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# The Learning Network

Teaching & Learning With The New York Times

September 11, 2013, 3:45 pm | 1 Comment

## Students Have Their Say: Exploring Ideas to Improve Science Education

By JENNIFER CUTRARO and MICHAEL GONCHAR



**Overview** | What does “good” science education look like? What experiences, good and bad, have students had in science classes? In this lesson, students explore suggestions for improving the way science is taught and make their own proposals for new approaches to science teaching.

**Materials** | Computers with Internet access, projection equipment

**Warm-Up** | When students arrive, project our Student Opinion question, [“What Memorable Experiences Have You Had In Learning Science or Math?”](#) at the front of the room. Before students respond, clarify what “memorable” means. You might ask students to define the word, and remind them that something is memorable if it is hard to forget – whether it is a good experience or a bad one.

Allow several minutes for students to respond, either online or individually in their journals or notebooks. Ask for volunteers to share their experiences. (Please note that answering online before Sept. 27, 2013 will enter students into a contest to be judged in collaboration with the Times Science desk.)

As students respond, take note of the kinds of experiences they identify as good or bad. Does any consensus emerge on what “good” science education might look like?

Finally, broaden the discussion by asking students why they think it’s important to learn about STEM, or science, technology, engineering and math, in the first place.

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**Related** | In The Times's interactive "[Ideas For Improving Science Education](#)," Claudia Dreifus posts a collection of suggestions put forth by scientists, educators and students on how to improve science education. Read the response by Freeman A. Hrabowski III, a mathematician and president of the University of Maryland, Baltimore County. Below is an excerpt:



[Go to related interactive »](#)

When I give talks around the country, I often ask the audience: "How many of you knew you were an English/history type or a math/science type by the time you were in 11th grade?" Almost all the hands go up. And, when I ask why, I often hear, "Because I was better in English."

The question is: How does someone know that at 15 or 16? The way that math or science works in our lives is not always obvious.

Have students read Mr. Hrabowski's entire recommendation, and then answer the questions below.

**Questions** | For discussion and reading comprehension:

1. Do you think of yourself as either a "math/science" type or a "history/English" type? Explain. What qualities do you think a "math/science" type has?
2. In his reply, Mr. Hrabowski says, "The way that math or science works in our lives is not always obvious." In your own words, what does this mean? Can you think of an application of science or math in your life that might not be immediately obvious?
3. Do you agree with Mr. Hrabowski when he says that "many students are bored in class," and they ask the teacher, "When am I ever going to use this?" Have you ever asked that question about science?
4. Can you think of ways to connect science and math to real life, as Mr. Hrabowski suggests? Do you agree with him that connecting science class to real life will make learning more exciting? Why?

**Activity** | Now that students have read one suggestion in The Times's interactive, they will have the opportunity to explore more ideas. The procedure in this activity is for students to read through the various other suggestions in the interactive, generate their own ideas, and then make a proposal for how to improve science education at their own school.

Working in small groups, students should assign one another different responses to read in the interactive and take notes. Then, when they are ready, students share out to the rest of their group what new ideas they gathered from the interactive.

Next, the small groups should generate their own ideas about how to improve science education. Can they think of something that the Science Times interactive didn't include?

Now that they have discussed a variety of ideas, small groups should reach a consensus on one idea they will expand upon for the project.

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- [What Do You Think About The Next Generation Science Standards? Lesson | What's Next: Updating Science Textbooks With New Discoveries](#)

**FROM NYTIMES.COM**

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- [New Guidelines Call for Broad Changes In Science Education](#)
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**Comments of the Moment**

"I think that only teachers and administration should be able to see a students records. A students records are personal and if just anyone can see them that could lead to bullying. Students information should be kept private from anyone who has no legitimate reason to access them."

—Courtney  
[Who Should Be Able to See Students' Records?](#)

"People saying it's not a sport because it does not involve physical activity are plain wrong. They have no idea how many calories a game, pro players burn in a match and how sweaty we are afterwards. This domain also requires lots of

**Project:** Small groups present one idea for improving STEM education at their school. Their presentations can use the format they think is most effective for communicating their ideas, such as video, PowerPoint, Prezi, poster, role play or persuasive speech. If you think it's possible, and appropriate, you might consider having select groups make their presentations in front of the STEM faculty members.

While students are discussing ideas for the project in their groups, you might find it helpful to provide some additional support. For example, you might want to direct students to read the reply from Paulo Blikstein in the interactive and watch the video at the top of this post. He envisions a weekly "Idea Day" in science education. You can ask students: What might an "Idea Day" look like in your classroom? How would you transform the classroom into a design firm, fabrication laboratory and science center? Can you think of a way to take a concept you have already learned about in a science class and devise a new way to learn about it by making something?

You can also point students to read the reply posted by Salman Khan, founder of the Khan Academy:

Despite the STEM subjects' being about new ways of thinking and creating new things, many students don't perceive them as creative. And that's because, to a large degree, the type of filters we have for these subjects are actually filtering out our most creative people. If I had one wish in this area, it would be to see that creativity and invention became the central focus of STEM courses and that the traditional skills be viewed as what they are: tools to empower creativity.

Mr. Khan argues that STEM subjects are "about new ways of thinking and creating new things." You can ask students: Do you agree that science is creative? What might that creativity look like in the classroom?

Additionally, groups might find this article about how [Chinese educators are looking to American classrooms](#) helpful as they come up with project ideas. For example, one of the Chinese teachers quoted in the article says of his students:

"Give them a problem and they will find the answer," he said. "However, they can't ask a good question."

You can encourage students to think about why that might be a problem when it comes to training scientists? And, what implications does that quote have for their project?



**Going Further** | Here are three ideas for further exploring science education:

**App Developer:** Students might [design an app](#) or script a short video meant to teach a science concept. Students doing this should think about: What [considerations](#) go into the development of an app that teaches? How can

training... Not just moving fingers. Strategy, tactics, positioning, etc. People who say "it kills your brain cells each day you play" (Yeah Naomi/Jada, I'm looking at you two) have absolutely no idea what are the benefits of playing video games."

—Jimmy  
[Should Video Games Be Considered a Sport?](#)

"...in our society you need to have the perfect body and the fact is some girls don't have that body. If you are bigger than some girls do pick on you because you're too fat and not cool. I think the campaign ad is a great idea because girls need to learn to love the way they are."

—Tara HHHS  
[Is There Too Much Pressure on Girls to Have 'Perfect' Bodies?](#)

"I think it's a good idea to have student records for other schools to see. However, if the files are old I believe the new school that the student is going to attend should conduct an interview, if they feel necessary, to see if the student has improved. But these records are personal and only school staff members, (teachers, superintendents, principals) should be able to see this information. Seeing this information could help the teacher construct more effective ways to teach the student."

—Jacob(HHS)  
[Who Should Be Able to See Students' Records?](#)

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- October 07 [6 Q's About the News | New Exhibition Features the Paintings and Re-Paintings of Vincent Van Gogh](#)  
Why has interest in Vincent van Gogh's copies of his own paintings increased in recent years?

developers know that students interacting with the app actually [learned](#) anything? Students should identify and clearly define the science concept they want to teach. They also should consider assessments, like pre- and post-testing, to compare a student's understanding of the topic before and after playing the game or watching the video.

**Science Quiz Show:** As a class, take The Times [High School Challenge](#) quiz. Project it at the front of the room, have students track their own answers in their notebooks, and then discuss correct answers as a class. Which questions did most students get right? Did any questions trip them up?

**Challenge the Challengers:** Find inspiration in these stories of students who [challenged](#) policies that mix ideology with science teaching. Are there examples of "science denial education" in your own community? If so, you might have students work in pairs to develop their own challenges to policies that stand in the way of evidence-based science. Has your own teaching of topics such as evolution or climate been challenged? The [National Center for Science Education](#) provides a wealth of great resources for students and teachers alike on teaching evolution and climate change and, specifically, on [facing challenges](#) to the teaching of those topics.

### [Common Core ELA Anchor Standards, 6-12:](#)

#### Reading

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

#### Speaking and Listening

1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively and orally.

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1. September 15, 2013 8:43 am  
[Link](#)  
I appreciate NYTLN's focus on science (and math) education but I would like to raise the concern that science and math does not equal "STEM" and that a science teacher or math teacher isn't the equivalent of a STEM teacher. Technology is in there, of course, but in particular I'm thinking about the all-important engineering piece. Good STEM lessons and projects \*begin\* with the engineering design process.

October 07

### Test Yourself | E.L.L. Practice, Oct. 7, 2013

What punctuation marks belong in the blanks in this quiz, from an article about the role of soccer in the lives of homeless young people?

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The NSF-funded work being done in Mobile AL by the Eye on Engineering project to develop middle school STEM learning modules demonstrates this distinction. One of the curriculum writers for that effort, science educator Anne Jolly, writes persuasively about the distinction I'm making here in a themed blog at MiddleWeb. Here's a sample:  
<http://www.middleweb.com/9611/perfect-stem-lessons/>

I'd love to hear more discussion about how we all might draw this distinction better in our discussions about science, math and STEM curricula. Schools are so very busy fulfilling so many expectations that it's always tempting to say, "Oh, STEM is just science in some new clothes." Not the way Jolly describes it.

—John Norton

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