

Bringing Primary Literature into the Classroom

Dr. Melissa McCartney
Science Magazine

NSF Robert Noyce Teacher Scholarship Program Conference
June 2014

Outline:

- 1) Brainstorming session
- 2) Demo of the current *Science* in the Classroom website
- 3) Discussion on brainstorming versus reality

We have just received \$950K from NSF!

How would you bring primary literature into a classroom?

- What tools would you need?
- What training would you need?
- What would your students need?
- What would make you return to the website?
- What would make you contribute to the website?

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AIM HIGH! AIM BIG!

- resource will be web-based
- resource will center around *Science* content

Here is our starting point

Science in the Classroom

A collection of annotated research papers and accompanying teaching materials

Audience High School **University** Topics Physics | Geology | Ecology | Chemistry | Biology | [- Any -](#)



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WHAT IS THIS?

Welcome to Science in the Classroom, a collection of annotated research papers and accompanying teaching materials designed to show students how science continues to advance.

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EDUCATION PORTAL



[Science Education Portal](#)

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QUESTIONS?

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Biology
05/30/2014

Can DNA Enhance Your Look?

Fine Tuning of Craniofacial Morphology by Distant-Acting Enhancers. Attanasio et al.

We're all familiar the adage that no two faces are alike. But, how is this tremendous amount of variation possible? Using genetic tools and three-dimensional imaging, this paper makes the case that...

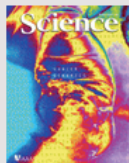


Geology
04/25/2014

Quake, Rattle, and Roll

Enhanced Remote Earthquake Triggering at Fluid-Injection Sites in the Midwestern United States. van der Elst et al

One predictable feature of earthquakes is that they are completely unpredictable. Or are they? Scientists are beginning to collect data indicating that a range of human activity, including hydraulic fracturing, can induce earthquakes. How is this...

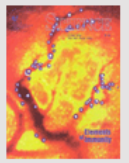


Ecology
03/28/2014

Do Clouds Need Passports?

Dust and Biological Aerosols from the Sahara and Asia Influence Precipitation in the Western U.S. Creamean et al.

Have you ever stopped to look at the clouds moving across the sky? How did they get there? And, where do they go after they finish dropping precipitation onto the land below them? Aerosol particles, either dust or biological, have an...



Biology
02/28/2014

How Dynamic is your Virus?

Population Dynamics of Immune Responses to Persistent Viruses. Nowak and Bangham

When exposed to the same virus, why do some people become sick while others remain healthy? The virus is the same, suggesting that there must be a difference in the immune response of different hosts. What factors determine this, and why do they differ from person to person? To...

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Audience:
First Year Undergraduates
Advanced High School

Science in the Classroom is relevant to the Framework for the Next Generation Science Standards produced by the National Academies

Practice 8

Obtaining, Evaluating, and Communicating Information

Being literate in science and engineering requires the ability to read and understand their literatures [34]. Science and engineering are ways of knowing that are represented and communicated by words, diagrams, charts, graphs, images, symbols, and mathematics [35]. Reading, interpreting, and producing text* are fundamental practices of science in particular, and they constitute at least half of engineers' and scientists' total working time [36].

Currently twelve *Science* papers have been annotated and are ready for use in the classroom.



Ecology
10/31/2003

Lemmings: They're What's for Dinner Cyclic Dynamics in a Simple Vertebrate Predator-Prey Community. Gilg *et al.*

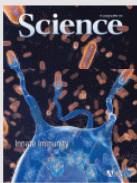
Scientific studies often involve more than one discipline. In this case of lemming population dynamics, scientists use both ecology-related methodology to collect data in Greenland, and mathematical equations to construct a predictive model. Similar to the cyclic...



Biology
04/15/2011

The Art of DNA DNA Origami with Complex Curvatures in Three-Dimensional Space Han *et al.*

Origami, the Japanese art of paper folding, transforms a 2D piece of paper into a 3D masterpiece. While there are a limited number of ways to fold origami paper, the variety in the sequence of the folding results in...

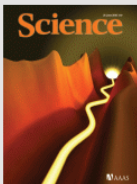


Biology
01/15/2010

What the Pelvis Can Teach Us About Evolution

Adaptive Evolution of Pelvic Reduction in Sticklebacks by Recurrent Deletion of a Pitx1 Enhancer. Chan *et al.*

Talk of evolution research most often conjures up images of Darwin and his finches. However, the Stickleback fish, a lesser known animal model that can exhibit evolutionary changes in as few as ten generations, allows scientists to direct a much more modern study of...



Physics
05/20/2010

Experiments Einstein Could Only Dream Of

Measurement of the Instantaneous Velocity of a Brownian Particle. Li *et al.*

Sometimes, scientists have to wait for technology to catch up. Albert Einstein, arguably one of the greatest scientist in modern history, fell victim to this himself. While working on Brownian motion, Einstein proposed ideas that he did not yet have...



Biology
08/03/2011

A New Diagnostic Strategy for Prostate Cancer

Urine TMPRSS2:ERG Fusion Transcript Stratifies Prostate Cancer Risk in Men with Elevated Serum PSA. Tomlins *et al.*

During their lifetime, 18% of all American men will get prostate cancer, a slow-growing cancer which rarely causes symptoms. Since both surgery and radiotherapy commonly cause harmful side effects, it is important that only patients with aggressive cancers are...

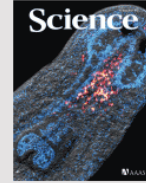


Chemistry
11/04/2011

Replicating Photosynthesis

Wireless Solar Water Splitting Using Silicon-Based Semiconductors and Earth-Abundant Catalysts. Reece *et al.*

As an energy source, the sun is capable of providing enough power for all of our energy needs. Currently, we are unable to harness this power and store it until it is needed in a manner that is cost competitive with traditional energy sources. How can scientists and...



Biology
05/13/2011

Heads or Tails?

Polarized *notum* Activation at Wounds Inhibits Wnt Function to Promote Planarian Head Regeneration. Petersen and Reddien.

When compared with starfish, humans seem to be the more advanced species. Humans have a complex nervous system, the ability to walk upright, and opposable thumbs. However, one category where the starfish reigns superior is in regeneration, or the ability to...



Biology
08/06/2010

A Tiny Fungus is Causing Big Problems

An Emerging Disease Causes Regional Population Collapse of a Common North American Bat Species. Frick *et al.*

Despite their size, ecosystems are fragile and easily disrupted. The introduction of a novel disease can have serious impacts on naïve wildlife populations, which in turn will affect the strength of the entire ecosystem. White-nose syndrome, a fungal infection affecting...

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population dynamics



A New Diagnostic Strategy for Prostate Cancer
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Biology
08/03/2011

cancer screening



The Art of DNA
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Biology
04/15/2011

DNA origami



Replicating Photosynthesis
Wireless Solar Water Splitting Using Silicon-Based Semiconductors and Earth-

Chemistry
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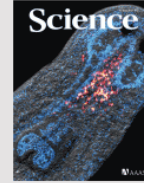
solar batteries



What the Pelvis Can Teach Us About Evolution

Biology
01/15/2010

genetics in evolution



Heads or Tails?

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05/13/2011

regeneration



Experiments Einstein Could Only Dream Of

Physics
05/20/2010

Brownian motion



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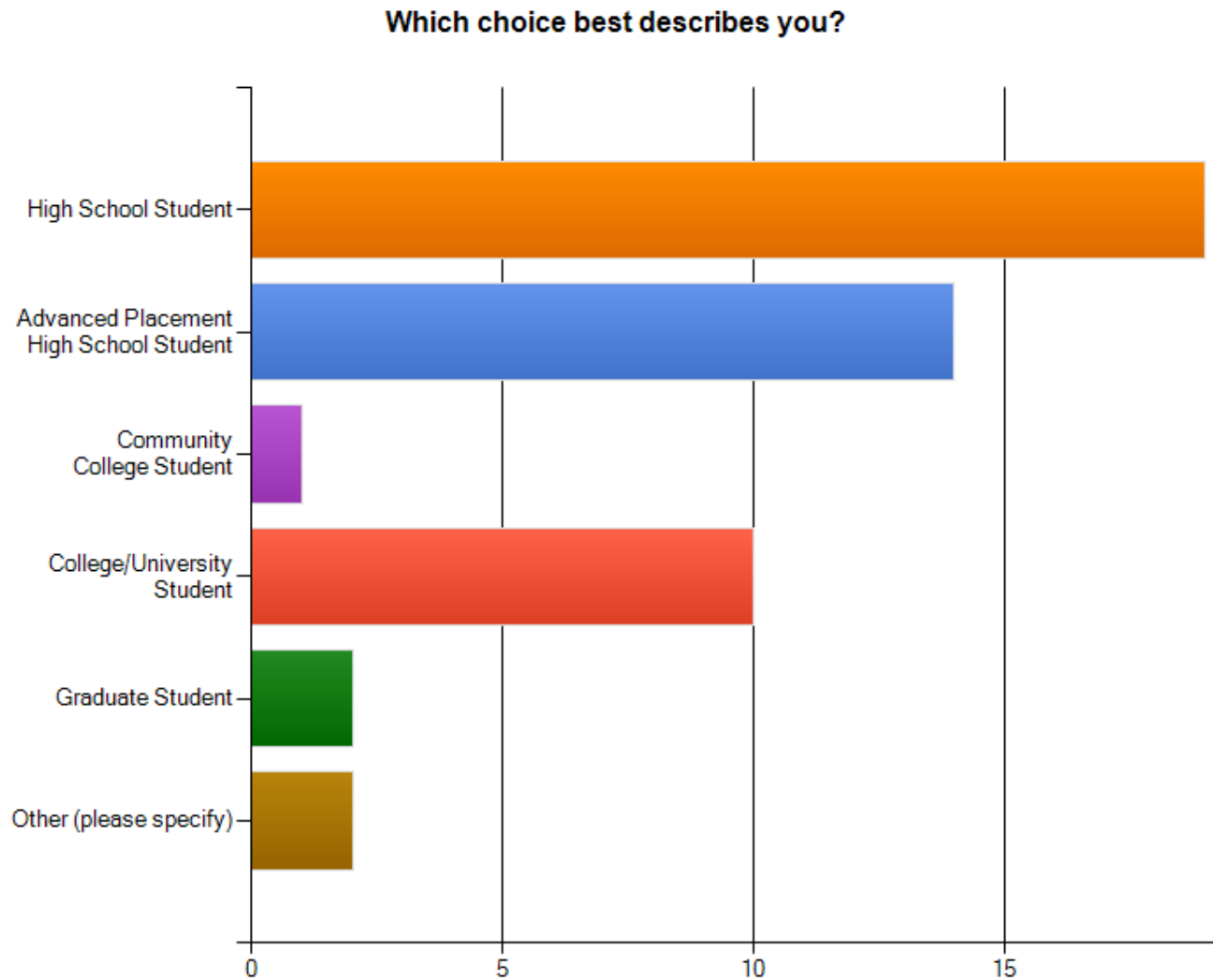
Biology
08/06/2010

ecosystem disruption

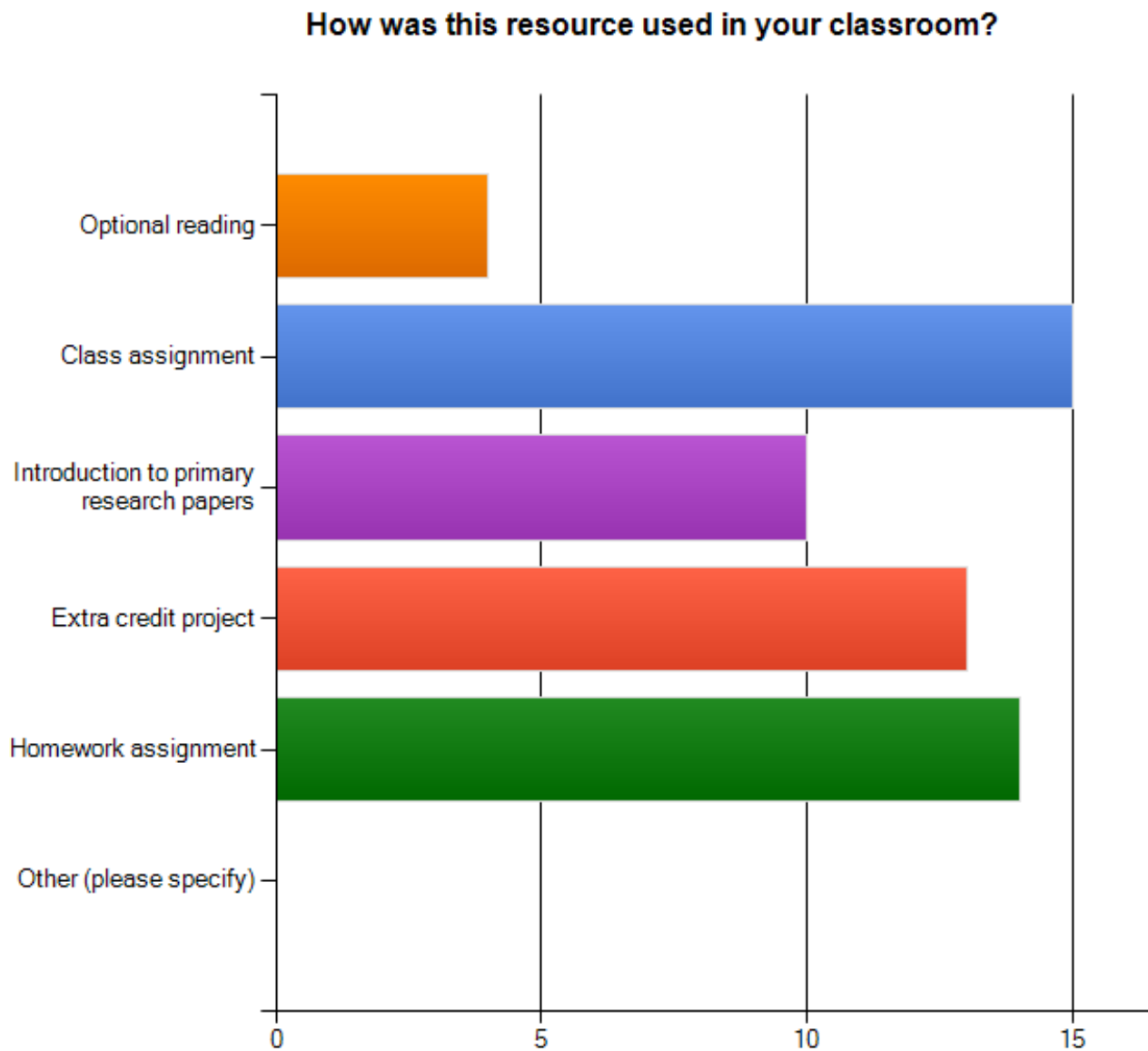


<http://scienceintheclassroom.org>

Different levels of students are using SitC in several different ways.

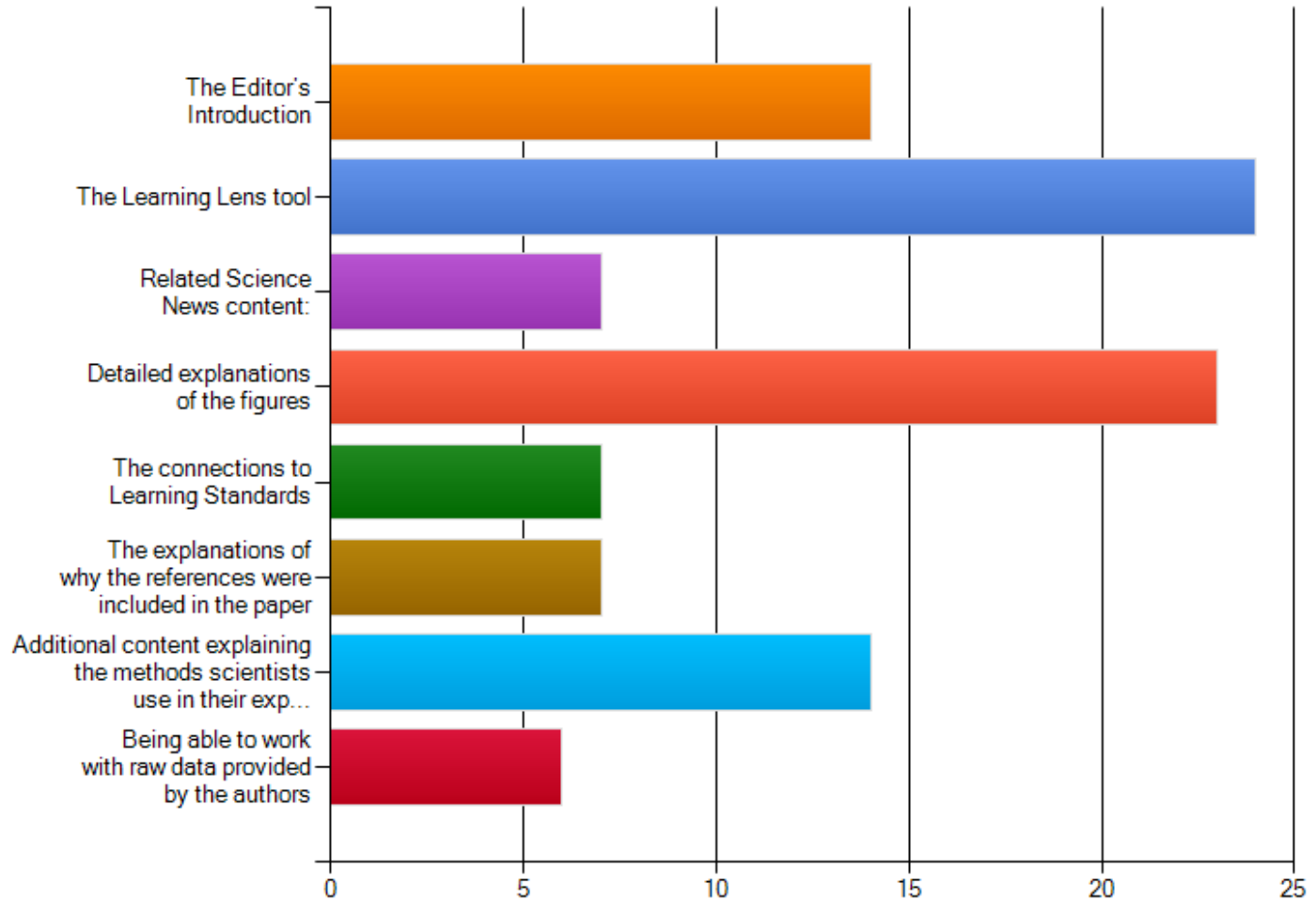


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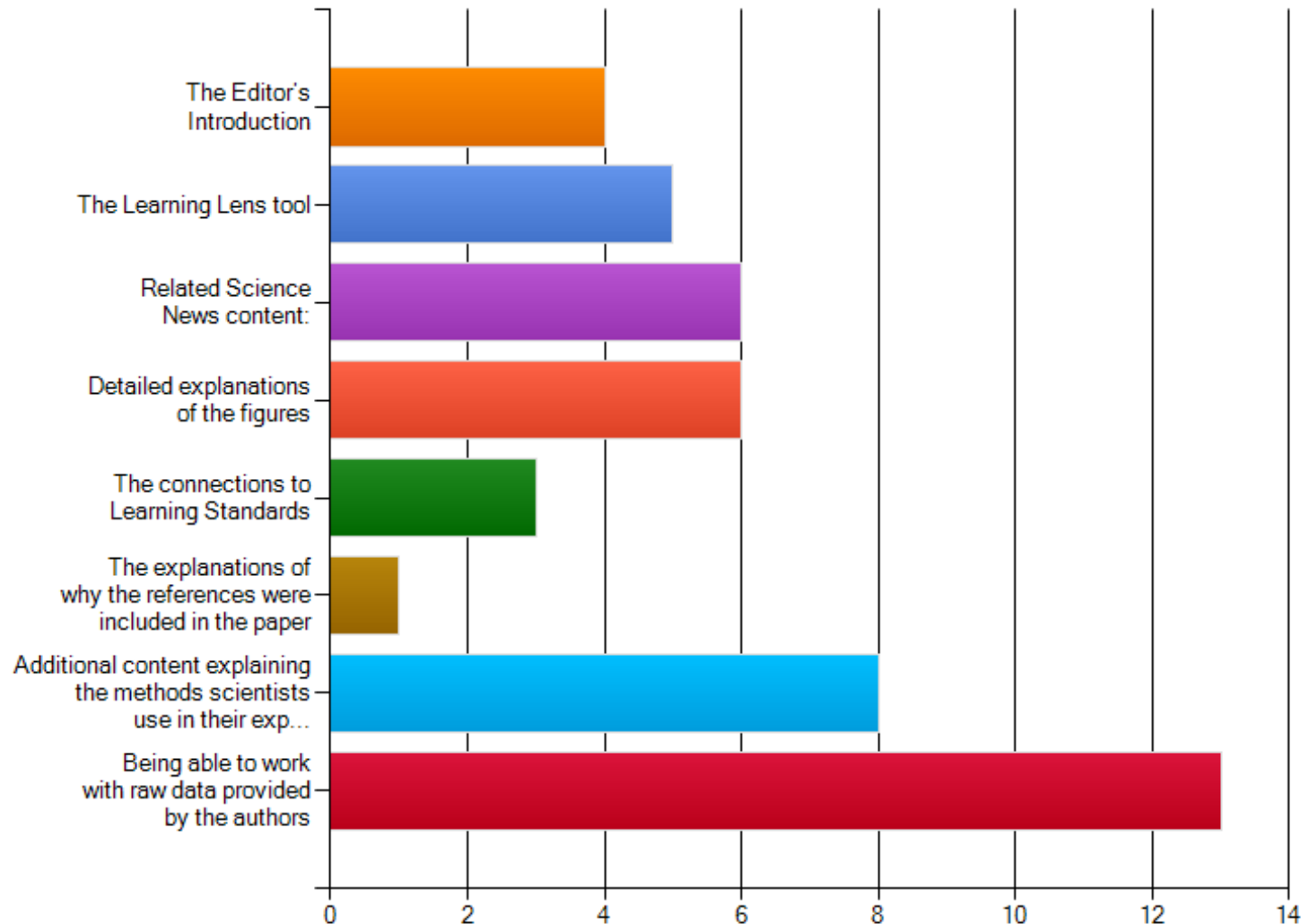
The Learning Lens and detailed explanations of the figures are most helpful to students.

Did you find any of the following elements helpful in your understanding of the research paper?
Please check all that apply.



How can we better engage students with the raw data provided?

Was there a specific area of the resource you struggled to understand or interact with?



Discussion on brainstorming versus reality

- What are we doing right?
- What could we be doing better?
- How can we engage the audience (teachers and students)?
 - Online discussion groups?
 - Journal clubs around a particular article?
 - Collaboration to generate new activities?
- What sorts of interaction would you - - realistically - - bring to the site when back at your teaching positions?
- Additional feedback welcome!

Please send feedback!

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<http://scienceintheclassroom.org>

