From "Lone Nut" to "Movement Maker": Infusing Project-Based Leaning (PBL) with Global Collaboration in a *STEM Classroom*

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Launch Event

Your Challenge…

Trying new things in the classroom can sometimes make you feel like a lone nut. You want to be progressive, innovative and bold in engaging students, but that can be scary. What if it fails? What if you're ridiculed? What if students don't perform? What if administrators, parents, and/or other stakeholders are wary or critical?

Today, we want you to be a lone nut; we'll be your first followers. Today, we want you to plan something new for your classroom- be it simply to learn more about project-based learning, or to be really bold by flattening the walls of your classroom (metaphorically, of course; please don't really tear down the walls) and making learning global.

In the global society in which we live, designing opportunities for students to practice digital and global citizenship and to foster global competence, awareness, and appreciation is an important learning outcome, but one that is rarely explicitly practiced. Beyond that, it can be an exciting, innovative way to foster content acquisition! As such, the hope is that teachers grow in their own project-based learning and global collaboration practices and strengthen skills that can be transferred to and applied in classrooms and instructional design with their students.

So, as a lone nut (for now, but not for long), how can you design a STEM PBL unit that includes some level of global collaboration within it to use with your students next semester?

Project Requirements:
1) Participate in a mini global STEM PBL
2) Discuss various levels of global collaboration
3) Determine where global collaboration fits as a function of a PBL
4) Discuss ways to elicit global collaboration partners
5) Design a new or rework a project-based learning unit to include an element of global collaboration within the project-based unit lesson

Knows and Need 2 Knows

*What do you know about project-based learning?

*What do you know about global collaboration?

*Have you personally or your students ever engaged in collaborative activities OUTSIDE your own classroom or school?

*Based on the driving question and project requirements for today's session, what do you know and what do you need to know?

Global collaboration helps support:

*21st century skills development (an important component of PBL)

*Cultural appreciation and awareness

*Content acquisition
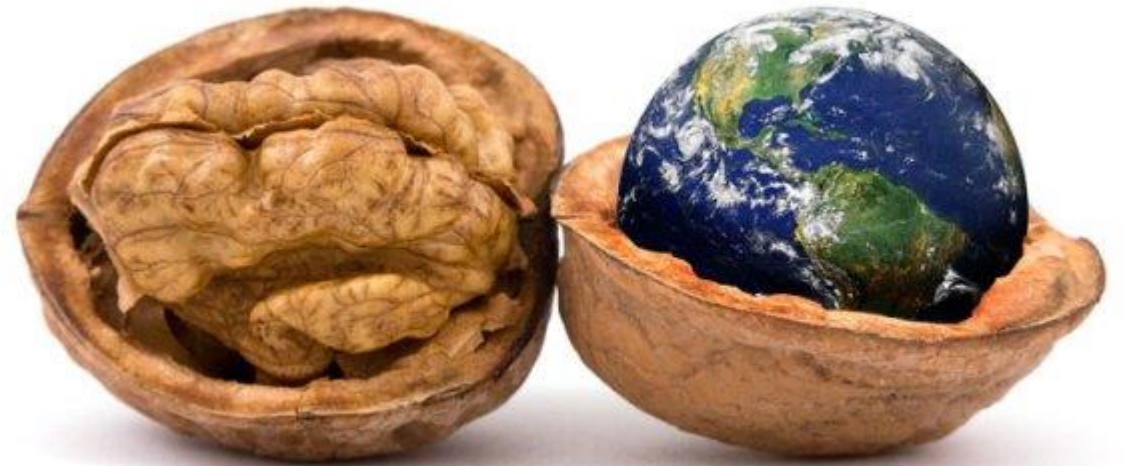
A STEM PBL in a Nutshell

Entry Document

      Origami is that art of paper folding. This art has especially deep roots in Japanese culture with a long tradition dating back centuries. Origami paper itself was developed in China during the 2nd century B.C. While it made its way to Japan in the 6th century, it wasn't until the 16th century that origami became a mainstream art. Today, origami is enjoyed all over the world.

      While appreciated for its aesthetics and high degree of skill needed to create more complex figures, origami can also serve another important function: learning and practicing geometry skills. In fact, "today, origami has expanded to incorporate advanced mathematical theories…" (PBS, 2009). Important geometrical concepts such as bisectors, perpendicular bisectors, congruent angles and segments, perpendicular lines and angles, and parallel lines can all be addressed through origami. For this project, how can we use the bisectors of segments and angles to create a piece of origami art to share with a global community?
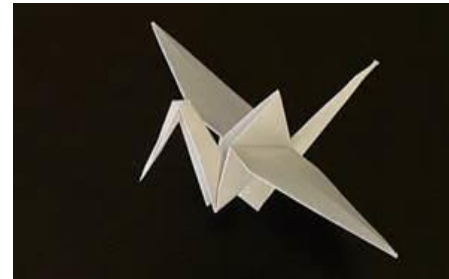

Image taken from martitavs.blogspot.com

Image taken from iurban.in.th

Image taken from matvpratique.com

Project Requirements:
1) a completed origami art piece for each individual in the group
2) a labeled origami diagram for each step of the folding process using correct terminology (bisector, congruent angle, etc.) and symbols
3) a 2 minute classroom presentation using technology
4) a clear, digital photo of the team's origami art pieces which include a "setting" background
5) a posting to the iEARN Origami Project forum
6) a minimum of two (2) individual postings to student postings from other schools

PBL Card Sort Activity

PBL in a Nutshell...

P B L

1. Hook/Launch: Engage your students!

2. Team: Entry Document + Social Contracts/Roles + Rubrics

3. Plan: Address driving question, list K/NTKs, create research questions, address resources, and request workshops.

4. Research/Work: Research your driving question and discover information. Use workshops and DIY's to get it done. Teamwork and technology use are crucial and expected!

What did you discover today?

5. Critique/Create: Product and presentation creation! Peer feedback helps you refine your product and presentation.

What did you create today?

6. Share: Team presents product and reflects on design. An authentic audience adds their questions and expertise.

Assessment throughout: Students are assessed on both standards and soft skills

Graphic created by Katie Donaldson, UT Dallas

Your turn…

Think about a favorite topic, standard, activity, or lab.

1. What challenging real-world topic could you use to pose a question that students would feel compelled to answer?

2. What labs and activities do you already do that could be used as DIYs and workshops for your PBL?

3. To what real-world audience should your students present their findings/solutions/products?

Crit Session

Global Collaboration in a Nutshell…

Global Science Education Continuum

Global Awareness	Parallel Activity	Shared Data	Limited Communication	Engaged Collaboration	Global Contribution
Exposure to other cultures and geographical areas to increase knowledge or perception of a world beyond one's own	Classrooms are separated geographically, yet are simultaneously engaged in the same activity; participating classroom do not communicate, but are aware of others' participation	Students from a variety of locations share their data in some way but without direct communication between classrooms	Students from a variety of locations sharing information via direct asynchronous or synchronous communication	Students from a variety of locations sharing information; involves moderate to significant levels communication via direct asynchronous or synchronous communication	Result of collaboration that involves the giving back or contributing to the world around you

Note: Figure adapted from the work of Nugent, Smith, Cook, & Bell (2015). All information provided in the figure was taken directly from this source and is credited to the authors.

Working global collaboration into PBL...

- **Driving Question**
  - Example: How can our chemistry class design a video game with our Chinese computer science partners that assesses the concept of density to be used by 6th grade students as a supplementary learning tool?

    (Grade 6 Science TEK 6.6: calculate density to identify an unknown substance; related to TEK: Chem 4.A: differentiate between physical and chemical changes and properties and 4.B: identify extensive and intensive properties; TEK: IPC 6.C: Analyze physical and chemical properties of elements and compounds such as...density...)

- **Research Phase**
  - Example: World Moon Project Data (sharing of data or information)

    (TEK: Grade 8.7: Demonstrate and predict the sequence of events in the lunar cycle)

- **Authentic Audience**
  - How can we use our knowledge of thermal energy and transfer, along with scientific processes, to design a functional solar cooker to be shared for comment with students around the globe in the iEARN Solar Cooking Project?

    (TEK: IPC 5E: Investigate and demonstrate the movement of thermal energy through solids, liquids, and gases by convection, conduction, and radiation such as in weather, living, and mechanical systems)

Sample PBLs with Global Pieces

*World MOON Project ([World MOON Project](#)) (*shared data*)

*Origami ([iEARN](#)) (*limited collaboration-low level*)

*Kite Project ([ePals](#)) (*limited collaboration-low level*)

*US and Belarusian/Korean Collaboration in PBL course (iEARN and independent) (*limited collaboration-very high level*)

*Video Game Design (independent) (*engaged collaboration*)

Hook me up!
How do I find potential global collaborators?

- TONS of websites
  - Check out the sheet of potential collaboration sites (this is NOT exhaustive, but a good start!)

- Personal contacts (friends, colleagues, administrators, community)

Partner Share…

Go back to the favorite topic, standard, activity, or lab that you just envisioned turning into a PBL.

1. How could you add a global component to it?

2. What benefits could you see from including a global component?

3. What challenges/pitfalls might you anticipate?

Tabletalk

Lessons Learned

*Establishing stakeholder support
*Finding partners
*Ensuring student safety
*Making it relevant to the content
*Integration to PBL
*Technology for collaboration
*Synchronous vs. asynchronous
*Funding
*Curriculum/standards alignment

*Teacher commitment
*Planning and organization
        (creating vs. established
        global projects)
*Language/cultural barriers
*Time-zone challenges
*Be open-minded and flexible
*Other

Additional Resources

- Buck Institute (www.bie.org)

- Engage Learning Model (www.engage2learn.org)

- ISTE (www.iste.org)

- Global Education Conference (www.globaleducationconference.com)

Aw, nuts. It's over. But, contact us!

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