Applying physics to solve problems in new contexts and representations: Methods Students Use

Dean Zollman

Kansas State University

Kansas State University
Physics Education Research

Collaborators

- Sanjay Rebello
- David Jonassen
- Liz Gire
- Sytil Murphy
- Dong-Hai Nguyen
- Dyan McBride
- Jacquelyn Chini
- Adrian Carmichael
- Zdeslav Hrepic
- Fran Mateycik

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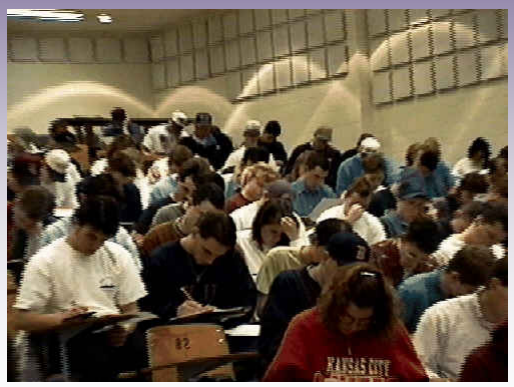
`The questions on the test were, like, totally different from the homework."

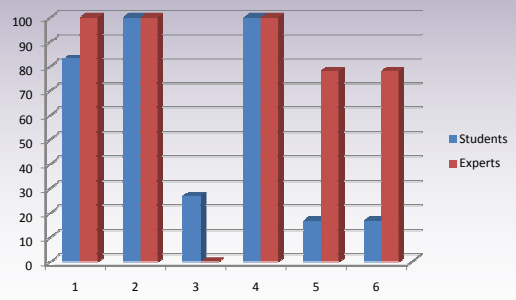


Do students see & hear what we see &hear

- Compared Students' and Experts' Views of the Content of a Lecture
- Students viewed videotape of a well known lecturer
- Lecturer, grad students (experts) responded to
  - "Was [question] covered in the lecture?"
  - "If so, rank the completeness (1-5)"
- Undergrads
  - Pre- post-test on the same topics
  - Asked if a question was coverage

Comparisons

- Lecturer and experts agreed on completeness & coverage
- Students & experts: Was a question covered?



Hrepic, Zollman, Rebello: *Journal of Science Education and Technology*, 16 213-224 (2007)

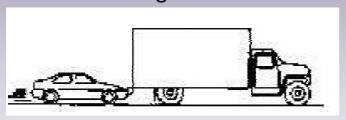
One conclusion

- Prior knowledge was an important factor in determining what students saw in the video.
  - Students who were successful on pre-test question would conclude that a topic was covered in the video
    - Even if it were not
- Prior knowledge helps set the context for student learning

Context set by order of questions

Question α

A large truck breaks down out on the road and receives a push back into town by a small compact car as shown in the figure below.

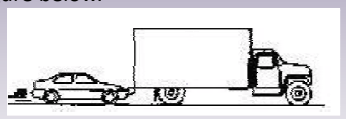


While the car, still pushing the truck, is speeding up to get up to cruising speed:

(A) The force with which the …

Question β

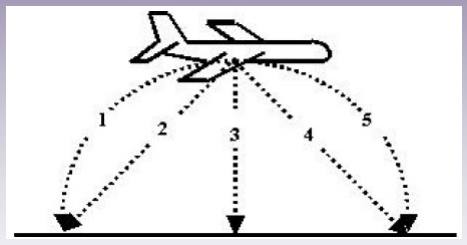
A large truck breaks down out on the road and receives a push back into town by a small compact car as shown in the figure below.



After the car reaches a constant cruising speed at which
the driver wishes to push the truck:

(A) The force with which the …

Control question



Experiment

- Present each group of students with one of four versions (~60 students per group)

Version	Question 1	Question 2
1	Question α	Question β
2	Question β	Question α
3	Control Question	Question α
4	Control Question	Question β

Some results

Question α followed by question β

- 9.4% responded that no force was present when the car and truck traveled at a constant speed
- However, they recognized that a force was present between the accelerating objects.

Question β followed by question α

- 0 responded that no force was present when the car and truck traveled at a constant speed

Statistically significant

Gray, Rebello. Zollman PERC Proceedings (2002)

Context & Representations

- Slight change to us
- Can be a big change to a novice