Don’t have a pre-post test, use a Bloom’s rubric!
The development and validation of a rubric for
“blooming” assessments to measure student learning
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Purpose and Research Question

Purpose:
• To compare student performance on assessments from different semesters when a concept or pre-post survey does not exist or when other assessment tools are not appropriate

Proposal submitted and accepted to the President’s Teaching and Learning Collaborative (PTLC)

Methods

• Independent, blinded raters (n=3)
• 3 rounds of validating Bloom’s level of course questions (n=155): round 1 with standard rubric, round 2 with preliminary flow chart rubric, round 3 with finalized flow chart rubric
• Inter-rater reliability and percent agreement between raters scored at each round

Development of Bloom’s rubric

Qualitative Survey:
FCQ’s → End of Term Survey + FCQ
Exam (no pre/post)

Proposal accepted to PTLC → 1st validation of Bloom’s rubric → 2nd and 3rd validation

Bloom’s rubric validation & example use

Table 1. Percent agreement between rater and average question rating

<table>
<thead>
<tr>
<th>Rater</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
<th>Q11</th>
<th>Q12</th>
<th>Q13</th>
<th>Q14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rater 1</td>
<td>90%</td>
<td>85%</td>
<td>92%</td>
<td>88%</td>
<td>91%</td>
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<tr>
<td>Rater 2</td>
<td>87%</td>
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<td>Rater 3</td>
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Example “Blooming” of exam question
What are the directions of the chemical, electrical, and net driving forces acting on K+ when the membrane potential is -55mV?

Bloom’s Rubric Q1: No → Q4
Bloom’s Rubric Q4: No → Q7
Bloom’s Rubric Q7: No Q13
Bloom’s Rubric Q13: No → Q14
Bloom’s Rubric Q14: Yes → Apply

Application of rubric

Bloom’s Analysis of IPHY 4720 Exam Questions

Fall 2004
78% remember & comprehend
22% apply & analyze
9% evaluate & synthesize

Fall 2008
27% remember & comprehend
64% apply & analyze
9% evaluate & synthesize

Assessing a moving target? Measure how target changes!

As exams kept changing to maintain a consistent average (Table 3), learning could not be assessed directly. Therefore, instead of using exam scores to measure learning, we measured the changes in the exam itself (see Bloom’s analysis of IPHY 4720 Exams above.) As students were able to maintain consistent scores on a more challenging assessment, we can indirectly state that IPHY 4720 reform led to increases in student learning and performance.

Conclusions

1. Between independent raters, use of Bloom’s rubric is reliable.
2. A validated Bloom’s rubric can be used to compare student performance on assessments when other assessment tools are inappropriate or unavailable.