Grading practices can send a powerful message to students about what is expected. Research in physics education has identified a mismatch between what college instructors value and their actual scoring of quantitative student solutions. This work identified three values that guide grading decisions: (1) a desire to see students reasoning, (2) a tendency to avoid deducting points from solutions that might be correct, and (3) a tendency to assume correct reasoning when solutions are ambiguous. When values are in conflict, the conflict is resolved by placing the burden of proof on either the instructor or the student. In this qualitative interview study, we verified that this mismatch exists and that the three values are present among earth science (n=7) and chemistry (n=10) instructors.

This research could serve as a tool to promote cognitive conflict in faculty. This cognitive conflict can lead to reflection on and changes in practice (Henderson et al., 2004). For example, instructors who are in need of some guidance, I think, is much easier. For student C7: “I appreciate student solution D because it does give me the student when grading student work? All values suggest different values.

<table>
<thead>
<tr>
<th>Value</th>
<th>Science Faculty Grading of Quantitative Problems: Are Their Values Consistent with Their Practice?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value 1: high grade</td>
<td>Instructor C7: “I appreciate student solution D because it does give the Burden of proof construct is not clearly commented. (BOPS).</td>
</tr>
<tr>
<td>Value 2: low grade</td>
<td>Instructor E3: “Well, this person [SSE] didn’t show their work, but they got the right number and it looks like they did everything right. I guess we’re not no chance but to give them at 10.”</td>
</tr>
<tr>
<td>Value 3: no grade</td>
<td>Instructor E3: “[SSE has] no organization, no units, and it’s impossible to follow the logic. I always add this on the how much burden of proof construct is not clearly commented. (BOPS).</td>
</tr>
</tbody>
</table>

**CONCLUSIONS AND IMPLICATIONS FOR PRACTICE**

- Including 30 surveys and 6 interviews physics from Henderson et al. (2004):
  - 48% of faculty could be viewed as penalizing students for showing work (e.g., graded SSD > SSE).
  - 34% of faculty could be viewed as penalizing students for showing work, and rewarding omission of work (e.g., graded SSE > SSD).
- 48% of faculty placed the burden of proof on the student, requiring students to prove knowledge in order to earn points.
- Chemistry were more likely than earth science or physics faculty to grade SSE > SSD. The nature of chemical problem-solving may account for this difference (Carnahan & Goss, 1999).
- This research can serve as a tool to promote cognitive conflict in faculty. This cognitive conflict can in turn lead to reflection on and changes in practice.

**REFERENCES**


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