Implementation

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

Upper-level,Intermediate,Intro College,High School

Content: What does it test?

Focus: Beliefs / Attitudes

Subject:

Timing: How long should I give students to take it?

20-30 min

Example Questions

Sample questions from the MPEX:A significant problem in this course is being able to memorize all the information I need to know. *Strongly Disagree 1 2 3 4 5 Strongly Agree*Knowledge in physics consists of many pieces of information each of which applies primarily to a specific situation. *Strongly Disagree 1 2 3 4 5 Strongly Agree*

Versions and Variations: Which version of the test should I use?

The latest version of the MPEX, released in 1997, is version 4.0.

Administering: How do I give the test?

- Give it as both a pre- and post-test. This measures how your class shifts student thinking.
  - Give the pre-test at the beginning of the term.
  - Give the post-test at the end of the term.
- Use the whole test, with the original wording and question order. This makes comparisons with other classes meaningful.
- Make the test required, and give credit for completing the test (but not correctness). This ensures maximum participation from your students.

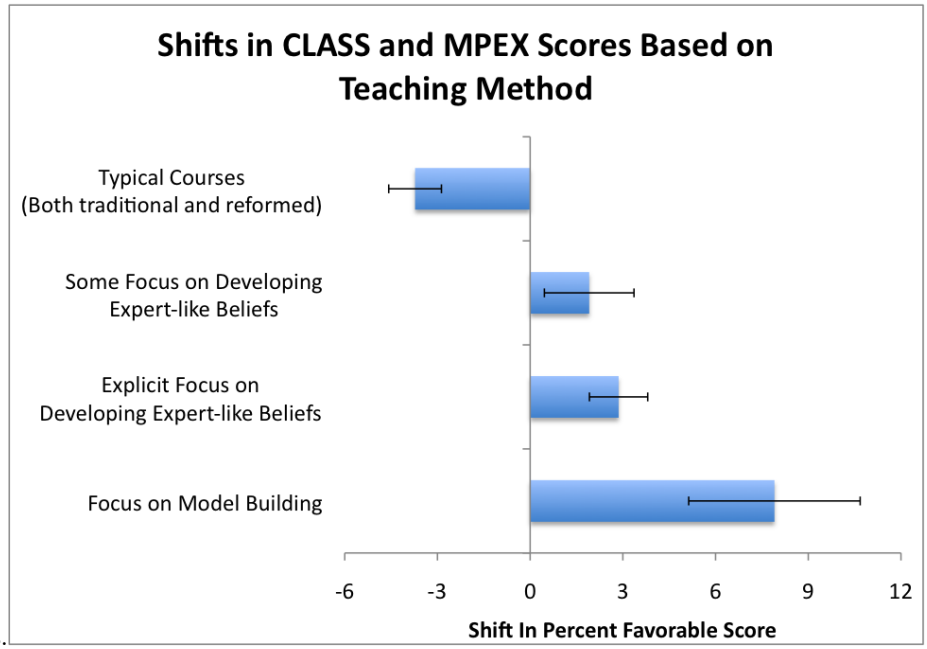
- Tell your students that the test is designed to evaluate the course (not them), and that knowing how they think will help you teach better. Tell them that correctness will not affect their grades (only participation). This helps alleviate student anxiety.
- For more details, read the **PhysPort Guides** on implementation:
  - **PhysPort MPEX implementation guide** (www.physport.org/implementation/MPEX)
  - **PhysPort Expert Recommendation on Best Practices for Administering Belief Surveys** (www.physport.org/expert/AdministeringBeliefSurveys/)

Scoring: How do I calculate my students' scores?

- The "percent favorable score" is the percentage of questions where a student agrees with the expert response. (Dis)agree and strongly (dis)agree are counted as equivalent responses. See the **PhysPort MPEX implementation Guide** for instructions on scoring the MPEX (www.physport.org/implementation/MPEX)
- See the **PhysPort Expert Recommendation on Best Practices for Administering Belief Surveys** for instructions on calculating shift and effect size (www.physport.org/expert/AdministeringBeliefSurveys/)
- Use the **PhysPort Assessment Data Explorer** for analysis and visualization of your students' responses (www.physport.org/explore/MPEX)

Typical Results: What scores are usually achieved?

In typical physics classes, students' beliefs usually deteriorate or at best stay the same. There are a few types of interventions, including an explicit focus on model-building and/or developing expert-like beliefs that appear to lead to significant improvements in beliefs. Further, small courses and those for elementary education and non-science majors also result in improved beliefs. However, because the available data oversamples certain types of classes, it is unclear what leads to these improvements. The figure below depicts CLASS and MPEX shifts for a variety of teaching



methods.

Resources

What's a good introductory article?

E. Redish, J. Saul, and R. Steinberg, Student expectations in introductory physics, Am. J. Phys. **66** (3), 212 (1998).

Background

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

Research Overview

Test questions were chosen through literature review, discussion with faculty and the researchers' personal experiences. Over 100 hours of student interviews were conducted to validate that students read and interpreted the questions in the way intended. Redish et al. (1997) collected MPEX data from calibration groups with varying expertise in physics to confirm that MPEX scores increased with increasing experience in physics. They also found that as level of expertise in physics increased so did MPEX overall score (test was only given to each

calibration group once as a pre-test). The repeatability of test results was tested by comparing the test average and distribution of shifts in the same course at the same institution but for subsequent semesters. The results were comparable. The internal consistency of the entire test was found to be good and higher than the internal consistency of the question clusters. Clusters of questions were decided a priori by researchers, a deliberate decision consistent with the researchers' resources theoretical viewpoint in which students' beliefs are viewed as local coherences, not stable mental structures (Elby, 2010). Because of this theoretical stance, factors produced by standard factor analysis of student responses do not necessarily need to exactly match the categories the researchers defined. Saul (1998) conducted a factor analysis of MPEX student responses and found four factors which did not directly correspond to the researchers categories, but this does not decrease the reliability of these categories.

Research Validation

- Questions based on research into student thinking
- Student interviews
- Expert review
- Appropriate statistical analysis
- At least one peer-reviewed publication
- Administered at multiple institutions
- Research published by someone other than developers

Developer: Who developed this test?

E. F. Redish, J. M. Saul, & R. N. Steinberg

Translations: Where can I find translations of this test in other languages?

- **en**:

References

- A. Elby, Helping physics students learn how to learn, Am. J. Phys. **69** (S1), S54 (2001).
- J. Marx and K. Cummings, What Factors Really Influence Shifts in Students' Attitudes and Expectations in an Introductory Physics Course?, presented at the Physics Education Research Conference 2006, Syracuse, New York, 2006.

- C. Omasits and D. Wagner, Investigating the Validity of the MPEX Survey, presented at the Physics Education Research Conference 2005, Salt Lake City, Utah, 2005.
- E. Redish, J. Saul, and R. Steinberg, Student expectations in introductory physics, Am. J. Phys. **66** (3), 212 (1998).
- J. Saul, Beyond problem solving: Evaluating introductory physics courses through the hidden curriculum, Dissertation, University of Maryland, 1998.
- J. Saul, R. Steinberg, and E. Redish, Comparison of student expectations in introductory calculus-based physics courses, AAPT Announcer **26** (2), 98 (1996).
- U. Wutchana and N. Emarat, Student effort expectations and their learning in first-year introductory physics: A case study in Thailand, Phys. Rev. ST Phys. Educ. Res. **7** (1), 010111 (2011).

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