | Contact Us

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

Browse Assessments

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

Any Subject | Any Level | Submit

Assessment Focus
Any

- Content knowledge
- Problem-solving
- Scientific reasoning
- Lab skills
- Beliefs / Attitudes
- Interactive teaching

Format
Any

- Pre/post
- Multiple-choice
- Multiple-response
- Agree/disagree
- Short answer
- Rubric
- Observation protocol

Research Validation

- Gold star validation
- Silver validation
- Bronze validation
- Research-based

Translations

82 Research-Based Assessments

Sort by: Research validation

- Force Concept Inventory (FCI)**
Mechanics Content knowledge (forces, kinematics)
Levels: Intro college, High school
Formats: Pre/post, Multiple-choice
30 min
- Colorado Learning Attitudes about Science Survey (CLASS)**
Beliefs / Attitudes (epistemological beliefs)
Levels: Upper-level, Intermediate, Intro college, High school
Formats: Pre/post, Multiple-choice, Agree/disagree
8-10 min
- Brief Electricity and Magnetism Assessment (BEMA)**
Electricity / Magnetism Content knowledge (circuits, electrostatics, magnetic fields and forces)
Levels: Upper-level, Intro college
Formats: Pre/post, Multiple-choice
45 min
- Force and Motion Conceptual Evaluation (FMCE)**
Mechanics Content knowledge (kinematics, forces, energy, graphing)
35 min

These are:

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

project info



Assessment

physport.org/
assessments

Which assessment
should I choose?

PhysPort
Supporting physics teaching with research-based resources

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82 Research-Based Assessments

Sort by: Research validator

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Mechanics Content knowledge (forces, kinematics)
Levels: Intro college, High school
Formats: Pre/post, Multiple-choice
30 min
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Levels: Upper-level, Intro college
Formats: Pre/post, Multiple-choice
45 min

Assessment Focus
Any

- Content knowledge
- Problem-solving
- Scientific reasoning
- Lab skills
- Beliefs / Attitudes
- Interactive teaching

Format
Any

- Pre/post
- Multiple-choice
- Multiple-response
- Agree/disagree
- Short answer
- Rubric
- Observation protocol

Research Validation

- Gold star validation
- Silver validation
- Bronze validation

- Conceptual topics across physics curriculum
- Additionally: beliefs, problem-solving skills, affect
- Searchable by
 - kind & level of course
 - format & topic
 - research validation

80+ available

Assessment

[physport.org/
assessments](https://physport.org/assessments)

Which assessment should I choose?

How should I administer it?



Force Concept Inventory (FCI)

Developed by David Hestenes, Malcolm Wells, Gregg Swackhamer, Ibrahim Halloun, Richard Hake, and Eugene Mosca

Purpose	To assess students' understanding of the most basic concepts in Newtonian physics using everyday language and common-sense distractors.
Format	Pre/post, Multiple-choice
Duration	30 min
Focus	Mechanics Content knowledge (forces, kinematics)
Level	Intro college, High school

Typical results

Sample questions

Research overview

Translations

Assessment

[physport.org/
assessments](https://physport.org/assessments)

Which assessment
should I choose?

How should I
administer it?

Where do I get it?

Verified educators!

For faculty and
teaching staff
free, easy

Download test

Administration guide

Security instructions

Assessment

[physport.org/
assessments](https://physport.org/assessments)

Which assessment
should I choose?

How should I
administer it?

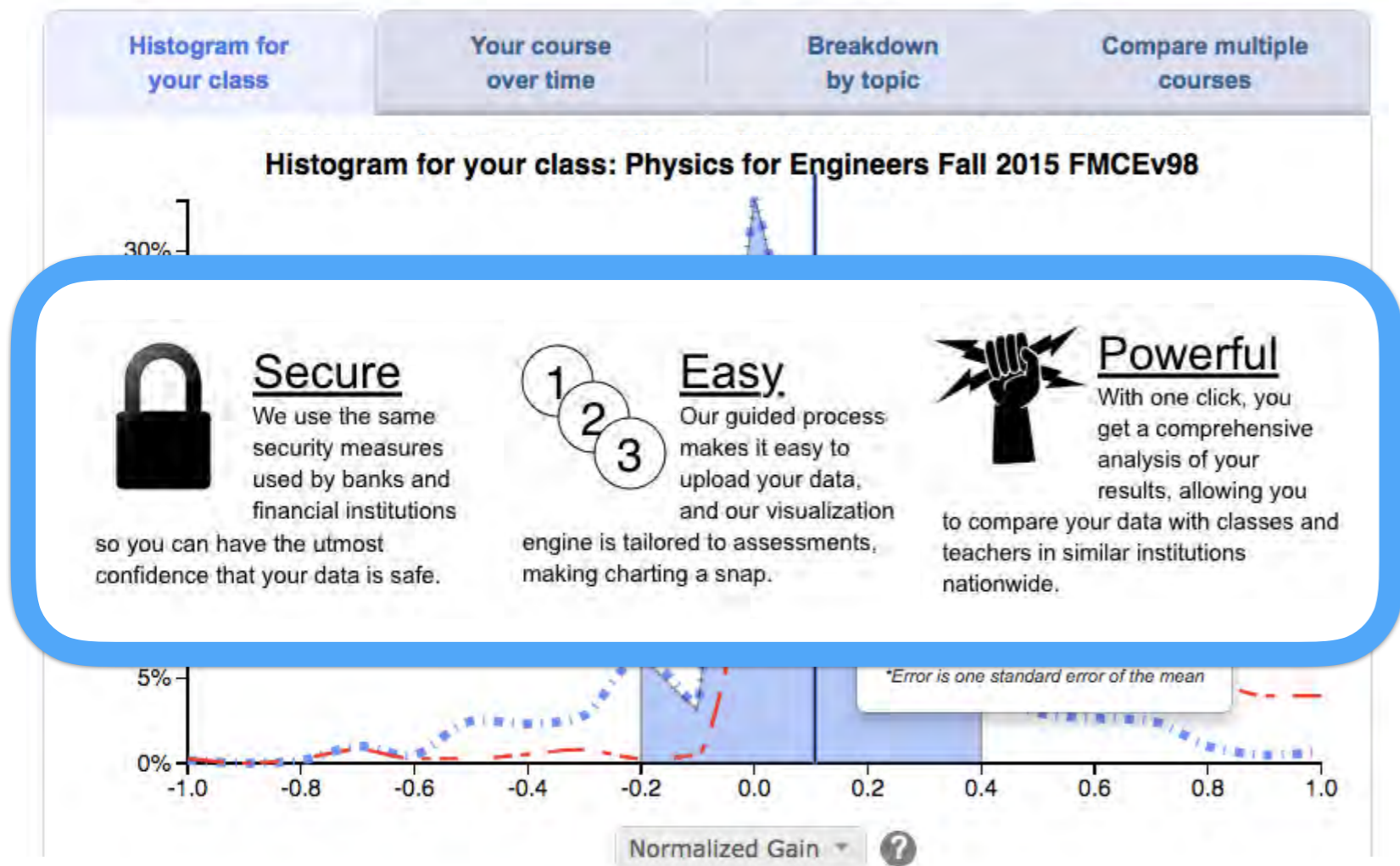
Where do I get it?

How should I interpret
my results?

Data Explorer

physport.org/
DataExplorer

Visualize and compare your students' performance on research-based assessment instruments.



Upload your data

Explore your data

Download your results

PhysPort can help.

How to help students learn more?

How do you know if students are learning?

free

friendly

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research-based

Find information and advice

Change your teaching

I want personalized help and advice.

FOLCs

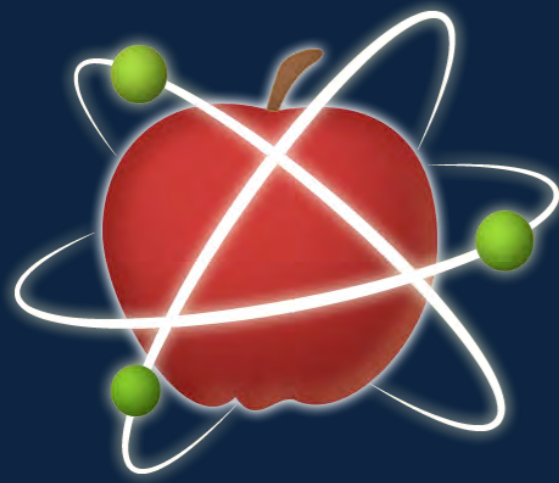
[www.aapt.org/
Conferences/
newfaculty/folc.cfm](http://www.aapt.org/Conferences/newfaculty/folc.cfm)

Consultants

[physport.org/
consultants](http://physport.org/consultants)

Questions
about research

esayre@ksu.edu



PhysPort

Supporting physics teaching
with research-based resources

physport.org

PhysPort can help.

Learn about better teaching!

Search for teaching methods

Read recommendations from experts

Be a PhysPort verified educator!

Download assessments

Take online workshops

Do Physics Education Research!

Discover how students learn

Build better pedagogy

PEER field schools

Email us to learn more

smckagan@aapt.org

esayre@ksu.edu

