Assessing the 4Cs

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Assessing the 4Cs

21st Century Learning
(MEANS & ENDS Switching Places)

Curricular Content
- English
- Social Studies
- Math
- Science
- Languages
- P.E.
- Fine & Applied Arts

Core Competencies
- Critical Thinking
- Creative Thinking
- Communication (Collaboration)
- Positive Personal & Cultural Identity
- Personal Awareness & Responsibility
- Social Responsibility

“When fast gets really fast, **being slower to adapt makes you really slow** – and disoriented.”

-Thomas Friedmann

“If the technology platform for society can now turn over in five to seven years, but it takes ten to fifteen years to adapt to it, we will all feel out of control, because we can’t adapt to the world as fast as it’s changing.”

-Eric Teller

CEO of Google’s X Research

Five Minds for the Future (Gardner, 2006)

1. **Disciplined Mind**: People will need to develop an expertise in one or more discipline; people will need to be disciplined.

2. **Synthesizing Mind**: People will need to acquire, probe, and evaluate information on a continual cycle.

3. **Creating Mind**: People will face situations that require thought beyond careful or habitual practice; creation is the stretch.

4. **Respectful Mind**: People will need to be open to diverse perspectives, processes, and people; diversity is welcome, good, and necessary.

5. **Ethical Mind**: People will need to be able to see and think of themselves abstractly; what type of person do I want to be?
Which of the five minds are already authentically present within your instructional program?
Which of the five minds are present in your instructional program, but are not prioritized the way they should be?
Which of the five minds are not present in your instructional program? Is there room to adjust to reconcile that?

“Performance assessments are demonstrations of mastery that emulate the context or conditions in which the intended knowledge or skills are actually applied.”

-AERA, APA, & NCME, 1999

Rubric Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Advantage</th>
<th>Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytic</td>
<td>Breaks down the criteria into specific aspects of quality</td>
<td>Specificity as to what is strong and what needs strengthening; excellent for formative assessment.</td>
<td>Challenging to create. Can be cumbersome for summative assessment, especially when an overall level of quality is being determined/recorded.</td>
</tr>
<tr>
<td>Holistic</td>
<td>Provides a much broader, overall description of quality along several levels (i.e.3-5)</td>
<td>Reliability with scoring inferences is much more readily attained; excellent for summative assessment.</td>
<td>The lack of detail makes them a challenge to use for instruction and feedback purposes.</td>
</tr>
<tr>
<td>Single-Point</td>
<td>Breaks down the criteria into specific aspects of quality, but only describes the highest level of proficiency.</td>
<td>The space beside each specific aspect is used for personalized comments on what is strong and what needs strengthening.</td>
<td>Significantly more time consuming to complete, which could increase the turnaround time for feedback.</td>
</tr>
</tbody>
</table>

Adapted from: Balch, Blanck, & Balch, 2016
## Analyzing and Interpreting Data Analytic Rubric

<table>
<thead>
<tr>
<th></th>
<th>Initiating</th>
<th>Developing</th>
<th>Achieving</th>
<th>Advancing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizing &amp; Presenting data</strong></td>
<td>There are significant omissions or inaccuracies that interfere with the overall understanding of what is presented.</td>
<td>There are often omissions or inaccuracies that interfere with the overall understanding of what is presented.</td>
<td>There may, at times, be some minor omissions or inaccuracies, but nothing that interferes with overall understanding.</td>
<td>Data is consistently well organized and presented in a logical and way that makes it easy to understand.</td>
</tr>
<tr>
<td><strong>Making sense of data</strong></td>
<td>Recognizes only the most straightforward patterns and big ideas.</td>
<td>Recognizes some patterns and a few big ideas.</td>
<td>Recognizes important patterns and the crucial big ideas.</td>
<td>Recognizes insightful patterns and the inconspicuous big ideas.</td>
</tr>
<tr>
<td><strong>Evaluating the quality of the data</strong></td>
<td>Knows that critiquing the quality of evidence gathered is important, but rarely does it with any kind of precision; challenged to recognize why evidence lacks credibility.</td>
<td>Understands the importance of critiquing the quality of evidence gathered, but only does it under the most obvious circumstances; is able to explain why evidence lacks credibility when it’s glaring.</td>
<td>Critiques the quality of evidence gathered to ensure accuracy, relevance, and validity; is often able to explain why evidence lacks credibility</td>
<td>Critiques the quality of evidence gathered to ensure accuracy, relevance, and validity; is able to thoroughly and consistently explain why evidence lacks credibility.</td>
</tr>
<tr>
<td><strong>Deriving meaning from the data</strong></td>
<td>Draws only the most obvious conclusions that are overly simplistic; some conclusions are inaccurate</td>
<td>Inferences and conclusions are somewhat accurate, but often vague.</td>
<td>Inferences and conclusions drawn from data are accurate, but sometimes narrow in focus.</td>
<td>Inferences and conclusions are accurate and comprehensive.</td>
</tr>
<tr>
<td><strong>Making data-based decisions</strong></td>
<td>Rarely justifies decisions or solutions with accurate and relevant information; few new insights are identified and the limits of most other possible decisions or outcomes are ignored.</td>
<td>Sometimes justifies decisions or solutions with accurate and relevant information; insights are narrow, and the limits of most other possible outcomes are superficially acknowledged.</td>
<td>Often justifies decisions or solutions with accurate and relevant information; explains new insights and recognizes the limits of most other possible decisions or outcomes.</td>
<td>Consistently justifies decisions or solutions with accurate and relevant information; thoroughly explains new insights and recognizes the limits of all other possible decision’s outcomes.</td>
</tr>
</tbody>
</table>

*Source: Erkens, Schimmer, & Vagle (2019)*
<table>
<thead>
<tr>
<th>Specific aspects in need strengthening</th>
<th>Advancing</th>
<th>Specific aspects of strength</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gathering data:</strong></td>
<td>Consistently gathers an appropriate amount of evidence.</td>
<td></td>
</tr>
<tr>
<td><strong>Organizing &amp; Presenting data:</strong></td>
<td>Data is consistently well organized and presented in a logical and way that makes it easy to understand.</td>
<td></td>
</tr>
<tr>
<td><strong>Making sense of data:</strong></td>
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*Source: Erkens, Schimmer, & Vagle (2019)*
Six Tenets and Critical Thinking:

- **Assessment Purpose:** Generalizable vs Specific skills & disposition.

- **Assessment Architecture:** Design assessments that authentically make students do the thinking.

- **Accurate Interpretation:** Accurate inferences and interpretations by the teacher examining the student’s critical thinking competence.

- **Instructional Agility:** Make ‘real-time’ maneuvers based on emerging results, evidence, or revelations.

- **Communication of Results:** Feedback (and verification) of strengths and areas in need of strengthening as students become critical thinkers.

- **Student Investment:** Nurture opportunities for students to internalize the skills and dispositions of critical thinkers; monitoring through metacognitive opportunities.

“The accuracy of summative judgments depends on the quality of the assessments and the competence of the assessor.”

- Connie Moss (2013)
Critical Thinking

“When it comes to the most important student competency to include in curricula and assessment, critical thinking is the first among equals. If you are not teaching and measuring critical thinking skills, it borders on educational malpractice in the 21st Century.”

-Ken Kay & Valerie Greenhill
The Leader’s Guide to 21st Century Education, p. 68

Critical Thinking Now and Going Forward

- Student-Driven Critical Thinking
  - Inquiry-based learning
  - Problem-based learning

- Transferable Skills
  - Transferable and applicable to contexts beyond the school.

- Metacognitive Monitoring
  - Self-observe, self-react, self-motivate, and self-control their growth as critical thinkers.

Critical Thinking Skills and Behaviors

<table>
<thead>
<tr>
<th>Critical Thinking Skills</th>
<th>Critical Thinking Behaviors</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distinguish fact from opinion</td>
<td>Asks questions that furthers understanding.</td>
<td>Well-thought out decisions based on a sound rationale and evidence.</td>
</tr>
<tr>
<td>Seek multiple perspectives</td>
<td>Doesn’t draw conclusions too hastily.</td>
<td>Information, conclusions, and decisions are revised as new information comes to light.</td>
</tr>
<tr>
<td>Recognize assumptions</td>
<td>Considers all sides of an argument.</td>
<td>Decisions reflect a “systems thinking” rather than “silo” approach.</td>
</tr>
<tr>
<td>Identify bias and persuasion</td>
<td>Uses criteria to evaluate information.</td>
<td>Information evaluated based on evidence, logical inference, and informed guesses.</td>
</tr>
<tr>
<td>Evaluate arguments for relevance and accuracy.</td>
<td>Can “push back” effectively.</td>
<td>Ideas and plans are presented in a coherent and well thought out fashion.</td>
</tr>
<tr>
<td>Weigh data appropriately.</td>
<td>Recognizes other people’s agendas.</td>
<td></td>
</tr>
<tr>
<td>Use multiple sources rather than a single source.</td>
<td>Explores multiple perspectives.</td>
<td></td>
</tr>
<tr>
<td>Use diagrams to visually represent processes and thinking.</td>
<td>Understands how conclusions were drawn.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Linda M. Murawski (2014)

Balanced Approach to Critical Thinking

The *generalist* view of critical thinking would have discrete skills being easily transferable so that once
learners know how to think critically they can and will apply it across multiple settings and disciplines.

The **specificist** view would have critical thinking skills tied to a specific subject, which would make critical thinking skills context dependent instead of easily transferrable; that thinking always involves thinking about *something*.

### Implication for Schools

- Balance is most favorable.
- **Generalist approach** when identifying the skills of a critical thinker.
- **Specificist approach** in having those generic skills taught throughout specific-subject domains.
- Emphasizes the application of critical thinking skills is emphasized.
- Defining critical thinking is meant to bring some necessary clarity to a somewhat abstract concept.

“The ability to think critically—ask pertinent questions, recognize and define problems, identify arguments on all sides of an issue, search for and use relevant data and arrive in the end at carefully reasoned judgments—is the indispensible means of making effective use of information and knowledge.”

-Derek Bok  
*Our Underachieving Colleges, p. 109*

### Collaborative Thinking

1. **Collaboration 1.0**  
   a. *Means to an end.*  
   b. *Collaboration was the chosen option.*

2. **Collaboration 2.0**  
   a. *Collaboration as an end; developing the skills to act competently within a collaborative effort.*

3. **Collaboration 3.0**  
   a. *Collaborative problem solving.*  
   b. *Two purposes: collaboration and innovation*

“Collaborative problem solving involves two different constructs—**collaboration and problem solving**. The assumption is that collaboration for a group task is essential because some problem-solving tasks are too complex for an individual to work through alone or the solution will be improved from the joint capacities of a team”

-Fiore, 2017, p. 2
## Matrix of Collaborative Problem-Solving skills for PISA 2015

<table>
<thead>
<tr>
<th>1. Establishing and maintaining shared understanding</th>
<th>2. Taking appropriate action to solve problem</th>
<th>3. Establishing and maintain team organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Exploring and Understanding</td>
<td>(A1) Discovering perspectives and ability of team members</td>
<td>(A2) Discovering the type of collaboration interaction to solve the problem, along with goals.</td>
</tr>
<tr>
<td>(B) Representing and Formulating</td>
<td>(B1) Building a shared representation and negotiating the meaning of the problem (common ground)</td>
<td>(B2) Identifying and describing tasks to be completed.</td>
</tr>
<tr>
<td>(C) Planning and Executing</td>
<td>(C1) Communicating with team members about the actions to be/being performed</td>
<td>(C2) Enacting plans.</td>
</tr>
<tr>
<td>(D) Monitoring and Reflecting</td>
<td>(D1) Monitoring and repairing the shared understanding</td>
<td>(D2) Monitoring results of actions and evaluating success in solving the problem</td>
</tr>
<tr>
<td></td>
<td>(D3) Monitoring providing feedback and adapting the team organization and roles</td>
<td></td>
</tr>
</tbody>
</table>

Note: The 12 skills have been labeled with a letter-number combination referring to the rows and columns for ease of cross-referencing later in the document. (Fiore, et al., 2017, p. 15)

### Assessing Collaborative Thinking

#### Before Collaboration Begins
- Clearly describe the nature of the collaboration such as 1.0 to learn or explore a concept; 2.0 to develop collaboration skills; or 3.0 to make a decision, solve a problem or produce an innovation; or any combination of these forms of collaboration.
- Provide criteria for the collaboration skills students will need to develop and or co-construct this criterion with students.

#### During Collaboration
- **Observation:** While this possibility is optional and not always feasible at the student level, it is helpful both from a metacognitive perspective for students and from a data gathering perspective for teachers to task students with observing and recording evidence of a specific, isolated feature. The evidence that is recorded and shared can supplement (endorse or challenge) the teacher’s observations.
- **Intentionally guide reflection** on specific aspects of collaboration. For example, if you want students to learn how to deal with conflict, specifically ask them to reflect on various ways to handle conflict.
- **Refine the criteria** as the collaboration unfolds. It is one thing to pre-determine criteria and important to have a picture of what the end looks like. However, applying the criteria is provides another view of clarity and often leads to clear language and descriptions of what collaboration looks like.
- **Use checklists, rubrics** and other reflection forms to gather in the moment checks so students and
the teacher can provide midcourse corrections and adjustments to make the collaboration as
effective as possible.

**After Collaboration**
- Provide opportunities for **self-assessment**: Ask students to reflect on their perceptions of their own collaboration skills. Use a rubric or descriptions that have been generated over the course of the project so that there is a clear picture of quality.
- Provide opportunities for **peer-assessment**: Ask students to reflect on individual members of the collaboration and provide specific examples.
- Provide an **overall description of the level of proficiency** on the agreed upon criteria.

**Collaborative Task Considerations**

1. Set the purpose (1.0, 2.0, or 3.0).
2. Determine the knowledge domain.
3. Choose the collaborative structure.
4. Define the tasks as interdependent or independent.
5. Determine the parameters (well-defined vs ill-defined).
6. Predesign talks as **static or dynamic**.
7. Identify the communication medium?
8. Determine the number of team members.
10. Set goals: team-based goals and/or individual.

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**Creative Thinking**

**Four Corners Activity**

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**Features of the Creative Process (Erkens, Schimmer, & Vagle, 2019)**

- Inventive and imaginative process
- Involves the generation of something unique or fresh.
- Necessitates the development of something that adds value.

“Innovation and creativity are inextricably linked. It has been said that innovation is imagination realized and that only when the creative thought is put into action does innovation occur.”

### 4 Cs of Creativity (Kaufman & Beghetto, 2009)

<table>
<thead>
<tr>
<th>Mini</th>
<th>Little</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro</td>
<td>Big</td>
</tr>
</tbody>
</table>

### The Instructional Questions for Teaching the Creative Process

<table>
<thead>
<tr>
<th>Phase Defined</th>
<th>Questions to Lead the Process</th>
<th>Questions to Guide Students' Self Discovery</th>
</tr>
</thead>
</table>
| **Preparation:** Identifying an area of curiosity or a problem for further investigation. | ● What are your passions?  
● What’s interesting to you?  
● What are the small (or big) things you wish you could fix for yourself or your loved ones?  
● What natural phenomena need more study or explanation?  
● What message would you like to send to the world?  
● What legacy would you like to leave behind? | ● What specific strategies did I use while preparing?  
● What was hard to do / easy to do?  
● What helped me the most?  
● What did I do that slowed my own process?  
● What hung me up from moving forward?  
● How could I improve my efforts in this phase?  
● What have I learned about myself? |
| **Incubation:** Pondering ideas by exploring intuition, synthesizing concepts, imagining possibilities, and preliminarily constructing possible products, processes, or solutions | ● What are you noticing?  
● What’s interesting about that?  
● What would happen if . . . ?  
● If there were no hurdles, what could you do?  
● What’s a radically different way of looking at that?  
● How many possibilities can you consider?  
● How many different connections can you make?  
● What is your intuition telling you? | ● What specific strategies did I use while pondering my idea(s)?  
● What tools or templates helped me?  
● When did I have my best thoughts?  What was the time of day or the activities I was engaged in or the location / setting when I could think best?  
● Did daydreaming or playing help me at all?  
● Did I procrastinate at all?  If I did, why?  Did it help?  
● How could I improve my efforts in this phase?  
● What have I learned about myself? |
| **Illumination:** Developing realizations, insights, epiphanies, and inspiration. | ● What’s captivating about that?  
● What do you see that others might not?  
● What did you learn that others might not know yet?  
● How might what you understand now make the world a better place for others?  
● What odd combinations just might work? | ● What specific strategies did I use while becoming inspired or developing my insights?  
● Was I aware of a defining moment when I knew what I needed to do next?  
● If I didn’t have a defining moment, how did I make decisions about the best ways to proceed?  
● What criteria was I using to determine my next steps?  
● How could I improve my efforts in this phase?  
● What have I learned about myself? |
| **Verification:** Seeking feedback and validation during the formative phase as to whether or not potential solution(s) is worth pursuing; self- | ● What are my criteria for quality?  
● Where would feedback be most helpful to me?  
- On one criteria?  
- On a single part of the project?  
- On the whole thing?  
● Will others appreciate this work/idea? | ● What specific strategies did I use while verifying my ideas?  
● Did I get enough feedback?  
● Was the feedback I received helpful?  
● How am I responding to positive feedback?  To negative feedback? |
assessing, and making personal decisions regarding final steps.

- Who can I ask?
  - Who do I trust to help me?
  - Who might know the most about this?
- How can I get a range of perspectives so I’m prepared for the final stage?
- What will I do with feedback I don’t like? How can I make sure I get some feedback that forces me to examine my work carefully?

- What am I doing with the feedback I don’t appreciate? Is my thought process helpful in that moment?
- Was I accurate in my self-assessment or was I too hard/easy on myself? How will I know?
- Am I clear about my next steps?
- How could I improve my efforts in this phase?
- What have I learned about myself?

Implementation: Moving idea from concept to reality by producing the product, process, or solution to share with others.

- Is it finished?
- Is it working? Or is it pleasing?
- Am I ready to share it?
- Are others appreciating it? Using it? Understanding it?
- How do I feel about it?
- What makes me proud of it?
- Even though I’m done, what might I have done differently in hindsight?
- What have I learned through this process?
- What comes next? Where do I begin again?

- What specific strategies or actions did I employ while finishing?
- What was hard to do / easy to do?
- What (or who) helped me the most?
- What did I do that slowed my own process?
- What hung me up from moving forward?
- How could I improve my efforts in this phase?
- What have I learned about myself?

Source: Erkens, Schimmer, & Vagle (2019)
COMMUNICATION

• Interpersonal skills (both F2F and online)
• Teaming & collaboration.
• Cultural awareness & sensitivity.
• Social responsibility
• Civic responsibility
• Applicable & relevant means of communicating.
• ??

Assessing Communication (E.g.)

• **Listening:** Pays attention to what others are saying and sometimes identifies the feelings or subtext behind a message based on *how* it is said.

• **Comprehending:** Understands the speaker’s or the group’s main ideas and can link ideas from one speaker or source to the next.

• **Contributing:** Asks questions, answers questions, and links the ideas of others or adds thoughtful ideas or opinions that enhance the conversation.

• **Interacting:** Responds positively and even seeks feedback or input by all speakers or groups. Does not require prompts to change behavior. Naturally seeks to engage everyone.
References


