Harvard and MIT-Style Innovation for the 21st-Century High School

T. Bernard Kinane, M.D.
Associate Professor of Medicine
Chief of Medical Student Education, Harvard Medical School
Harvard-MIT Program in Health Sciences and Technology

Simon Dao, Ph.D.
Research Scientist, MIT
Adjunct Professor, Northeastern University
MIT is known for innovations.

Innovation is a synonym for creativity.

Can I take a “creativity class” like I would a calculus class?

No.

How is it possible that MIT is a leader in creativity when it doesn’t even formally teach it?
The MIT model:

Bright people
+ Hardworking
+ Challenging problems

_____________________________________________________________________

A hit or miss proposition for creativity
but
MIT “hits” more often than its peers.
Does creativity have to be “hit or miss”?
Consider the following:

Is it possible to teach the MIT student so that whenever she creates ✨, it’s guaranteed that 99% of the population thinks ✨ is creative?
If we want a 99% success rate, we need to understand what people mean when they believe something is creative.
How the population perceives creativity:
What experts say creativity is:

Sir Ken Robinson, the most watched TED talk of all time: 29M views for “How Schools Kill Creativity”

“...process of having original ideas. But it’s having ideas that have value.”

Julie Burstein, Peabody Award-winning radio producer

something that “...grows from everyday experiences...”

Elizabeth Gilbert, author of “Eat, Pray, Love”...
An experiment to define creativity:

MIT students were given 2 tasks.

Task 1: Imagine hearing a piece of music that you have never heard before. And, you absolutely love it.

Do you think the musician is creative? [Yes/No/Maybe]

Task 2: Write down the things you think music is made of. Then indicate if the musician invented any of those things.
Results:

• Is the musician creative? 90% said “Yes”
• What makes up music?

- time
- theme
- vocals
- instruments
- notes
- energy
- words
What does the data say?

If the musician did not invent any of the components of music, what did he/she do that justified being thought of as being creative?
Creativity: ability to make non-obvious connections
A “teachability” experiment:

Random people are given this problem:
- Draw a perfect circle
- No radial instruments (string, stick, compass, etc.)
- No tracing objects (tracing a round cup, etc.)
- No paper folding

Each attempt (not participant) is scored:
- Blinded scoring of the methods used by the participants
- Creativity scale from 1 to 5
  - 1: not creative
  - 5: very creative
An experiment with help from students:
What did we learn? It’s damn hard to draw a circle.

Challenge

Problem

Solution

$S_2$

50-70%

$S_3$

50%

$S_4$

25%

$S_5$

10%

$S_6$

<1%

creativity score

0 5

obvious non-obvious
Solutions that work after 6 or more trials are by definition...

A connection between a problem and a solution that is non-obvious to 99% of the population.
How to teach creativity:

• Give students challenges
• Teach them how to create their own challenges

• Show students problems
• Teach them to identify problems

• Encourage students to fail often
• Reward them for failures (iterations)
What’s the most famous painting in the world?

Original

Copy
Angry Birds

How many attempts did they make?
What next?

• We want to move this “teaching of creativity” to the high school level, beyond the walls of Harvard and MIT.
• We have created an organization called Innovators Only (innovatorsonly.org)
InnovatorsOnly.org

Professors
+
High Schools
+
Funding from local gov’t, corp. sponsors, families

________________________________________

Students working on challenging problems

Solution $S_2$ $S_3$ $S_4$ $S_5$ $S_6$
The most creative students get:

- Scholarships
- Invitations to do summer research with professors at:

Harvard  MIT  Boston University  NYU
Johns Hopkins  Rice  Columbia  Stanford
Carnegie Mellon  Brown  UCSD  Princeton
Northeastern  Berkeley  Vanderbilt  Tufts

Learn how high schools can participate at www.innovatorsonly.org