Debunking Science Myths by SHenderson

At the TSELA winter meeting, a well-respected colleague & friend of mine who is a science coordinator in the Dallas metroplex area shared a resource he uses when he talks to students & parents about science misconceptions. The 2011 article is called The Debunking Handbook & was written by John Cook & Stephan Lewandowsky. You can access a copy of the article here.

Science teachers deal with misinformation & student misconceptions more than other subjects so it is vital that we have the resources we need to successfully confront this issue. So here’s just one more “arrow to place in your quiver.”

The basic premise of the article is, “any efforts to debunk misinformation can inadvertently reinforce the very myths one seeks to correct. To avoid these ‘backfire effects,’ requires three major elements:” 1. the refutation must focus on core facts rather than the myth to avoid the misinformation becoming more familiar; 2. any mention of a myth should be preceded by explicit warnings to notify the reader that the upcoming information is false; & 3. the refutation should include an alternative explanation that accounts for important qualities in the original misinformation.

Several other useful suggestions are provided in the article. While reading the article, I kept picturing Joe Friday (from the show Dragnet– one of my favorite shows as a kid) & his quote, “All we know are the facts, ma’am.” To avoid “The Overkill Backfire Effect” the article suggests that science communicators should strive to make their content easy to process. Content should be easy to read, easy to understand, & succinct (will be more likely to be accepted as true). Also, simply enhancing the color contrast of a printed font can increase an individual’s acceptance of the truth. When debunking, one should end on a strong & simple message that people will remember, plus, one should use graphics whenever possible to illustrate points. The authors use this acronym: KISS→ Keep It Simple, Stupid!

The Worldview Backfire Effect is especially problematic with individuals who are fixed in their world views. You have a greater chance of correcting misinformation among younger individuals who are not as firmly decided about certain issues. The article ends with the most important point– once you successfully debunk a misconception or misinformation, you must fill that gap with an alternative explanation. This can be accomplished by explaining why the myth was wrong, by exposing the rhetorical techniques used to misinform, & by explaining why the misinformers promoted the myth. Here is an nice reference for you– Anatomy of an Effective Debunking:

- Core facts– a refutation should emphasize the facts, not the myth. Present only key facts to avoid an Overkill Backfire Effect.
- Explicit warnings– before any mention of a myth, text or visual cues should warn that the upcoming information is false.
- Alternative explanation– any gaps left by the debunking need to be filled. This may be achieved by providing an alternative causal explanation for why the myth is wrong & optionally, why the misinformers promoted the myth in the first place.
- Graphics– core facts should be displayed graphically if possible.

“We live in a society exquisitely dependent on science & technology, in which hardly anyone knows anything about science & technology.”
- Carl Sagan

“Part of what it is to be scientifically-literate, it’s not simply, ‘Do you know what DNA is? Or what the Big Bang is?’ That’s an aspect of science literacy. The biggest part of it is do you know how to think about information that’s presented in front of you.”
- Neil deGrasse Tyson

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New Teacher Profile
(McNiel Middle School)

Please help me welcome Logan Carroll new secondary science teacher at McNiel Middle School. Logan is currently teaching six sections of Grade 6 Science & one section of Grade 6 Leadership @ McMS.

Secondary School– S.H. Rider High School

College/Degree– Grayson County College-full ride softball scholarship, then transferred to Texas A&M University where received a Bachelor of Science in Interdisciplinary Studies

Previous Teaching Experience– Taught 1st grade in Iowa Park from 2012 to 2016.

Professional Goals- “Inspire kids through science!”

Hobbies/Interests– Traveling & music!

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2017 Wichita Falls Divisional STEM Competition

The results are in! On Saturday, February 4th, the Wichita County Chapter of TAME held its annual qualifying competition for the upcoming state competition. This year’s competition included students from: Chillicothe, Iowa Park, Nocona, Breckenridge, Burk Burnett, along with middle & high school students from each of the WFISD secondary campuses.

The students started with a combination math/science exam which was based on their current grade level. The following WFISD students placed in the top five for their grade level:

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Place</th>
<th>School</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damon</td>
<td>Rogers</td>
<td>1</td>
<td>McNiel Middle School</td>
<td>6</td>
</tr>
<tr>
<td>Kayla</td>
<td>Hernandez</td>
<td>3</td>
<td>McNiel Middle School</td>
<td>6</td>
</tr>
<tr>
<td>Tyler</td>
<td>Clancy</td>
<td>4</td>
<td>McNiel Middle School</td>
<td>6</td>
</tr>
<tr>
<td>Javier</td>
<td>Solorio</td>
<td>5</td>
<td>Kirby World Academy</td>
<td>6</td>
</tr>
<tr>
<td>Isaac</td>
<td>Enriquez</td>
<td>4</td>
<td>Kirby World Academy</td>
<td>7</td>
</tr>
<tr>
<td>Manasvi</td>
<td>Reddy</td>
<td>1</td>
<td>Kirby World Academy</td>
<td>8</td>
</tr>
<tr>
<td>Elijah</td>
<td>Hernandez</td>
<td>2</td>
<td>McNiel Middle School</td>
<td>8</td>
</tr>
<tr>
<td>Anthony</td>
<td>Shuey</td>
<td>3</td>
<td>Kirby World Academy</td>
<td>8</td>
</tr>
<tr>
<td>Jayden</td>
<td>Jackson</td>
<td>4</td>
<td>Kirby World Academy</td>
<td>8</td>
</tr>
<tr>
<td>Jacob</td>
<td>Newberry</td>
<td>5</td>
<td>Kirby World Academy</td>
<td>8</td>
</tr>
<tr>
<td>Christopher</td>
<td>Laxamana</td>
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<td>8</td>
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<tr>
<td>Krishna</td>
<td>Reddy</td>
<td>1</td>
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<td>9</td>
</tr>
<tr>
<td>Rohan</td>
<td>Tanjavur</td>
<td>2</td>
<td>Hirschi High School</td>
<td>9</td>
</tr>
<tr>
<td>William</td>
<td>Nguyen</td>
<td>3</td>
<td>Rider High School</td>
<td>9</td>
</tr>
<tr>
<td>Ila</td>
<td>Kamath</td>
<td>4</td>
<td>Hirschi High School</td>
<td>9</td>
</tr>
<tr>
<td>Collin</td>
<td>Hebner</td>
<td>6</td>
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<tr>
<td>Preston</td>
<td>Esslinger</td>
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<td>10</td>
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<tr>
<td>Jacob</td>
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<tr>
<td>Gabriela</td>
<td>Garcia</td>
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<td>Rider High School</td>
<td>11</td>
</tr>
<tr>
<td>Brianna</td>
<td>Lee</td>
<td>3</td>
<td>Rider High School</td>
<td>11</td>
</tr>
</tbody>
</table>

The Engineering challenge divided all students into random groups where they were tasked with designing a satellite (a food container) antennae array (plastic straw) plus a solar panel (pieces of cut paper) that would deploy when triggered. The entire device had to fit into a 7” by 7” box. Check out the pictures from this competition on Facebook (taken by Jessie Mitchell). Thanks to all the WFISD TAME sponsors for helping make the day such a success!
Science Learning Opportunities

Two things are in the works that you need to be made aware of: Physics Days @ Castaway Cove & Texoma Mini-Maker Faire.

Physics Days will be offered at the local waterpark during May 15 - 19 & 22 - 26. Students will be provided with science activities they can perform while enjoying the park facilities. Contact Jessie Mitchell (McMS) for more information.

Texoma Mini-Maker Faire will be held at the Wichita Falls MPEC this fall on Oct. 27th & 28th. Student teams will compete in the science/engineering challenges, booths will be set up in the exhibit hall to see a variety of “makers” & their products, & there will be some cool demonstrations. There is a minimal cost associated.

Course | Being Taught Now (5th 6 Wks.) | Going to be Taught (6th 6 Wks.)
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Grade 6 Science | The Dynamic Earth; The Solar System | Continue The Solar System; Space Exploration; Organisms & Environments
Grade 7 Science | Continue Genetics; Genetic Variations & Adaptations; Structure & Function of Living Systems / Homeostasis | Continue Structure & Function of Living Systems / Homeostasis; Components of the Solar System; Review
Grade 8 Science | Continue Climatic Interactions; Earth Cycles; Characteristics of the Universe (including Light Years & Theories) | Content Review; Experimental Design OR Biology Content for Gr.8 Science
Biology | Microorganisms; Plants; Body System Interactions | EOC Review; Invertebrates / Vertebrates; Experimental Design
IPC | Periodic Table; Chemical Reactions I & II | Environmental Impact of Chemical Reactions; Solutions / Acids & Bases
Chemistry | Stoichiometry; Gases; Solutions | Acid / Base; Thermochemistry; Nuclear Chemistry
Principles of Technology: Physics | Static Electricity; Current & Circuits; Magnets & Electromagnetism | Quantum Theory & the Atom; Solid State Electronics; Nuclear & Particle Physics
Environmental Systems | Environmental Impact | Environmental Ethics, Research, & Law
Earth & Space Science | Stellar Evolution, Beyond our Solar System; Severe Weather & Storms, Climate Atmosphere, Moisture & Weather, Air Pressure | Glaciers (Cryosphere), Deserts, Wind; Global Climate Change, Mineral Usage, Depletion, Oceanic Pollution & Freshwater Depletion
Forensic Science | Controlled Substances; Firearms & Tool Marks; Anthropology | Glass & Soil; Questioned Documents; Forensic Psychology
Human Anatomy & Physiology | Female & Male Reproductive System; Growth & Development; Blood; Circulatory System | Nervous System
Medical Microbiology | Gram Positive/Negative Bacteria; Parasitology & Virology | Fermentation & Environmental Microbiology; Control of Microbial Growth & Antimicrobial Drugs

Special Thanks to Fuzzy...
WFISD has some extraordinary science teachers. I thought you might need to know about the actions of one of our best—Ferran Kaspar (BMS). Fuzzy is taking a personal day to travel with the RHS Earth, Wind & Fire teacher & students on a fossil-hunting field trip to Mineral Wells. We will board the “yellow hammer” school bus @ ~8:15 on May 17th & travel ~105 minutes south to a location near the Mineral Wells Lake area. Students will hunt for brachiopods, bryozoans, & crinoid stems until they can’t see straight. I hope to find a trilobite...or I might just steal one of his...
More Great Ideas!

Here are some more really neat things I have seen while visiting classrooms this spring:

Many of you use student activities where students work independently, in pairs, or in groups to create some sort of poster. I think it is very wise to post the results of such activities so students can take pride in their work & so other students can see examples of science learning. Here are three photos I took at Wichita Falls High School showing the results of quality science work. Good job Ashley, Dorene, & Sabrina!

At right is a photo I took in the hallway outside Ashley Peterson’s (IPC Teacher) laboratory. According to Ashley, "We were talking about atomic theory, so each student researched a scientist that contributed to our knowledge of the atom." Each poster also included a photograph of each scientist.

The shot at left was taken on the third floor @ WFHS just outside Dorene Baker’s (Honors Physics & AP Physics Teacher) lab. She actually had posters lining the lockers on both walls. According to Dorene, "The project was designed to familiarize students with the metric system...incredibly, they still have trouble with it by the time they reach me as juniors & seniors. They had a list of lead-in statements like 'The mass of a ? would be measured in kilograms.' The list of statements included common metric measures of mass, length & capacity. They had to provide an image of a suitable object, then research its actual measure in both metric & customary. Some spiced things up by centering around a theme, like Star Wars or their favorite video game."

The shot @ right is what you’ll notice when you climb the east stairwell @ WFHS & exit to the third floor & turn to the right. In the hallway just outside Sabrina Bradley’s (Forensic Science & Chemistry Teacher) lab, you’ll notice the names of serial killers with their pictures, some of their victims, & some spattered blood (nice touch!). According to Sabrina, "This was our serial killer project. Each Friday we profile a different serial killer & at the end of the semester, the students chose one of them & gather information about the killer, their victims, & the murders. They then create a poster showcasing that information. They’re given a week to do it, & this year I had some of the best posters I’ve ever had!"

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Did You Know?

Contact Steve with suggestions/ideas for future newsletters.

Check out the WFISD Secondary Science webpage @ http://www.wfisd.net/page/579

D⁴ (Dates, Deadlines, & Dogmatic Dribble)

- The 6th 6 weeks runs from 4/10/17 to 5/26/17
- HS Graduation is Sat. May 27th (RHS/WFHS/HHS)
- The Grade 8 benchmark exam testing window is Mon. Apr. 10th to Thurs. Apr. 13th—> answer documents must be returned to your campus testing coordinator by 5:00 pm on the 13th!
- Deadline for accessing your campus consumable fund is Fri. Apr. 21st
- The annual AP Science Saturday Review will be held Sat. Apr. 22nd (Earth Day) from 8:00 am to noon @ RHS
- Fri. Apr. 28th & Fri. May 19th will be inclement weather days.
- AP & IB Science Exams begin Mon. May 1st
- Science STAAR Exams will be Wed. May 3rd (Biology) & Wed. May 10 (Gr.8 Science)
- Mon. May 29th is a staff holiday
- “Summer vacation is a time when parents realize that teachers are grossly underpaid”- Anonymous

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More Great Ideas!

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Summer Vacation