Assessing Collaborative Learning Strategies

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How should we assess LEARNING?
Traditional answers

Grades

Exams

Student evaluations
Our focus

Standardized assessments

Student evaluations of their own understanding
Effect of collaborative strategies using standardized assessments?

How well can students evaluate own learning?
Effect of collaborative strategies using standardized assessments?

How well can students evaluate own learning?
Standardized assessments

Force Concept Inventory

Hestenes et al., 1992
Standardized assessments

\[ g = \frac{S_f - S_i}{1 - S_i} \]

R.R. Hake, 1998
Standardized assessments

\[ g = \frac{S_f - S_i}{1 - S_i} \]

R.R. Hake, 1998
How can we get more instructors to use standardized assessments?

Make it easier to do!
Standardized assessments

Interactive Learning Toolkit

The Interactive Learning Toolkit helps you implement innovative teaching ideas, such as Peer Instruction and Just-in-Time-Teaching, and to monitor your students' learning. Our goal is to help you focus on teaching by streamlining the organizational work that accompanies the teaching of a course. Select materials for class use from a large class-tested database and organize (and possibly share) your own materials. Administer your courses, design course Web pages, and interact with your students online.

Access to the site is restricted to registered users; if you are not registered, please register now.

This site is supported by a grant from the National Science Foundation and by the Division of Engineering and Applied Sciences at Harvard University.
Standardized assessments

Easy to implement
Easy to administer
Easy to obtain results
Standardized assessments

Physics 1b

February 2006

Courses > Physics 1b > Standardized tests > Physics Background Questionnaire > Results

started the test at 2006-Feb-04 10:0:23 am and completed it successfully at 2006-Feb-04 10:0:26 am

Key: Correct choice has grey background and student's choice is in bold
did agree with the honesty statement.

1

The figure below shows a boy swinging on a rope, starting at a point higher than P. Consider the following distinct forces:

1. A downward force of gravity.
2. A force exerted by the rope pointing from P to O.
3. A force in the direction of the boy's motion.
4. A force pointing from O to P.

Which of the above forces is (are) acting on the boy when he is at position P?

A. 1 only.
B. 1 and 2.
C. 1 and 3.
D. 1, 2, and 3.
E. 1, 2, and 4.

An elevator is being lifted up an elevator shaft at a constant speed by a steel cable as shown in the figure below. All frictional effects are negligible. In this situation, forces on the elevator are such that:

A. the upward force by the cable is greater than the downward force of gravity.
B. the upward force by the cable is equal to the downward force of gravity.
C. the upward force by the cable is smaller than the downward force of gravity.
Standardized assessments

Physics 1b
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B. the upward force by the cable is equal to the downward force of gravity.
C. the upward force by the cable is smaller than the downward force of gravity.
D. the upward force by the cable is greater than the sum of the downward force of gravity and a downward force due to the air.
E. none of the above. (The elevator goes up because the cable is being shortened, not because an upward force is exerted on the elevator by the cable.)
Standardized assessments

www.deas.harvard.edu/ilt
Standardized assessments

10,000 students tested

Results from 22 classrooms throughout U.S.

Self-reported teaching techniques
Standardized assessments

-0.1
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0

<pretest>

<gain>

2-year Traditional (n=257)
2-year Collaborative (n=183)
Standardized assessments

4-year colleges: better with collaborative learning

2-year colleges: not as successful

Why?
Standardized assessments

22 additional 2-year college courses from U.S. and Canada

Most use collaborative techniques
What is the effect of collaborative learning strategies on standardized assessments?

How well can students evaluate their own learning?
Student self-evaluation

Use the following scale to rate your comprehension of the concept of ________.

1 - I am totally lost (I really have no clue at all)
2 - I am pretty confused -- many things don't make sense to me
3 - Some aspects confuse me, but it's beginning to make sense
4 - I understand it mostly, but I still have some questions
5 - I think I have a solid grasp of the concept
Student self-evaluation

Students rate their understanding throughout the learning process:

- Pre-class reading
- Lecture
- Tutorial
- Homework
- Exams

Compare rating with understanding
Student self-evaluation

Average student confidence

Confidence

RA 1  Lect 1  RA 2  Lect 2  PSet  Exam 1  Exam 2  Exam 3  Final

Stage in learning process

Confidence values:
- RA 1: 3.05
- Lect 1: 3.24
- RA 2: 2.71
- Lect 2: 3.29
- PSet: 3.32
- Exam 1: 3.55
- Exam 2: 3.53
- Exam 3: 3.47
- Final: 3.67
Student self-evaluation

Correlation of student ratings with their performance

- Third exam: $r=0.46$
- Second exam: $r=0.34$
- First exam: $r=0.26$
- Lecture: $r=0.25$
- Reading assignment: $r=0.15$
- Final exam: $r=0.29$

Stage in learning process

Correlation

0 0.1 0.2 0.3 0.4 0.5
Self-evaluation

Students not good at evaluating own understanding,

BUT, they get better with greater knowledge and more feedback!
Collaborative strategies work better in 4-year than 2-year colleges...

...student self-evaluations not informative
Thank you!

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