PhysPort Implementation Guide: Self-Efficacy in Physics (SEP)

Version P

PhysPort
Supporting physics teaching with research-based resources

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Implementation

Purpose of the SEP

To examine the relationship between physics self-efficacy and student performance in introductory physics classrooms.

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

Intro college

Content: What does it assess?

Beliefs / Attitudes (self-efficacy)

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

5 minutes

Example Questions

I can solve for the variable r in the expression $F = Gm_1m_2/r^2$

Strongly Disagree Disagree Neutral Agree Strongly Agree

Access: Where do I get the assessment?

Download the assessment from physport at www.physport.org/assessments/SEP.

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

The latest version of the SEP, released in 2004, is the pilot version (version P).

Administering: How do I give the assessment?

- Give it as both a pre- and post-test. This measures student learning.
  - Give the pre-test before you cover relevant course material.
  - 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. 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.
- Refer to the test by a generic title like "Physics attitudes test" to prevent students from looking up the answers.
- For more details, read the **PhysPort Guides** on implementation:
  - **PhysPort Expert Recommendation on Best Practices for Administering Concept Inventories** (www.physport.org/expert/AdministeringConceptInventories/)

Scoring: How do I calculate my students' scores?

- Each student's score is sum of their points for each question, where strongly disagree is 1 point, strongly agree is 5 points, and disagree, neutral and agree are 2-4 points respectively. Possible range of scores is 8 to 40.

Clusters: Does this assessment include clusters of questions by topic?

There are no clusters of questions on the SEP.

Typical Results: What scores are usually achieved?

Typical scores on the SEP from Shaw 2004 for males and females in a conceptual physics course (Table 2), two terms of college physics courses (Table 3) and a calculus-based second semester physics course (Table 4). In conceptual physics, male students had a higher mean score than female students. In college physics and calculus-based physics, there is no significant difference in responses between male and female students.

	N	$\bar{x}$	s	R	p
F	186	28.64	4.97	0.297	0.002
M	170	29.81	4.43	0.395	<0.0001
F+M	356	29.18	4.75	0.324	<0.0001

Table 2: SE for conceptual physics course

	term	N	$\bar{x}$	s	σ_E	p
F	1	51	30.51	3.64	0.51	
M	1	33	31.52	4.18	0.73	0.247
F	2	49	30.53	3.64	0.52	
M	2	27	31.48	5.12	0.99	0.350

Table 3: SE scores for male and female students in College physics course.

	N	$\bar{x}$	s	σ_E	p
F	18	30.78	4.45	1.05	
M	59	29.15	6.37	0.83	0.317

Table 4: SE scores for male and female students in 2nd semester calculus-based physics course.

Interpretation: How do I interpret my students' scores in light of typical results?

It is hoped that students' SEP scores improve as a result of your course or at least do not decrease from pre- to post-test. Aim for positive shifts in scores from pre- to post-test. You can also compare your SEP scores to those listed in Typical Results.

Resources

Where can I learn more about this assessment?

K. Shaw, The Development of a Physics Self-Efficacy Instrument for Use in the Introductory Classroom, presented at the Physics Education Research Conference 2003, Madison, WI, 2003.

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

You can download translations of this assessment in the following languages from PhysPort:

- **Chinese** translated by Junpeng Zhang
- **English**

If you know of a translation that we don't have yet, or if you would like to translate this assessment, please contact us!

Background

Similar Assessments

The SOSESC-P has 33 questions, whereas the PSEQ and SEP have 5 and 8 questions, respectively, so the SOSESC-P probes

more dimensions of self-efficacy in more depth than the other surveys. There is a lot more variety in the questions on the SEP than the questions on the PSEQ. The SEP asks students about their belief that they can solve very specific physics problems, their comfort using a computer, and if they consider themselves good at mathematics, whereas the PSEQ questions are about physics in general. All have the same level of research validation

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

Research Validation: Bronze

This is the third highest level of research validation, corresponding to at least 3 of the validation categories below.

- [x] Based on research into **student thinking**
- [ ] Studied using **student interviews**
- [x] Studied using **expert review**
- [ ] Studied using **appropriate statistical analysis**
- [ ] Research conducted **at multiple institutions**
- [ ] Research conducted **by multiple research groups**
- [x] **Peer-reviewed publication**

Research Overview

Based on a literature review, the developers created an 8 question pilot version of the SEP where the questions were modeled after self-efficacy questions from surveys in other disciplines. The questions underwent expert review and were revised. The SEP was tested with over 500 students, and the results are published in one peer-reviewed paper.

Developer: Who developed this assessment?

Kimberly A. Shaw

References

- K. Shaw, The Development of a Physics Self-Efficacy Instrument for Use in the Introductory Classroom, presented at the Physics Education Research Conference 2003, Madison, WI, 2003.