Higher Education in a Post-COVID World

VIRTUAL CONFERENCE
Online Assessment Strategies for STEM

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You are a student that just cheated on the exam. Why did you do it?

Type your answer in the chat window but DO NOT PRESS ENTER until I say 3-2-1-GO.
## Factors that lead to Academic Dishonesty

- Peer pressure
- Performance anxiety
- Excuse making
- Inability to manage the demands of student life
- Situations that encourage academic dishonesty
- Self-justification habits
- Unfamiliarity with what constitutes academic dishonesty
- Lack of understanding about consequences

[https://www.niu.edu/academic-integrity/students/causes/index.shtml](https://www.niu.edu/academic-integrity/students/causes/index.shtml)
We can impact and lower every one of these factors through some simple practices.
You should provide Formula Sheets

Lower these factors:
- Peer pressure
- Performance anxiety
- Excuse making
- Self justification habits

REMOTE/ONLINE TEACHING TIP: Mail one to students without printers!
Handwritten Academic Dishonesty Statement

<table>
<thead>
<tr>
<th>Lower these factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Peer pressure</td>
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</table>

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After you have completed the test, please copy the following statement on the bottom of the last page and then SIGN and DATE it to attest that you abided by it:

*I did not receive help on this exam from anyone other than my instructor. I did not help any other student with this exam.*
Give essay exams instead of multiple choice

Lower these factors:
• Performance anxiety
• Excuse making
• Self justification habits

REMOTE/ONLINE TEACHING TIP:
Use scanning apps and Microsoft OneNote.

Video Tutorial for CamScanner
Give open-notebook essay exams

- Lower these factors:
  - Performance anxiety
  - Excuse making
  - Self justification habits

REMOTE/ONLINE TEACHING TIP: Don’t use this technique with multiple choice exams. Use multiple exam versions.
Scheduled Short Oral Exams

• Use software like Calendly to schedule 15-min sessions at the convenience of the student
• Require ID and camera (student can attend from safe place with good internet)
• Give students a specific list of LOs or CLOs you will be examining
• Use a rubric to grade
Now we need to get past exams and take a deeper dive into the issues.
What factors do WE control in assessment?

<table>
<thead>
<tr>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authenticity</td>
</tr>
<tr>
<td>Alignment</td>
</tr>
<tr>
<td>Variety</td>
</tr>
<tr>
<td>Transparency</td>
</tr>
<tr>
<td>Agency</td>
</tr>
<tr>
<td>Creativity</td>
</tr>
</tbody>
</table>
All we have time for ☺️

- Authenticity
- Alignment
- Variety
- Transparency
- Agency
- Creativity
Traditional STEM Assessment
Actual STEM Workplaces
Authenticity

How close is the assessment to the work the student will perform in the real world?

Can you design more authentic assessments?
Alignment
New skills and fields emerge that need to be learned for the discipline.

New knowledge, research, and desires bloat the existing curriculum from within.

The reality is that most curriculum contains both drift and bloat.
Step 1: Are the course objectives actually “real”?

Major course competencies:

1. Solve Equations Algebraically: Solve a variety of equation types so that you are prepared for mathematics you might encounter in other courses and career.
2. Graphs and Relationships: Interpret the key features of graphs and relate graphs to the mathematics of their equations to wisely use math in other contexts.
3. Real-World Applications: Translate textual information into mathematics and vice versa in applications to real-world problems to enhance problem solving skills.
4. Create Models from Data: Create an appropriate mathematical model for a set of data to make interpolations and extrapolations.
5. Technology and Reasonability: Apply technology to enhance mathematical interpretation and determine reasonability of solutions since real-world problems rarely involve integers.
6. Fluency in Terminology and Notation: Demonstrate a fluency with function notation and mathematical terminology in equations, graphs, tables, and words to prepare for success in other courses involving math.
7. Transformations of Graphs: Apply transformations to functions to modify the behaviors of their graphs.
Declutter. Ask yourself “Is this learning objective relevant to the objectives of this course?”
Every LO should correspond with a course objective.
Doing a “Kondo” of the learning objectives against the Course Objectives will make space for innovation.
Examine each learning objective through the ESIL Lens

**Existence**
Does the learner know it exists?

**Supported**
Can the learner do it supported with help from notes and peers?

**Independent**
Can the learner do it independently?

**Lifetime**
Can the learner maintain the skill for lifetime success?
<table>
<thead>
<tr>
<th>ESIL Level</th>
<th>Depth of Knowledge</th>
<th>Learning Strategy</th>
<th>Assessment Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existence</td>
<td>Does the learner know this knowledge or skill exists? Can the learner find the</td>
<td>May just be mentioned, demonstrated, or referenced in other learning (video,</td>
<td>Not assessed</td>
</tr>
<tr>
<td></td>
<td>right search words?</td>
<td>reading, etc).</td>
<td></td>
</tr>
<tr>
<td>Supported</td>
<td>Can the learner recall the knowledge or perform the skill supported with help</td>
<td>Can be included as a regular part of the learning experience or in some kind of</td>
<td>Low-stakes assessment e.g. homework with multiple attempts, group assignment, open</td>
</tr>
<tr>
<td></td>
<td>from notes, tutorials, and/or peers?</td>
<td>out-of-class learning (video tutorials, readings, etc)</td>
<td>notes quiz</td>
</tr>
<tr>
<td>Independent</td>
<td>Can the learner recall the knowledge or perform the skill independently, without</td>
<td>The learning experience should involve durable learning practices, that is: active</td>
<td>Multiple formative assessments</td>
</tr>
<tr>
<td></td>
<td>assistance, and maintain the skill until the next expected refresh?</td>
<td>interaction, repeated recall of knowledge, and relevance to other concepts that</td>
<td>Medium-stakes assessment (problem sets, essays, etc)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>are being learned.</td>
<td>One high-stakes assessment (e.g., project, paper, exam, etc.)</td>
</tr>
<tr>
<td>Lifetime</td>
<td>Can the learner recall the knowledge or perform the skill independently, without</td>
<td>In addition to the “Independent” learning strategies, this knowledge should be</td>
<td>In addition to the assessments on the “Independent” level, student learning should</td>
</tr>
<tr>
<td></td>
<td>assistance, with the goal of maintaining it for their lifetime?</td>
<td>brought to recall repeatedly in integration with new material so that the learner</td>
<td>be assessed in some kind of cumulative event like a final exam or term paper.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>gains long-term comprehension.</td>
<td></td>
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Examine each learning objective through the ESIL Lens

Example for General Biology
Give examples of clinically used drugs that target the microtubular system, and potential side effects.
Then Use a Variety of Assessment

Video Demos  Oral Exams  Projects  Problem Sets  Labs  Simulations  Discussions
Then Use a Variety of Assessment

- Video Demos
  - S
- Oral Exams
  - I or L
- Projects
  - S
- Problem Sets
  - S or I
- Labs
  - S or I
- Simulations
  - I
- Discussions
  - S
Does the ESIL Lens align with the activity choices?
We can do our part to increase these factors in STEM education.

- Authenticity
- Alignment
- Variety
- Transparency
- Agency
- Creativity
And through our efforts, we lower some of the factors that lead to cheating.

- Peer pressure
- Performance anxiety
- Excuse making
- Inability to manage the demands of student life
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When we increase variety and authenticity in assessment, we do something else...
Questions?

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