International Assessment of Student Learning Outcomes Initiative: An Application of Pasteur’s Quadrant

Roger Benjamin

Learning Outcomes: Evolution of Assessment

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Pasteur’s Quadrant: Use-Inspired Basic Research (UIBR) in Tertiary Education

• Pasteur’s Quadrant is from Pasteur’s life narrative in which he developed the building blocks of micro-biology while trying to solve typhus.

• At historical junctures decisions created objective tools of analysis for agriculture, health and national security to be used for policy applications. All tools based on value system of science.

• Tertiary education should be next for UIBR. Our focus here is on international education assessment. Several fields are relevant to establishing an interdisciplinary approach---cognitive science, economics, data analytics, ed tech, teaching and learning.
Themes

• Justification of Initiative.

• What is CLA+ International? What is the plan for its evolution?

• An application of Pasteur’s Quadrant.
The 3 Core Principles of the Initiative

• The test must be reliable and valid across national boundaries (see papers and monographs about reliability and validity of CLA+ at cae.org)

• The test results must be actionable:
  o Aligned with and lead to improvements in teaching and learning
  o Provide benefits for students, institutions, national consortia of institutions, and countries
Principle 3 Governance

• Participating countries, national consortia of universities, and institutions own their data.

• Students decide how to use their test data, including mastery badges.

• The advisory group, formed of representatives from participants, will recommend the content for new tests to internationalize the CLA+ International protocol and new forms of tests to use are appropriate.
The Case for Assessment of Student Learning

• Postsecondary institutions are too important and too fragile **Not** to provide the best objective tools of analysis to assist them in becoming more effective and efficient.

• We have a system based on peer review to measure the quantity and quality of research that researchers, universities and research facilities create. We also need a system of continuous improvement for teaching and learning.
The Rationale

• National leaders want to know how well their universities are preparing their students for the Knowledge Economy.

• Faculty and administrators want to know how to improve their teaching and learning.

• Students want credible, third-party evidence of their skill levels attained to show potential employers.

• Employers want credible evidence of the skill levels job applicants have.
Why Generic Skills Should Be the Focus for CLA+ International

• It is the strongest way to effectively and efficiently obtain reliable and valid comparable test results that are actionable for all the parties noted here.

• Without the ability to compare between institutions and across nations all stakeholders noted remain isolated with no ability to interpret how well they are doing in comparison to their counterparts.

• Other existing or projected international education assessment projects do not now permit comparisons in a reliable or valid way. Disciplines promising but will take time.
CLA+ International Protocol

- It is a **90 minute** test that requires the student to demonstrate their generic skills.

- It features a,
  - **Performance Task**, a real world problem, that is document based requiring an open ended response (60 minutes)
  - 25 **Selected-Response Questions** (30 minutes)
  - Measures six subscores
CLA+ International

• Measures six sub scores:
  o Analysis and Problem Solving (APS)
  o Scientific and Quantitative Reasoning (SQR)
  o Critical Reading and Evaluation (CRE)
  o Critique an Argument (CA)
  o Writing Effectiveness (WE)
  o Writing Mechanics (WM)
Rationale for OECD/CAE Initiative

• OECD is the hub for international comparative assessments such as PISA and PIAC.

• Solutions for methodological issued encountered in AHELO developed,
  o Random sampling approach not practical for colleges but a representative sample is possible.
  o Moderate stakes are needed to motivate students to take the test and do their best on it.
  o Cross-national differences in levels of scoring difficulty can be equated.
CLA+ Analytics Provides Actionable Test Results

Education technology based tool comprised of three sections,

- **CLA+ Career Connect**: certified mastery level badges that provide students with credible information about the generic skill levels they have achieved.

- **CLA+ Education**: provides information resources for students and faculty, suggesting ways to improve their generic skills.

- **CLA+ Analytics**: provides assistance for advanced data analysis of test results and their use in policy analysis.
Two Evidence-based Applications of Pasteur’s Quadrant---UIBR (Use inspired basic research)
# Proportion of Selective vs. Less-selective Institutions (USA)

<table>
<thead>
<tr>
<th></th>
<th>Colleges &amp; Universities</th>
<th>Student Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective</td>
<td>143 (5%)</td>
<td>143 (5%)</td>
</tr>
<tr>
<td>Less Selective</td>
<td>3,014 (95%)</td>
<td>3,014 (95%)</td>
</tr>
<tr>
<td>ALL</td>
<td>3,157 (100%)</td>
<td>3,157 (100%)</td>
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Projected National CLA Performance

- Above 1200:
  - Students Attending Selective Institutions: 184,079
  - Students Attending Less-Selective Institutions: 770,616

- Above 1300:
  - Students Attending Selective Institutions: 133,066
  - Students Attending Less-Selective Institutions: 375,601

- Above 1400:
  - Students Attending Selective Institutions: 72,471
  - Students Attending Less-Selective Institutions: 143,467
Geographic Distribution of Selective and Less-selective Colleges
Test Administration in Italy

• 12 Universities (4 North, 4 Center, 4 South)
• 5,853 students
• Test Administration: April – May 2013
• Scoring: June – July 2013
• Analysis: September – December 2013
• Final Report: January 2014
# 60-minute PT & 20-item SRQ Comparison

Table 3. Descriptive statistics for the CLA+ for Italian vs. American students

<table>
<thead>
<tr>
<th>Scale Score</th>
<th>Participants</th>
<th>n</th>
<th>Mean</th>
<th>St. Dev</th>
<th>25th</th>
<th>50th</th>
<th>75th</th>
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</thead>
<tbody>
<tr>
<td><strong>Total Scale Score</strong></td>
<td>Italian Students</td>
<td>5853</td>
<td>1000</td>
<td>200</td>
<td>884</td>
<td>1016</td>
<td>1119</td>
</tr>
<tr>
<td></td>
<td>American Students</td>
<td>4380</td>
<td>999</td>
<td>199</td>
<td>856</td>
<td>1007</td>
<td>1142</td>
</tr>
<tr>
<td><strong>PT Scale Score</strong></td>
<td>Italian Students</td>
<td>5853</td>
<td>1000</td>
<td>200</td>
<td>852</td>
<td>989</td>
<td>1124</td>
</tr>
<tr>
<td></td>
<td>American Students</td>
<td>4380</td>
<td>1067</td>
<td>203</td>
<td>937</td>
<td>1070</td>
<td>1159</td>
</tr>
<tr>
<td><strong>SRQ Scale Score</strong></td>
<td>Italian Students</td>
<td>5853</td>
<td>1000</td>
<td>200</td>
<td>908</td>
<td>1048</td>
<td>1119</td>
</tr>
<tr>
<td></td>
<td>American Students</td>
<td>4380</td>
<td>796</td>
<td>152</td>
<td>681</td>
<td>803</td>
<td>884</td>
</tr>
</tbody>
</table>
Interpretation

• Italian students’ performance was comparable to their American counterparts with some differences at the Selected Response level due to the fact that different skills are required.
• Italian performance differed based upon Region (north, center, south).
• Italian employers found students’ Teco results correlated higher with their judgments about the skill levels of the students they interviewed for jobs than the GPA of the students.
Next Steps:
1) Conference on Evidence-based Policy Applications

Conference on evidence-based policy applications from existing international assessments planned for January 2017,

- Leveling the playing field from college to career, US and Italy
- Predictive validity of test results
- Mexican-based analysis of AHELO results
- Importance of CLA+ Analytics for French Tertiary sector
- KokoHs German project
- Policy effects of learning gains project in England
Next Steps:
2) Implementation of OECD/CAE Initiative

First test administration planned for fall 2017-spring 2018. To be announced in late winter 2016,

- Four to six countries planning to test with six set as the upper limit for this initial test administration
- 3 national consortia of private colleges and universities plan to test and a fourth national consortium possible