Aligning Skills, Competency Frameworks, and Learning Outcomes

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September 14, 2021
SREE Summer Fellow
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Funding provided by the Bill & Melinda Gates Foundation

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Outline

• Introduction
• Background: 21st Century Skills
• RQ1
• RQ2
• Discussion and Next Steps
Introduction

• The digital age is ushering in a competitive global economy, shifting the need for employees with sophisticated and refined competencies.
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• Universities and colleges—are increasingly tasked with training the next wave of workforce entrants

• The success of this training is measured by growth in a broad range of abilities often labeled as 21st century skills.
Background: Enter 21st Century Skills

- Organization for Economic Co-operation and Development (OECD) approach to organize 21st century skills:
  1. Cognitive Skills
  2. Intrapersonal Skills
  3. Interpersonal Skills
  4. Technical Skills
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What about:
- • Hard skills?
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- Soft skills?
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- Soft skills?
- Noncognitive skills?
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- Generalizable skills?
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- Generalizable skills?
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- Cross-Cutting skills?
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- Transferable skills?
- Cross-Cutting skills?
- Employability skills?
Background: Enter 21st Century Skills

21st Century Skills (e.g., Generalizable, Employability)

- Cognitive Skills (e.g., hard skills, abilities)
  - Technical
    - Information Processing
  - Reasoning
    - Critical thinking
    - Reflective Judgement
- Noncognitive Skills (e.g., soft, psychosocial)
  - Interpersonal
    - Collaborative Problem-solving
    - Perspective-taking
  - Intrapersonal
    - Self-regulation
Background: Why Skill Frameworks

• The recent skill building support is largely in response to two broad social and economic developments that have serve to channel attention, resources, and human energy to skill building:
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1. **The Skills Gap**
2. **Gainful Employment**
The skills gap is defined as the discrepancy between the skills employers need and require and those possessed by job candidates and employees.
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74% of HR managers state that the skills gap continues to persist (U.S. Chamber of Commerce Foundation).

78% of respondents will be looking for alternative means to evaluate job applicants as opposed to relying on credentials or degrees (U.S. Chamber of Commerce Foundation).

Notable gaps emerge between the importance of key learning outcomes and executives’ sense that recent graduates are prepared in these areas, even with some improvements.

<table>
<thead>
<tr>
<th>Among business execs:</th>
<th>Prepared Gap</th>
<th>2014 Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical thinking/analytical reasoning</td>
<td>-44</td>
<td>-55</td>
</tr>
<tr>
<td>Apply knowledge/skills to real world</td>
<td>-43</td>
<td>-57</td>
</tr>
<tr>
<td>Communicate effectively in writing</td>
<td>-43</td>
<td>-55</td>
</tr>
<tr>
<td>Self-motivated</td>
<td>-41</td>
<td>-57</td>
</tr>
<tr>
<td>Communicate effectively orally</td>
<td>-40</td>
<td>-57</td>
</tr>
<tr>
<td>Able to work independently</td>
<td>-39</td>
<td>N/A</td>
</tr>
<tr>
<td>Able to work effectively in teams</td>
<td>-35</td>
<td>-46</td>
</tr>
<tr>
<td>Ethical judgment/decision-making</td>
<td>-34</td>
<td>-51</td>
</tr>
<tr>
<td>Able to analyze/solve complex problems</td>
<td>-33</td>
<td>-46</td>
</tr>
<tr>
<td>Find, organize, evaluate info: multiple sources</td>
<td>-32</td>
<td>-39</td>
</tr>
<tr>
<td>Solve problems w/people of diff. backgrounds</td>
<td>-29</td>
<td>-38</td>
</tr>
<tr>
<td>Able to innovate/be creative</td>
<td>-25</td>
<td>-40</td>
</tr>
<tr>
<td>Able to work with numbers/stats</td>
<td>-18</td>
<td>-28</td>
</tr>
<tr>
<td>Stay current on changing tech</td>
<td>-8</td>
<td>-23</td>
</tr>
<tr>
<td>Proficiency in foreign language</td>
<td>-1</td>
<td>-7</td>
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*8-10 ratings on a 0-to-10 scale*
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Closing the Skills Gap: Key Insights and Success Metrics

WHITE PAPER
NOVEMBER 2020
Background: The Skills Gap

- The skills gap is defined as the discrepancy between the skills employers need and require and those possessed by job candidates and employees.
- 74% of HR managers state that the skills gap continues to persist (U.S. Chamber of Commerce Foundation).
- 78% of respondents will be looking for alternative means to evaluate job applicants as opposed to relying on credentials or degrees (U.S. Chamber of Commerce Foundation).
Background: Gainful Employment

• Gainful employment is when:
  • (a) wages cover more than their living expenses, providing additional income that can either be saved or spent on non-essentials (often referred to as disposable income);
  • (b) opportunities for advancement and career building are clear and available;
  • (c) stability and working conditions are safe and reasonable
Background: The Onus is on HE

• This focus has changed the messaging, missions, programs, and initiatives within and about the postsecondary sector.

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  • Expansion/Revision of liberal education to include *practical skills* in Liberal Education and America’s Promise
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• **Four-year Colleges:**
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• **Community Colleges:**
Background: The Onus is on HE

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• **Four-year Colleges:**
  • Expansion/Revision of liberal education to include *practical skills* in Liberal Education and America’s Promise

• **Community Colleges:**
  • Adapt their success metrics and publicly available scorecards to account for the re-skilling of working professionals (“Skill builders”)
Research Questions (RQ):
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a) RQ1: Is there evidence of a disconnect—in terms of language usage—in the way higher education (scholars, administrators, policymakers) and employers define and reference key competencies, such as critical thinking, etc.?
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a) **RQ1**: Is there evidence of a disconnect—in terms of language usage—in the way higher education (scholars, administrators, policymakers) and employers define and reference key competencies, such as critical thinking, etc.?

b) **RQ2**: What evidence is there of a unified framework that seeks to move beyond traditional academic metrics, and more directly communicate the skills students have acquired to employers?
RQ1: Evidence of a common language

Do Employers and Educators Speak the Same Language?
RQ1: Evidence of a common language

Do Employers and Educators Speak the Same Language?

YES
RQ1: What employers are saying

Fulfilling the American Dream: Liberal Education and the Future of Work

Selected Findings from Online Surveys of Business Executives and Hiring Managers

Conducted on Behalf of

Association of American Colleges and Universities

with support from

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RQ1: What employers are saying

The learning priorities that executives and hiring managers value most highly cut across majors.

Very Important* Skills for Recent College Graduates We Are Hiring

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<th>Skill</th>
<th>Business Executives</th>
<th>Hiring Managers</th>
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<tbody>
<tr>
<td>Able to effectively communicate orally</td>
<td>85% in 2014</td>
<td>80%</td>
</tr>
<tr>
<td>Critical thinking/analytical reasoning</td>
<td>81% in 2014</td>
<td>78%</td>
</tr>
<tr>
<td>Ethical judgment and decision-making</td>
<td>77%</td>
<td>84%</td>
</tr>
<tr>
<td>Able to work effectively in teams</td>
<td>83% in 2014</td>
<td>77%</td>
</tr>
<tr>
<td>Able to work independently (prioritize, manage time)</td>
<td>77%</td>
<td>87%</td>
</tr>
<tr>
<td>Self-motivated, initiative, proactive: ideas/solutions</td>
<td>76%</td>
<td>85%</td>
</tr>
<tr>
<td>Able to communicate effectively in writing</td>
<td>82% in 2014</td>
<td>76%</td>
</tr>
<tr>
<td>Can apply knowledge/skills to real-world settings</td>
<td>80% in 2014</td>
<td>76%</td>
</tr>
</tbody>
</table>

* 1-to-10 ratings on a 0-to-10 scale; 15 outcomes tested
RQ1: What Educators/Scholars are saying

- Teamwork
- Goal setting
- Time management
- Emotional skills
- Interpersonal communication
- Social skills
- Leadership
- Problem solving and decision making
UCI
RQ1: What Educators/Scholars are saying

The HElighten® Outcomes Assessment Suite

- Critical Thinking
- $a^2 + b^2 = c^2$ Quantitative Literacy
- Written Communication
- Intercultural Competency & Diversity
- Civic Competency & Engagement

**FIGURE 2.** 21st-century skill demand expressed as proportion of total job advertisements examined.

*Figure 4.* Visualization of a specific transition, where path thickness represents edge weight in a weighted network.
**Table 5. Comparison of Skill Rankings Across Broad Occupation Groups.**

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<tr>
<th>Rankings of transferability value</th>
<th>AEO group</th>
<th>SSO group</th>
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<td>1</td>
<td>Problem sensitivity(^{AC})</td>
<td>Social perceptiveness</td>
<td>Manual dexterity</td>
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<td>Visualization(^{C})</td>
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<td>Problem sensitivity&lt;sub&gt;AC&lt;/sub&gt;</td>
<td>Social perceptiveness</td>
<td>Manual dexterity&lt;sub&gt;BC&lt;/sub&gt;</td>
</tr>
<tr>
<td>2</td>
<td>Visualization&lt;sub&gt;C&lt;/sub&gt;</td>
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</tr>
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<td>3</td>
<td>Judgment and decision making&lt;sub&gt;ACW&lt;/sub&gt;</td>
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<td>Visualization&lt;sub&gt;C&lt;/sub&gt;</td>
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<td>4</td>
<td>Complex problem solving&lt;sub&gt;ACW&lt;/sub&gt;</td>
<td>Complex problem solving&lt;sub&gt;ABWF&lt;/sub&gt;</td>
<td>Judgment and decision making&lt;sub&gt;BCW&lt;/sub&gt;</td>
</tr>
<tr>
<td>5</td>
<td>Fluency of ideas&lt;sub&gt;AFW&lt;/sub&gt;</td>
<td>Critical thinking&lt;sub&gt;WF&lt;/sub&gt;</td>
<td>Critical thinking&lt;sub&gt;WF&lt;/sub&gt;</td>
</tr>
<tr>
<td>6</td>
<td>Critical thinking&lt;sub&gt;AFW&lt;/sub&gt;</td>
<td>Negotiation&lt;sub&gt;W&lt;/sub&gt;</td>
<td>Flexible closure&lt;sub&gt;BCW&lt;/sub&gt;</td>
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<tr>
<td>7</td>
<td>Flexibility of closure&lt;sub&gt;ACW&lt;/sub&gt;</td>
<td>Visualization&lt;sub&gt;W&lt;/sub&gt;</td>
<td>Social perceptiveness&lt;sub&gt;C&lt;/sub&gt;</td>
</tr>
<tr>
<td>8</td>
<td>Selective attention</td>
<td>Flexible closure&lt;sub&gt;ABW&lt;/sub&gt;</td>
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<tr>
<td>9</td>
<td>Social perceptiveness&lt;sub&gt;C&lt;/sub&gt;</td>
<td>Fluency of ideas&lt;sub&gt;WF&lt;/sub&gt;</td>
<td>Written expression</td>
</tr>
<tr>
<td>10</td>
<td>Negotiation&lt;sub&gt;W&lt;/sub&gt;</td>
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<table>
<thead>
<tr>
<th>Rankings of transferability value</th>
<th>AEO group</th>
<th>SSO group</th>
<th>PO group</th>
</tr>
</thead>
<tbody>
<tr>
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RQ1: Evidence of a common language

Do Employers and Educators *Mean* the Same Thing?
RQ1: Evidence of a common language
Do Employers and Educators *Mean* the Same Thing?

Mixed Evidence
RQ$1_b$: Common Meaning

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<td>Work Performance Indicators</td>
<td>(Elson et al., 2018)</td>
</tr>
<tr>
<td>Soft-Skill Training (e.g., organizational, interpersonal, teamwork, communication skills)</td>
<td>Employment and monthly wages over the longer term</td>
<td>(Barrera-Osorio, Kugler, and Silliman, 2020)</td>
</tr>
</tbody>
</table>
RQ1b: Common Meaning

Standardized Assessment
| Standardized Assessment | Employer Assessment |
RQ1b: Common Meaning

Standardized Assessment

Employer Assessment

Assessing critical thinking in higher education: the HEighten™ approach and preliminary validity evidence

Ou Lydia Liu, Liyang Mao, Lois Frankel & Jun Xu

To cite this article: Ou Lydia Liu, Liyang Mao, Lois Frankel & Jun Xu (2016) Assessing critical thinking in higher education: the HEighten™ approach and preliminary validity evidence, Assessment & Evaluation in Higher Education, 41:5, 677-694, DOI:
Standardized Assessment

Employer Assessment

CRITICAL THINKING SKILLS

1. Knowledge
- Define
- Identify
- Label
- Define mathematical models
- Name
- Recall
- Single underline

2. Organization and expression of facts and ideas
- write
- In your own words
- What is the main idea of?
- Can you write it in outline?

3. Application
- Solve
- Derive
- Give an example
- How is this significant?
- What is the main idea?
- Could this have happened in ______?

4. Analysis
- Develop
- Compare
- State
- What is the parts and features of ________?
- What evidence can you present for _____?

5. Synthesis
- Generate
- What would you predict
- What solutions would you suggest
- What might happen if you continued

6. Evaluation
- Develop
- Approach
- What do you think about ______?
- What is most important?
RQ1b: Common Meaning

Standardized Assessment

Employer Assessment

**CRITICAL THINKING SKILLS**

1. **Knowledge**
   - Identify and recall information
   - **Who**
   - **What**
   - **When**
   - **How**
   - **Why**

2. **Comprehension**
   - **Read**
   - **Paraphrase**
   - **Explain**
   - **In your own words**
   - **Summarize**

3. **Application**
   - **An example of**
   - **Another situation**

4. **Analysis**
   - **Parts or features of**
   - **Classification**

5. **Synthesis**
   - **Generate new ideas**
   - **Evaluate**

6. **Evaluation**
   - **Appraise**
   - **Support your opinion**

---

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RQ2: Is there movement towards a common framework?
RQ2: Is there movement towards a common framework?

Yes, but it’s complicated
RQ2: Unifying Frameworks
## RQ2: Unifying Frameworks

### Table 1: Frameworks of Learning Outcomes

<table>
<thead>
<tr>
<th>Framework</th>
<th>Abbreviated title</th>
<th>Author/impetus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framework for Higher Education Qualifications</td>
<td>QAA-FHEQ</td>
<td>Quality Assurance Agency for Higher Education</td>
</tr>
<tr>
<td>European Higher Education Area Competencies</td>
<td>Bologna</td>
<td>European Commission: European Higher Education Area</td>
</tr>
<tr>
<td>Liberal Education and America’s Promise</td>
<td>LEAP</td>
<td>Association of American Colleges and Universities</td>
</tr>
<tr>
<td>Frameworks for Learning and Development Outcomes</td>
<td>CAS</td>
<td>The Council for the Advancement of Standards in Higher Education</td>
</tr>
<tr>
<td>The Degree Qualifications Profile</td>
<td>DQP</td>
<td>The Lumina Foundation</td>
</tr>
<tr>
<td>The Assessment &amp; Teaching of 21st Century Skills</td>
<td>ATC21S</td>
<td>Collaboration among Cisco, Intel, Microsoft, the University of Melbourne, and others</td>
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<tr>
<td>ETA Competency Model Clearinghouse’s General Competency Model Framework</td>
<td>USDOL-ETA</td>
<td>U.S. Department of Labor, Employment and Training Administration</td>
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## Table 2

A Summary of the Seven Critical Domains and Use in Educational Testing Service (ETS) Products and Assessments

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<th>Domain</th>
<th>Components</th>
<th>Domain measured in ETS products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>EPP</td>
</tr>
<tr>
<td>Creativity</td>
<td>The generation of new ideas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novel integration of existing ideas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Application of new ideas in a real-world setting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thinking critically</td>
<td></td>
</tr>
<tr>
<td>Critical thinking</td>
<td>Solving problems</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Synthesize information</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sense-making</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fulfill roles within a team</td>
<td></td>
</tr>
<tr>
<td>Teamwork</td>
<td>Treat group members with respect</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motivate group members</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effectively communicate multiple types of messages</td>
<td></td>
</tr>
<tr>
<td>Effective communication</td>
<td>Communicate across multiple forms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effectively deliver messages to varying audiences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accessing and finding information</td>
<td></td>
</tr>
<tr>
<td>Digital &amp; information literacy</td>
<td>Analyzing and evaluating information</td>
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<td>Using and managing information</td>
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<td>Applying technology effectively</td>
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<td></td>
<td>Civic knowledge</td>
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<td></td>
<td>Participating in civic processes</td>
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<td>Citizenship</td>
<td>Action and organization toward change</td>
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<td></td>
<td>Respect for others</td>
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<td>Ethics and integrity</td>
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<td></td>
<td>Independence, self-directed learning</td>
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<td>Life skills</td>
<td>Time management</td>
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<td></td>
<td>Goal setting</td>
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<td></td>
<td>Adaptation, flexibility</td>
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<th>Yes</th>
<th>No</th>
<th>Notes</th>
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<td><strong>Reading skills</strong></td>
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<td></td>
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<td>Students apply/demonstrate reading skills by interpreting written instructions/project directions and constructing responses, using print and online materials as resources, completing worksheets, and seeking clarification about what they have read.</td>
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<tr>
<td><strong>Writing skills</strong></td>
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<td>Students rely on writing skills to construct lab reports, posters, and presentation materials, take notes, and compose responses to essay questions.</td>
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<td></td>
<td></td>
</tr>
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<td><strong>Math strategies/procedures</strong></td>
<td></td>
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<tr>
<td>Students use computational skills appropriately and make logical choices when analyzing and differentiating among available procedures. Outside of math class, this includes creating/interpreting tables and graphs and organizing/displaying data.</td>
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<tr>
<td><strong>Scientific principles/procedures</strong></td>
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<tr>
<td>Students follow procedures, experiment, infer, hypothesize (even as simple as &quot;what if we do it this way&quot;), and construct processes to complete a task (can occur outside of math/science classes).</td>
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<tr>
<td><strong>Critical Thinking Skills</strong></td>
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<tr>
<td><strong>Thinks creatively</strong></td>
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<tr>
<td>Students create innovative and novel ideas/solutions and display divergent thinking. This can be seen in oral presentations and creative writing assignments, open-ended tasks, and project design.</td>
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<tr>
<td><strong>Thinks critically</strong></td>
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<tr>
<td>Students display analytical and strategic thinking. This can be seen in debating an issue, converging on an understanding, assessing a problem, and questioning (playing devil's advocate).</td>
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</tbody>
</table>
The QA Commons: Essential Employability Qualities

- (1) Communication
- (2) Problem-solving
- (3) Creativity and Diligence
- (4) Collaborations
- (5) Adaptability
- (5) Ethical Decision-makers
- (7) Professional/Self-regulatory
- (8) Continuous learning
The QA Commons: Essential Employability Qualities

(1) Communication
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(5) Ethical Decision-makers
(7) Professional/Self-regulatory
(8) Continuous learning
The QA Commons: Pilot Study

• 14 institutions
• 27 different degree programs
• Community colleges
• Four-year schools

Aims:

• (a) Work with stakeholders to transform programs of study to incorporate, measure, and assess key 21st century skills at both the program and course levels;
• (b) Identify promising practices institutions can incorporate which are informed by employers’ input; and
• (c) Develop avenues to communicate the skills learned by students to employers.

The Five Criteria

EEQ Graduate Preparation
Accreditors require all programs to define and assess student learning outcomes (SLOs). However, institutions rarely integrate essential qualities employers cite as most needed into their assessment frameworks. The EEQs are evidence-based and define employability skills and qualities, situated in workplace contexts, that can be incorporated into program and course learning outcomes. The EEQ CERT validates that all students have gained proficiency in employability skills.

Career Support Services
Today’s students need career information and guidance more than ever. According to a Gallup study, only 17% of those students who used career services found them helpful. The QA Commons leads the effort to transform career services by endorsing programs’ integrating career services throughout the program and tracking the results.

Employer Engagement
Employer engagement is vital to ensuring career readiness. While employer advisory boards are important for occasional advice, they are rarely sufficient. Employers seek deeper engagement that is substantive, relevant, and utilized.

Student & Alumni Engagement
Incorporation of alumni engagement and program feedback is essential. Similarly, student involvement and self-assessment are needed to provide confidence they are prepared for the workplace.

Public Information
Program-specific information on completion rates, average loans, graduate careers, and salaries published in public forums empowers and informs students and parents about career pathways and opportunities.
Other Notable Frameworks: Are They Antithetical?
Other Notable Frameworks: Are They Antithetical?
Other Notable Frameworks: Are They Antithetical?

Figure 1: Measuring Postsecondary Value

Next Generation Undergraduate Success Measurement Project Framework

**POSTSECONARY GROWTH AND DEVELOPMENT**

- **Cognitive Ability & Intellectual Dispositions**
  - General and specialized (i.e., domain-specific) competencies as well as intellectual dispositions related to adaptability in dealing with dynamic changes in information and society.

- **Life-Course Agency**
  - Psychological growth associated with self-direction, life planning, and what individual students themselves are hoping to attain from their college experience.

- **Self-Regulation Skills**
  - Attitudes, dispositions, and skills related to setting goals, planning, organizing, and monitoring one’s own behavior.

- **Social Capital**
  - Access to resources, information, and opportunities; socioemotional support; interpersonal competencies; and multicultural appreciation.

- **Civic Engagement**
  - Community participation that facilitates the development of democratic skills, media literacy that supports political knowledge, and values that promote equity, diversity, and justice.

- **Psychological Flourishing & Mental Health**
  - Students’ mental health and individual flourishing provide opportunities for students to find meaning and purpose in their lives.

Our measurements aim not just to provide clearer demonstration of the value of educational investments, but also to inspire and inform efforts to improve institutional performance and advance educational equity.

**LIFE-COURSE OUTCOMES**

- **Post Graduate Education, Employment and Health Outcomes**
  - Post graduate degrees
  - Occupational status
  - Income
  - Health

- **Social & Psychological Outcomes**
  - Social connectedness
  - Social status
  - Improved well-being
  - Adaptability
  - Ability to manage stress
  - Resilience

- **Civic Outcomes**
  - Participation in elections and political processes
  - Involvement in community organizations
  - Critical awareness of systems of oppression and social responsibilities
  - Empowerment and leadership that reinforces political agency and democratic cooperation

Measuring the long-term value of higher education is complex and requires looking at multiple factors. The following are examples of outcomes related to the long-term value of higher education.
Moving Beyond Frameworks: Work Colleges

Earning to Learn: How America’s Work Colleges Are Bridging Equity Gaps and Connecting Education to Employment

By Jocelyn Pickford

March 2018
Moving Beyond Frameworks: Work Colleges

Figure 1. Work Colleges Across America

- Bethany Global University (Bloomington, MN)
- Sterling College (Craftsbury Common, VT)
- Blackburn College (Carlinville, IL)
- College of the Ozarks (Point Lookout, MO)
- Berea College (Berea, KY)
- Alice Lloyd College (Pippa Passes, KY)
- Warren Wilson College (Asheville, NC)
- Ecclesia College (Springdale, AR)
- Paul Quinn College (Dallas, TX)
Funders Recap
Funder Recap

• **RQ1: Funders could provide and direct resources in the following ways:**
  - Fund more research predicting work-based metrics via academic developed or standardized test instruments.
  - Additionally, a more direct means of establishing confidence in the meaning of terms used is to study the convergence between standardized assessments measuring 21st century skills and employer ratings of the same employees on the same constructs.
Funder Recap

• **RQ2a**: Funders could provide and direct resources in the following ways:
  
  o Fund research aimed at comparing students who have graduated from participating programs against those that haven’t in skill growth and labor market outcomes
  
  o Provide incentives for more institutions and programs to participate in the EEQ initiative
  
  o Provide incentives for employers to consider EEQ’s in the hiring of job candidates
Funder Recap

• **RQ2b:** Funders could provide and direct resources in the following ways:
  - Fund research aimed at comparing the students who have graduated from work colleges against those that haven’t in skill growth and labor market outcomes
  - Incentivize work colleges to collect and report skill growth data across programs of study
Next Steps: Proposals for the future
Proposals for the Future

Theories of Skill Development
Proposals for the Future

Theories of Skill Development

Pedagogy
Proposals for the Future

- Theories of Skill Development
- Pedagogy
- Measurement
Theories of Skill Development

• There is virtually no work that connects and synthesizes theories of skill development and university education in a manner that makes precise predictions
Theories of Skill Development

• There is virtually no work that connects and synthesizes theories of skill development and university education in a manner that makes precise predictions.

• That is, there is no unified theory for how 21st century skills develop (Care & Kim, 2018).
Ackerman’s Theory of Adult Intellect (1996) could provide insights into how personality (noncognitive) and cognitive abilities interact to develop domain-specific knowledge and expertise.
Theories of Skill Development

Fischer’s Theory of Skill Development (1980) could provide insights into how skills develop within skill domains, and how to predict sequential structures.
Pedagogy

- In the frameworks reviewed, how an emphasis on 21st century skills at the mission statement or policy level influences actual teaching practices are unclear.

- What’s more, some of the frameworks propose merely recording if instructors include some 21st century skills as outcomes on their syllabi or teaching plans.
In the frameworks reviewed, how an emphasis on 21st century skills at the mission statement or policy level influences actual teaching practices are unclear.

Hora, et al (2018), “Asking an untrained and unsupported adjunct instructor to magically transform a 300-student lecture hall into a group of highly capable, critically thinking engineers is, to put it mildly, unreasonable.”
Inculcating curiosity: pilot results of an online module to enhance undergraduate intellectual virtue

Gabe Avakian Orona & Duncan Pritchard

To cite this article: Gabe Avakian Orona & Duncan Pritchard (2021): Inculcating curiosity: pilot results of an online module to enhance undergraduate intellectual virtue, Assessment & Evaluation in Higher Education, DOI: 10.1080/02602938.2021.1919988
### Table A. IVC applications of pedagogical interventions to develop interest

<table>
<thead>
<tr>
<th>Type of Interest</th>
<th>Pedagogical Intervention (and sources)</th>
<th>IVC Application</th>
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<tbody>
<tr>
<td>Triggering situational interest</td>
<td>Novel experiences (Palmer, 2009; Malteese &amp; Harsh, 2015; Quinlan, 2019)</td>
<td>Introductory segment that capitalizes on the novelty of the concept of intellectual virtue to students; offers its relevance throughout history as well as for the students’ personal educational journey.</td>
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<td>Being exposed to scientists’ struggles and applications of concepts (Hong &amp; Lin-Siegler, 2012)</td>
<td>Videos of academics from a range of disciplines describing how a particular intellectual virtue is relevant to their work (e.g., we supply a video from a prominent bioroboticist, filmed in his laboratory, discussing how the intellectual virtue of curiosity is central to his work and necessary to doing quality research).</td>
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<td>Interactive learning activities alongside a lecture course (Yuretich et al., 2001)</td>
<td>Recordings of group activities of fellow university students. The recordings displayed collaborative problem-solving discussions that students were encouraged participate in alongside the video.</td>
</tr>
<tr>
<td>Maintaining situational interest</td>
<td>Repeated involvement (inquiry activities) and novelty (discrepant events) (Palmer, 2004)</td>
<td>Structured engaging quizzes followed each video. Quizzes were designed such that the process of solving the question(s) reflected intellectual virtue (curiosity) and its relevance to educational problem-solving.</td>
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<td>Writing activities: linking personal goals and values to class content (Hulme &amp; Harackiewicz, 2009; )</td>
<td>Practical exercises for students to do to reflect on their own development of intellectual virtue, such as recommendations for reading and approaches to educational inquiry.</td>
</tr>
</tbody>
</table>

Note. The table is a modified version of a summary table presented in van der Hooven Kraft (2017). The types of interest correspond to Hidi & Renninger (2006) phases of interest. In their model, a third phase—supporting individual interest—is presented as the final stage. While research has also applied pedagogical interventions to develop this phase of interest, the one-quarter long, pilot IVC module presented here focuses on the first two phases: triggering situational interest and maintaining situational interest. IVC = Intellectual Virtue Curriculum.
Pedagogy

Closing the middle-skills gap widened by digitalization: how technical universities can contribute through Challenge-Based Learning

Ruggero Colombari and Paolo Neirotti

Figure 3. The challenge-based intervention: complementarity with on-the-job training and the role of the university.
Measurement

• Sound measurement precludes any claims of skill development in higher education.

• Measurement theory should be thoughtfully considered in the construction of 21st century skill assessments.
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Thank you!
References
SKILLS, FRAMEWORKS, AND OUTCOMES

6 References


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