Artifact based energy literacy assessment utilizing rubric scoring

Quinn Langfitt, Liv Haselbach, R. Justin Hougham

Study Objectives
Applicability of rubric use for examining energy literacy in artifacts as an alternative to testing
Energy literacy levels and trends displayed in Imagine Tomorrow competition deliverables

Rubric Approach
Why Use a Rubric?
These differences between tests and rubrics make it important for a rubric based approach to be developed:
- Rubrics may measure more applied type knowledge than tests do
- Rubrics can be applied to past works
- Rubric assessments do not require any effort by the assessed
- No non-responses in rubric assessment

The Rubric
<table>
<thead>
<tr>
<th>Energy Literacy</th>
<th>Absent</th>
<th>Pre-Emerging</th>
<th>Emerging</th>
<th>Developing</th>
<th>Competent</th>
<th>Effective</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students:</td>
<td>Do not identify issue</td>
<td>Do not summarize the issue</td>
<td>Do not consider stakeholders</td>
<td>Focus on their own perspective</td>
<td>Do not consider impact or content</td>
<td>Do not consider current information</td>
<td>Available on the issue</td>
</tr>
<tr>
<td>Students:</td>
<td>Begins to frame the issue, but gloss over key details</td>
<td>Discusses approaches to resolve issue</td>
<td>Discuss the impact in one or two contexts</td>
<td>May consider perspectives of some stakeholders</td>
<td>May consider perspectives from various stakeholders</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Rubric Reliability on Abstracts
<table>
<thead>
<tr>
<th>Consistency</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment 1</td>
<td>0</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Comment 2</td>
<td>0.6</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Comment 3</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Comment 4</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Comment 5</td>
<td>0</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Rubric Interpretation:
- Absent: Did not address energy in any way
- Pre-Emerging: Briefly addressed one rubric topic, but with very little detail
- Emerging: Briefly addressed two rubric topics or did 1 from second group well
- Developing: Did ~2 plus from the second group well
- Competent: Did ~2 plus from the second group well
- Effective: Did ~2 plus from third group and most from second group well
- Mastering: Did ~2 plus from third group and all from second group well

Abstracts
Abstract Energy Literacy Scores by Year
- Energy literacy is higher in last two years
- Additional outreach these years likely a driving factor
- Similar trend between raters on yearly basis

Abstract Energy Literacy Scores by Category
- Energy literacy higher in more technical categories
- Consistent with what testing has shown
- Similar trends between raters on category basis

Conclusions
Rubric approach appears to be working effectively
- Energy literacy follows expected trends
- Increased literacy after increased outreach
- Higher literacy in more technical categories
- Higher literacy among older students
- Raters exhibited moderate to high reliability

Application
- Rubric applied to Imagine Tomorrow deliverables:
  - Abstracts from 2009-2013 by two raters
  - Posters from 2013 by one rater

Future Work
- Apply to 2014 competition with the following changes:
  - Refine the rubric for more clarity
  - Improve scoring database for better analyses
  - Hold calibration session
  - Add more raters
- Determine if changes improve assessment results

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