Bootstrapping Virtuous Active Learning Cycles

- "Inquizitiv" – an online tool that provides:
  - continuous active learning & creative learning
  - continuous feedback to students
  - continuous signal of student understanding to instructor
  - semi-supervised learning from instructor interaction

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Challenge 1: Active Continuous Learning

- Actively engaging in solving problems is better than passively consuming learning material
- Continuous engagement with the current conduct of the class enhances learning
- Student's continuous involvement should be measurable, and easy to give feedback on

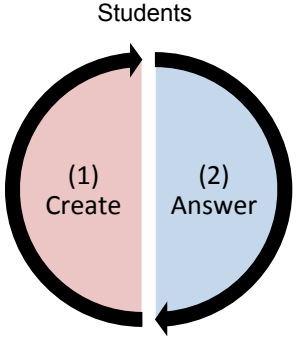
- Current Approaches
  - Occasional quizzes and tests → not continuous
  - Discussion boards and blogs → Uneven participation
  - Practice exercises → Hard to create and maintain

Challenge 2: Creative Learning Experiences

- Constructing a new artifact (creative problem solving) is as important as solving existing structured problems (deductive problem solving)
- Exercises should be made constructive rather than confirmable (choosing an existing solution)

- Current Approaches:
  - Journals and personal learning diaries → Hard to give feedback
  - Long-term projects → Hard to source and inappropriate for basic classes

Basic Solution: Students Create & Answer MCQs



Connect both challenges in one solution:

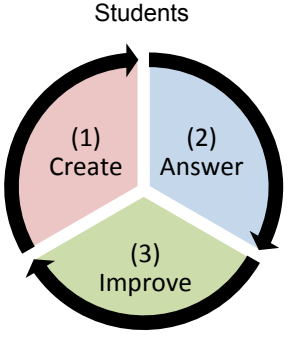
(1) Students **create** challenging Multiple-Choice Questions (MCQs) based on topics discussed in class

(2) Other students **answer** these MCQs maintaining continuous interaction and receiving feedback

Remaining Problem:

- How do we ensure high **quality** of the contributions?

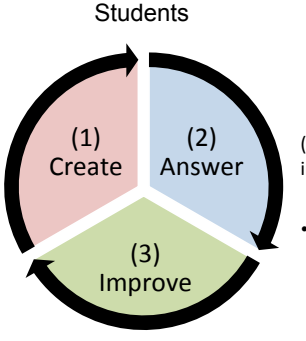
3rd Component: Students Improve & Finalize MCQs



(3) Students **improve** MCQs and choose among best alternatives

- "Peer reviewing" other students and seeing other reviews is known to add to the learning of students
- resulting in a **Virtuous Active Learning Cycle** where each step helps students learn and enables the other 2 steps

4th Component: Instructor Bootstraps the Cycle

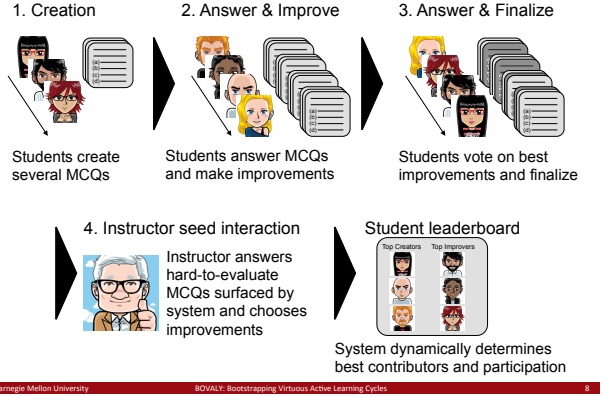
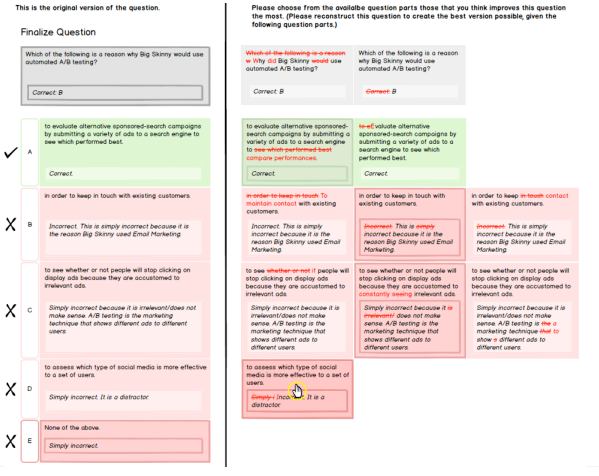


(4) Instructors provide selective input on student submissions

- High quality test-banks and instructor input can propagate quality through the system over time

Additional Benefits

- **Scale**
  - Machine Learning techniques surface most ambiguous MCQs to verify and focus limited instructor time for optimal use

- **Signal**
  - System calculates dynamic ranking of students giving instructors a continuous signal of student participation, and giving students continuous feedback

Current Prototype Design