Using a Concept Inventory for Faculty Development

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After this Presentation, I Hope You:

• Will Use The ASM Microbial Concept Inventory to
  • Assess Students and Self
  • Measure Learning Gains
  • Modify Your Classroom
  • Earn a Promotion

• Know That Concept Inventories Can be Part of a Larger Unit Discussion
  • Track Student Progress Over Years
  • Drive Changes in Curriculum
These are Research and Reflection Tools

• Concept Inventories are for
  • Assessment of Students
  • Measurement of Learning Gains
  • Reflection on Your Goals
  • Development of Your Class

• Concept Inventories are NOT: Replacement for Exams
Use in Your Class: Planning Before Class/Early in Class

• What do You Want to do?
  • Assess Current Teaching Methods
  • Plan Intervention
  • Publish Results
    • Get IRB Approval
    • Create a Hypothesis
    • Test Hypothesis
    • Publish

• Which Concepts are Important?
• How and When to Survey?
Example: Acquiring Antibiotic Resistance

Concept: Mutations and horizontal gene transfer, with the immense variety of microenvironments, have selected for a huge diversity of microorganisms.

<table>
<thead>
<tr>
<th>Misconception Tested in Distractors</th>
<th>% Respondents Pre-</th>
<th>% Respondents Post-</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change is intentional and in response to external conditions</td>
<td>48%</td>
<td>31%</td>
<td>-17%</td>
</tr>
<tr>
<td>Conflating immunity with drug resistance</td>
<td>5%</td>
<td>5%</td>
<td>0</td>
</tr>
<tr>
<td>Gene Transfer is only vertical (horizontal gene transfer is not a major factor)</td>
<td>15%</td>
<td>11%</td>
<td>-4%</td>
</tr>
<tr>
<td>Correct Response</td>
<td>32%</td>
<td>53%</td>
<td>+21%</td>
</tr>
</tbody>
</table>

Historically, I know students struggle with concepts of acquiring antibiotic resistance, therefore I emphasize the topic with multiple approaches and assessment.
Use in Your Class: End of Class

• Administer a Post Survey
• Calculate Student Learning
  • Pick Questions(s)
  • Compare Pre- and Post- Responses
  • Read Student Responses
• Make Changes as Needed
  • Students Demonstrated Learning: Congratulate Yourself
  • Students Have Background: Advance Your Class
  • No Learning Shown:
    • Reflect on Class
    • Goals of the Class
    • Teaching Methods
Use a Program: Change a Curriculum

• You Want to Change Big Things
  • Don’t they Know That Already?
  • What do Graduates Know?

• You Cannot do it Alone
  • Find a Problem to Take on
  • Create a Faculty Group
  • Open Discussion
  • Rally Around Concepts

• Bring Food

• Use In a Single Semester
  • Get Agreement From Faculty at Multiple Levels to Give Survey
  • Collect Data on Student Paths
  • Best if Given as Pre- and Post-
  • Measure Learning Gains on Relevant Concepts
  • Stimulate Faculty Discussion

• Over Multiple Semesters
  • Track Students
  • See Differences Over Time
Why Do All This Work?

• As Part of Your Promotion:
  • Improvement to the Learning in Your Classroom
  • Improvement Your Abilities
  • Collaborative Effort

• Publications and Presentations
  • Journal of Microbiology & Biology Education (ASM Press)
  • ASM Conference for Undergraduate Educators (asmcue.org)
    • 2017: Denver, CO (Registration Open)
    • 2018: Austin, TX
Access The ASM MCI Survey:

• https://advanced.bact.wisc.edu/instr
• Register to Receive the MCI
Thank You

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