Science and Social Justice: Promoting Authentic Projects in Secondary Classrooms

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PBIS Workshop Agenda

• Introduction to Workshop (5 min)

• Audio Journey & Photo Essay: How can multimedia be used as an entry point for integrating social justice-themed PBIS into a curriculum on nuclear physics? (30 min)

• Introduction to our social justice-themed PBIS curriculum on nuclear physics (15 min)

• Think-Pair-Share: Begin developing the essential questions and enduring understandings on a unit/lesson you teach often using the PBIS Project Planner & share it with a partner (15 min)

• Questions, comments, resources, and time for completing evaluations (10 min)
Essential Questions

• How can science educators help young people analyze the beliefs and practices that shape their lives?

• How can science educators empower students to take the needed steps towards creating a more inclusive, tolerant, just, and peaceful society?

• What are the historical and modern social justice issues in science and society?
Workshop Goals

We hope that participants will leave this workshop with:

• a deeper understanding of and commitment to incorporating social justice into science curricula,
• a deeper understanding of the tenets of PBIS and clear examples of how to incorporate social justice-themed PBIS concepts into science curricula,
• a start on your own social justice-themed PBIS science lesson, and
• lots of resources to take home to further support your professional development!
Prior Experience with PBIS

Please take a few moments to answer the first question on the Workshop Evaluation Tool to give us an idea of your prior experience with PBIS.

👉 Thumbs up—I’ve had lots of experience with PBIS and use it in my curriculum
👉 Thumbs side—Some experience, I’ve heard about it!
👉 Thumbs down—PBIS is brand new to me!
Prior experience with incorporating Social Justice issues into your Science Curriculum

Thumbs up—I’ve had lots of experience with social justice in my science curriculum!

Thumbs side—Some experience, I have designed a few lessons around social justice issues!

Thumbs down—this is brand new to me!
What do we mean by “social justice”?

A project based social justice lesson is one that highlights and unpacks:

- the issues/moral dilemmas that elicit students’ values and promote the development of a plan of action
- hierarchies (interpersonal, social, and institutional patterns) and practices that sustain racism and the status quo
- the question of who benefits and who suffers from inequalities and injustices
- the issues around privilege and status and how those factors contribute to social standing
- the historical roots, stories, and social hierarchies that sustain inequality and injustice
Part 1: An Audio Journey

Listen to the broadcast
Secretly Working to End
the War in ‘Atomic City’.

Write any thoughts/
reactions on the note paper.
Part 2: A Photo Essay

Take the next 5 minutes to roam about the room and think about what sorts of questions and thoughts you have when looking at this photo essay.

Write them on the post-it notes and stick them next to the images.
Audio & Photo Essay Debrief

What were some thoughts came to you when you witnessed the stories and images?

From the lens of an educator and in the context of social justice-themed project based curriculum design in science, share any ideas that come to mind regarding curriculum design that integrates:

- Social justice (privilege, inequalities, power, etc.)
- Student choice
- Captivating “hooks”
- Real-world issues
- An interdisciplinary approach
Based on our discussion thus far, what do you suppose are some key elements of PBI?
The PBIS Project Planner

Quick walk-thru of planner with our nuclear physics as example.

Silently read and jot down notes.
Your Turn!

Take 6-7 minutes to come up with 1-2 essential understandings and driving questions about a unit or lesson that you teach regularly that would benefit from incorporating social justice component.

Take another 6 minutes to share what you developed with a partner at your table (3 min each).
Why social justice-themed PBIS curricula?
What are some contemporary issues and themes that would be good science and social justice
PBIS is curriculum that...

- is learner-centered and honors teacher as facilitator
- contains authentic content and purpose and is based on a rich, complex, driving question that is relevant to student lives
- is grounded in challenging projects that integrate technology and culminate in a presentation, model and/or performance (artifacts) over an extended time frame
- is collaborative, cooperative, and interdisciplinary
- is incremental and leaves room for continual improvement
- incorporates problem-solving, peer persuasion and/or presentation (authentic, community-based accountability)
- contains explicit educational goals based on standards (NGSS, CCS)

Source: Krajcik, Czerniak and Berger (2003)
Beth White designed an interdisciplinary social justice curriculum based on the 1940-1950s for middle school students, which has science curricula for middle school students and is available for a free download by visiting http://www.paddytyler.com/materials.php.

Media Literacy Project: http://medialiteracyproject.org/about-mlp

Rethinking Schools: http://www.rethinkingschools.org/index.shtml

Teaching Tolerance, a project of the Southern Poverty Law Center: http://www.tolerance.org/

Edutopia, Project Based Learning: http://www.edutopia.org/project-based-learning
  • http://www.edutopia.org/10-tips-assessment-project-based-learning-resource-guide

It’s About Time: http://its-about-time.com/pbis/pbis.html

A Fierce Green Fire: The Battle for a Living Planet, a film on the environmental movement: http://fiercegreenfire.bullfrogcommunities.com/fgf_resources

Literature on Project Based Learning

- Teachers are generally enthusiastic, motivated, and successful in their quest to implement project-based learning in their science classrooms (Rosenfield and Ben-Hur, 2001).

- Standards-based, inquiry science curriculum can lead to standardized achievement test gains in historically underserved urban students, when the curriculum is highly specified, developed, and aligned with professional development and administrative support (Geier, et al. 2008).

- School culture and mission and teacher prior knowledge and experience of PBI played a significant role in teachers successfully implementing PBI in secondary science classrooms (Toolin, 2004).

- Driving Question Board (DQB) in project-based science (PBS) units: How to organize, focus, and link students questions to content learning goals. Examples in physics and chemistry provided (Weizman, et al. 2008).

- A planning team from a new urban public high school featuring project-based science, technology, engineering, and mathematics (STEM) education, with a population of African-American, low-income, and special needs students, creates a positive school culture with a clear vision and core values that engender relational trust, a strong sense of community, and principal and teacher co-leadership (Rhodes, 2011).


**Literature on Project Based Learning**

- PBL maximizes the use of technological tools for analyzing, presenting, and communicating results (Grant, 2002; Morrison & Lowther, 2005).

- How can science instruction help students and teachers engage in relevant genetics content that stimulates learning and heightens curiosity? (Alozie, 2010).

- Underrepresented HS students’ interest in science and science teaching increased as a result of engaging in a PBL summer program (Toolin, 2003).

- At the start of an integrated Algebra I and Environmental Science class, students were presented with the following challenge: "How much carbon is stored in the Normanskill Preserve?" They were told they had one month to investigate and present their results, and asked, "What do you need to begin?" (Penniman, 2011).

- The frequency of teachers' use of specific inquiry-based activities correlates with improvements in students' science attitudes and plans; the extent of the success of a PBS curriculum with students from groups underrepresented in science careers appears to be dependent on elements of both teacher knowledge and teachers' frequency of use of inquiry-based activities that are consistent with culturally relevant pedagogical practices (Kanter, 2010).
Thanks again, and please consider contacting us with any thoughts or inquiries!

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