

Writing and Peer Ranking in Introductory Physics

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A Question:

- *A truck and a motorcycle both have the same rocket engine attached to them. These rockets provide a thrust of 1000 N for 10 seconds. Which vehicle will have the greater momentum after the rockets stop firing?*

A Sample Answer

- *The larger truck will have more momentum. It has more mass and would be harder to stop than the smaller motorcycle. The harder it is to stop the more momentum an object has. The truck may take longer to get going than the motorcycle, but after it starts it will be the harder one to stop.*

Another Answer

- *I think the motorcycle will have the greater momentum because in the equation $\text{Force} * \text{change in time} = \text{mass} * \text{velocity}$, the mass of the motorcycle is less so his velocity will be greater. The same amount of force and time is applied to both but the mass and velocities will be different.*

Why is this a good idea?

- *Students get to see how other students are thinking*
- *Students have their writing looked at by their peers*
- *Writing Essay - which level of Bloom's taxonomy?*
- *Ranking Essays - which level of Bloom's taxonomy?*
- *Reduce grammatical and spelling errors*
- *Students write more carefully*
- *Instructor can gain a sense of student conceptual understanding*

Peer Assessment

- *Students evaluating students*
 - *Peer Rating - giving a score*
 - *Peer Ranking - comparing*
 - *Peer Review - critiquing*

Uses of Peer Assessment

- *Group Projects*
- *Presentations*
- *Lab Reports - or sections of them*
- *Research Papers*
- *Short Essays*

Implementation Options

- *Paper vs. Web-based?*
- *How many to assess per student?*
- *Assess in groups or individually?*
- *Rating or ranking?*
- *Grade the assessment?*

The key is feedback

- *Incorporate essays and rankings in class*
- *Ask students for evaluation criteria*
- *Use evaluation criteria to create a student-generated rubric*
- *This list is made by the students and for the students*

Exemplar and Badlar Essays

- *Planted by the instructor*
- *Exemplar - a near perfect essay*
- *Badlar - an essay containing a certain mistake (perhaps common mistake)*
- *Badlars can be useful for writing style also.*
 - *make it long*
 - *well written*

Web-Based Peer Assessment

- *The problem with paper-based - too much paper*
- *Web-based*
 - *can be automated*
 - *anonymous*
 - *randomization*
 - *grading easier*

Ranking, not Rating

- *In peer rating, students tend to give uniformly high scores*
- *In peer ranking, students are FORCED to make a distinction*
- *There are no ties in peer ranking*

Peer Ranking with “Bins”

- *Instructor grades essays by placing them in “bins”*
- *Students receive one essay randomly from each bin*
- *Benefits of bins:*
 - *Since no ties are allowed in ranking, this gives students a wider variety of essays*
 - *By grading into bins, instructor can grade the essays quicker (built-in grade buffer)*
 - *A bin could contain an exemplar or badlar that all students receive*

Peer Ranking with Essays

- *Give an essay question*
 - *not all essays are good for ranking*
- *Place essays into bins (generate a grade from this)*
- *Choose/create an exemplar/badlar*
- *Peer Ranking assignment*
- *Discuss essay and what makes a good/bad essay*

- ***Good Essay for Ranking***

- *Two students are discussing the motion of a ball thrown straight up that lands. One student says that the acceleration at the highest point must be zero, the other student says that it is not zero. Which student is correct?*

- ***Bad Essay for Ranking***

- *When a punter kicks a football, is he doing any work on the ball while his toe is in contact with it? Is he doing any work on the ball after it loses contact with his toe? Are any forces doing work on the ball while it is in flight?*

Peer Ranking of Labs

- *What is wrong with student labs?*
 - *"Most of our predictions were close to the actual."*
 - *"The results that were gathered for...are for the most part scientifically possible and reasonable correct. Because of known equations that were used to help prove the theory were used."*
 - *"In the Arm Power lab we found out that the less time it takes to do something the more work is required to lift the object."*
 - *"The results that we attained were reasonable"*
 - *"For the most part, the results agreed with our predictions, and in all cases excluding human error."*

Unanswered Questions

- *Do Peer Ranking Assignments really improve student writing?*
- *Do they improve student conceptual understanding?*
- *How does the class (as a whole) agree with the instructor on ranking?*
- *How do different instructors agree on ranking?*