

Frenemies: Bringing Words and Numbers Together in Harmony

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Middle School Example

Why would we weave numeracy and ELA...

- “companies and organizations accruing Yottabytes (10^{24}) of data”
- “1 Exabyte (10^{18}) of data is created on the internet daily, amounting to roughly the equivalent of data in 250 million DVDs”
- “Humankind produces in two days the same amount of data it took from the dawn of civilization until 2003 to generate”

[With Big Data, Context is a Big Issue](#)

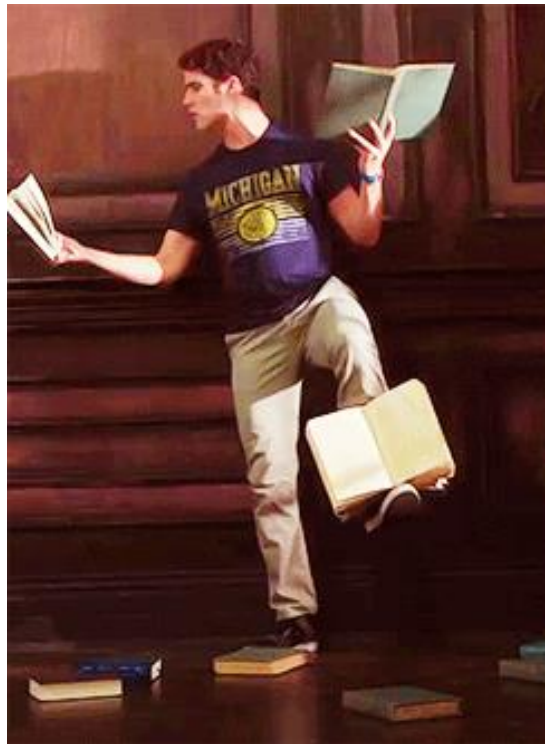
Middle School -- Numeracy and ELA

“The Age of Context demands that contextual data be applied to everyday situations in useful ways. How do we make use of this data? Since we’ve gotten good at collecting data, now it’s all about putting it into context and making sense out of it – mining for the nuggets of insights that answer the “So What?” question. **Data is meaningless and even cumbersome without context – the key holistic and interpretive lens through which data is filtered and turned into real information.**”

[With Big Data, Context is a Big Issue](#)

Middle School - Numeracy and ELA

How do we create that context...



Middle School - Numeracy and ELA

How do we do this?

S6E4. Obtain, evaluate, and communicate information about how the sun, land, and water affect climate and weather.

MGSE6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

ELAGSE6RI1: Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text

Collins Hill High School Example

- The world is not defined by disconnected subject areas. In reality, we use them interchangeably.
- Take a new perspective on a traditional text: *Lord of the Flies*
- Let's deconstruct the lesson (rubric)

Biofuel Rubric

| | Developing | Proficient | Exemplary |
|--------------------|---|--|--|
| Investigate | Identify current problems. Research and brainstorm materials and procedures for biofuel. | Identify current energy problems. Research and brainstorming reflect an overview of multiple biofuels and details on at least 1 type. | Reasons are provided for why 2 or more types of biofuel were ruled out and why you chose the final biofuel. |
| Plan | Compile and submit materials list. Compile and submit procedures. | Materials list shows who is responsible with little detail. Procedure is developing in detail but missing a clear understanding. Scientific vocabulary is explained. | Materials list shows who is responsible for each item, the concentration, and amount of any chemicals. Procedures are clear, detailed, and easy to follow. All scientific vocabulary is explained. |
| Design | Script or storyboard for video: Inconsistently develops 2 characters- character attributes are inconsistent with the novel (LOTF). Calculate and submit stoichiometric values for reactants and products of biofuel production or combustion of biofuel | Script or storyboard for video: Somewhat develops 2 characters- character attributes are somewhat consistent with the novel (LOTF). Stoichiometric values are clearly labeled and easily followed. | Script or storyboard for video: Fully develops 2 characters- character attributes are accurate and consistent with the novel(LOTF). Stoichiometric values are clearly calculated, explained, and related to the pollution emitted. |
| Create | Make 200mL of biofuel/prototype. Video of scene does not fully explain how the natural resources found can be used for the purpose of creating a biofuel. Discuss how materials will be used. Reevaluate, modify, and improve biofuel. Digital artifact is vaguely appropriate and or shows no relevance to data. | A functioning prototype is produced (it burns). Digital artifact is appropriate, shows relevance to data, and is clearly labeled. Video of scene explains how the natural resources found can be used for the purpose of creating a biofuel. Thoughtful reflection on how to improve the biofuel. | Digital artifact connects more than one pattern or trend and visualizes it in the artifact. Video of scene fully explains and shows superior knowledge of how the natural resource found can be used for the purpose of creating a biofuel. |
| Evaluate | Presentation shows some knowledge of thermochemistry, biofuels, character development, and the EDP. | Presentation shows clear knowledge of thermochemistry, biofuels, character development, and the EDP. Test heat production and emissions. Share- present, show video of how it was found, made, and tested (sell your product, why is it the best) 7-10 min | Presentation shows deep and thorough knowledge of thermochemistry, biofuels, character development, and the EDP. Video editing is apparent and shows cohesive storyline. |

Deconstruct the Lesson

The Prompt

Students were tasked with creating a biofuel using natural resources found on an island similar to the one in *Lord of the Flies*. Students researched, tested and prototyped biofuels within their group and then measured and calculated the amount of energy in joules and calories produced from burning their biofuel. They used stoichiometric calculations to predict the amount of carbon dioxide pollution that was produced during this process and then performed a statistical analysis on the effectiveness of their prototype. In conjunction with this, the students scripted a scene representing the characters from *Lord of the Flies* finding the materials and developing the biofuel on the island. The script and the video had to encompass the development of at least 2 characters.

Sample Student Work



Why and How?

Planning

- Provide teachers with common planning time to begin the conversations
- Start with vocabulary

Proximity

- Bringing the disciplines together regularly will inspire impromptu connections and conversations

Other articles and resources...

- [Embedding Literacy into STEM Projects](#)
- [No Longer a Luxury: Digital Literacy Cannot Wait](#)
 - “We want—or, rather, we need—today’s students to critically consume information, to create and share across time and space, to co-create and collaborate to solve problems, to persevere in light of setbacks, and to maintain flexibility.”
- PBL Planning tools: Buck Institute, Harvard Project Zero, Stanford D School
 - Be a filter -- parts of these resources may work put together into a new tool for your district / school / classroom

In Conclusion

- Continue curiosity
- Think of one or two applications
- Contextualize numeracy through literacy
- One place where these ideas can be enhanced
- Cross-curricular resources – common ground
- Teacher doesn't need to be the expert in literacy and numeracy
- Find connections presenting them with information

More Examples

Elementary School - Kimberly Boucher,
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High School (Technology) - Kennesaw Mountain
High School

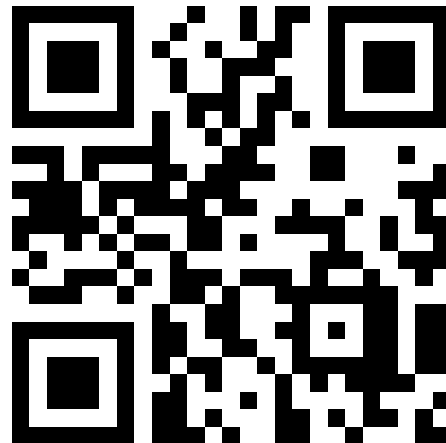
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We need your feedback!

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