Creating a Resource for Faculty: Assessment Implementation Guides

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Problem

Faculty want to use research-based assessments, but they need help knowing which to pick, how to use them, and how to interpret their results

Solution

- Build faculty-friendly guides to implementation and interpretation
- Empower faculty to make good choices

Basics

Content, course level, timing, and format are the most basic indicators that help you decide which test is right for your classroom

Scoring

Calculating gains from pre-/post-testing lets you accurately determine your students' progress toward understanding the material and changes in thought patterns and beliefs about physics

Results

Typical results set benchmarks for success for different teaching methods and let you compare your class to similar classes across the country

Research Basis

Including research allows you to easily and quickly see how rigorously the assessment has been validated with ratings from Level 1 to Gold Star

Colorado Learning Attitudes about Science Survey for Experimental Physics (E-CLASS)

Course Level: What kinds of courses is it appropriate for?

Level
Upper-Level
Intermediate
Intro College
Algebra-Based
Calculus-Based

Content: What does it test?
- Epistemology
- Expectations
- Lab skills
- Beliefs/Attitudes

Timing: How long does it take?
10-15 minutes

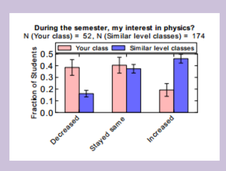
Format
Multiple-choice (Likert Scale)

Versions: Which version of the test should I use?
There is currently only one version of the E-CLASS.

Pre-test: Should I give this as a pre-test?
Yes, the E-CLASS tests content that students have ideas about even if they have never taken a physics course. Your students' pre-test score can help you understand their incoming ideas and then adjust the pacing and order of topics in your course. The pre-test scores also allow you to compare your students' overall improvement during your course to other students who started the course with different levels of incoming knowledge. There is a separate pre-test version of the E-CLASS to be given at the beginning of the course.

Scoring: How do I calculate my students' scores?
The E-CLASS is scored when all of your students have filled out both the pre- and post-surveys. A score report is sent to you. The "scores" are not actual scores, but rather are analyses of changes in answers and how answers compare to answers from experts (experimental physicists) and other similar students.

Typical results and interpretation
Typical results are included in the result report given at the end of the semester. They are specifically from classes similar to yours for comparison. This graph shows typical results from reference 2.



Clusters: Does this test include clusters of questions by topic?
The questions on the E-CLASS are not clustered.

Specific Implementation Instructions
The E-CLASS is web-based and graded automatically. See the *Scoring* section and then the *General Implementation Guide* for more details.

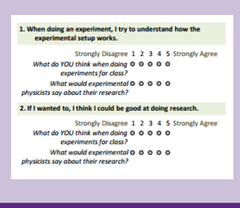
Research: What research has been done to create and validate the test?

Research validation – **Level 2**
Questions based on research into student thinking
Student interviews
Tested at multiple institutions
At least one peer reviewed publication

Similar Tests: Which other instruments is this similar to? In what ways?
This test is similar in format and design to the CLASS-Phys and CLASS-Chem.

Developer: Who developed this test?
Benjamin M. Zwickl, Noah Finkelstein and H. J. Lewandowski of the University of Colorado, Boulder developed the test.

Example Questions
Two example questions from both the pre- and post-test:



50+ Assessment Implementation Guides will be available on

PhysPort.org

(formerly PERUsersGuide), an online resource for promoting research-based teaching methods in classrooms across the country

What you can find on PhysPort:

Expert Recommendations written by PhysPort staff and expert guest authors to answer the most common questions of physics faculty new to implementing research-based teaching in their classrooms (coming soon)

Teaching Guides to over 50 research-based teaching methods, instructional strategies, and curricula developed by experts in PER

Assessment Data Explorer where you can get instant analysis of your students' scores on research-based assessment instruments, comparisons to national averages and students like yours, recommendations for improving your teaching, and reports for tenure and promotion files, teaching portfolios, and departmental accreditation (coming soon)

Student populations × **Topic**

	Mechanics	Electricity/ Magnetism	Waves/ Optics	Thermal/ Quantum	Mathematics	Lab Skills	Beliefs/ Attitudes	Interactive Teaching	Scientific Reasoning
Graduate						CDPA	CLASS, MPEX	RTOP, TDOP	
Upper-level		CUE, CURrENT	WCI			CDPA, E-CLASS	CLASS, MPEX, E-CLASS	COPUS, RTOP, TDOP	
Intermediate				QMCS, QPCS		CDPA, E-CLASS	CLASS, MPEX, E-CLASS	COPUS, RTOP, TDOP	
Intro College	FCI, FMCE, TUG-K, EMCS, ECA	BEMA, DIRECT, CSEM, ECCE	WDT	HTCE	QLCE, MMCE-II, CCI	CDPA, E-CLASS, PMQ	CLASS, MPEX, E-CLASS	RIOT, COPUS, RTOP, TDOP	Lawson, SAAR
High School	FCI, FMCE, TUG-K	DIRECT			QLCE, MMCE-II, CCI		CLASS, MPEX	RTOP, TDOP	Lawson, SAAR
Middle School							CLASS, MPEX	RTOP, TDOP	Lawson

Research basis × **Topic**

	Mechanics	Electricity/ Magnetism	Waves/ Optics	Thermal/ Quantum	Mathematics	Lab Skills	Beliefs/ Attitudes	Interactive Teaching	Scientific Reasoning
Gold star	FCI, FMCE, TUG-K	BEMA, DIRECT, CUE		QMCS			CLASS, MPEX		
Level 2	EMCS, ECA	CSEM	WDT	QPCS		CDPA, E-CLASS	E-CLASS	RTOP, TDOP, COPUS	Lawson
Level 1		ECCE	WCI	HTCE					SAAR
Under development		CURrENT			QLCE, MMCE-II	PMQ			

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