



# Science and Social Justice:

## *Promoting Authentic Projects in Secondary Classrooms*

Regina Toolin and

Beth White

University of Vermont



The  
UNIVERSITY  
of VERMONT

# 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 integrating social justice into a 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 teachers 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!



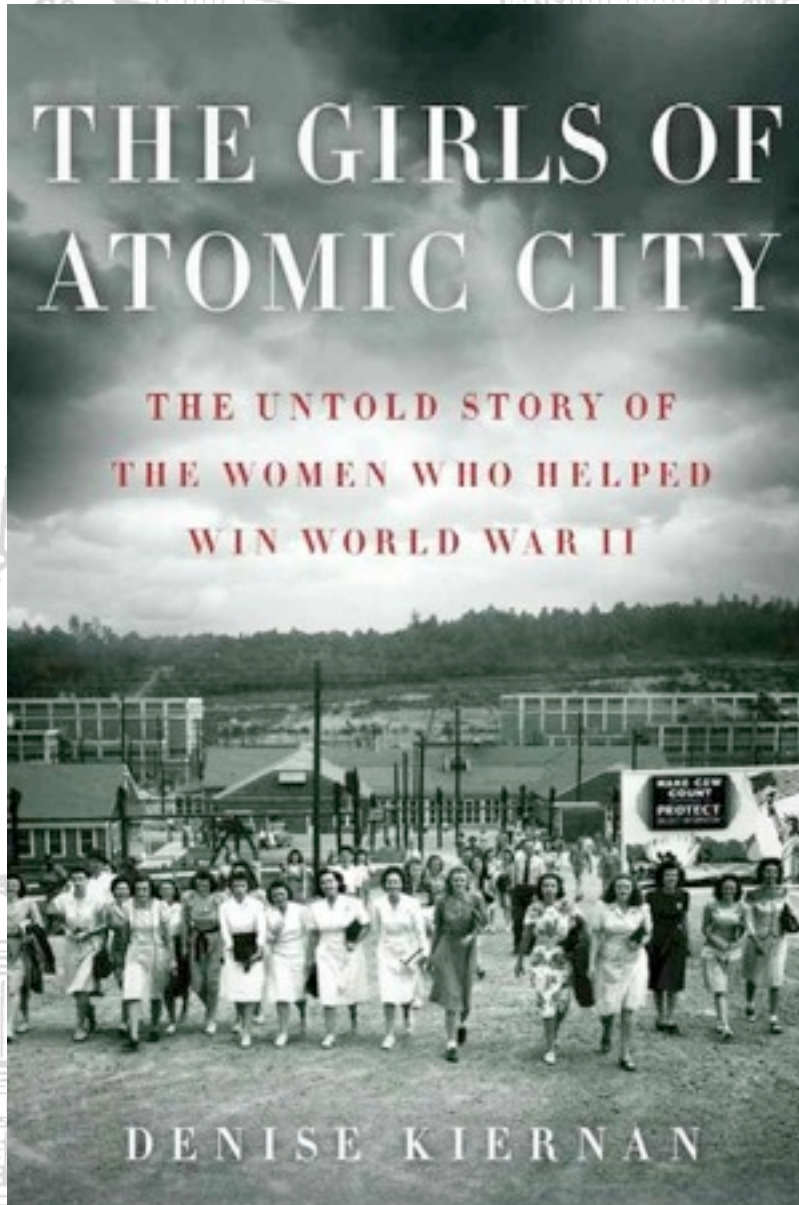
Thumbs down—this is brand new to me!

# 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.



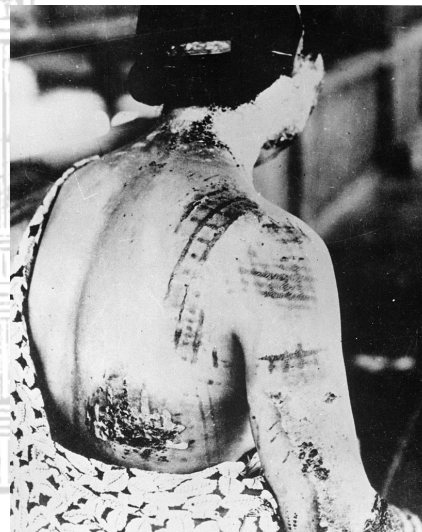
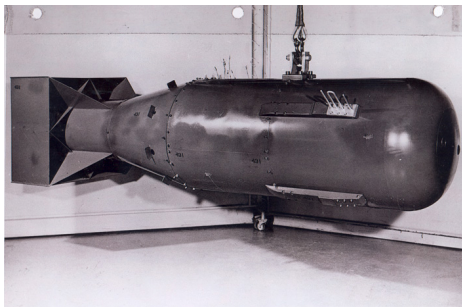
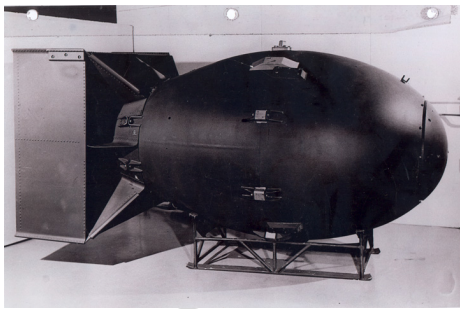


# Part 2: A Photo Essay

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 that 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

# Why social justice-themed PBIS curricula?

- Real world applications beyond facts and content
- Contextualizes science
- Applicable to more students and everyday lives
- Ethics
- Interdisciplinary approach (stats, social sciences, writing, etc.)
- Creates a paradigm shift (power, oppression, voice, knowledge, victim, etc.) to empowerment
- Voice in shaping policy, legislature, government
- Entry point for history of science brought to modern day
- Content is given a drama that may not otherwise be there—story based
- Real science is always practiced in the context of culture—it's always political and there's always money involved
- Involves students

# The PBIS Project Planner

## PBIS PROJECT PLANNER\*

\*Modeled after and adapted from Vermont secondary PROJECT Science Partnership and Buck Institute for Education ([www.bie.org](http://www.bie.org))

VISION: What are the big ideas?

Teacher(s):

Project Title:

Grade Level(s)

Big Ideas/Enduring Understandings: What big ideas or real-world dilemma will drive this project?

Subject(s):

- How can you incorporate interdisciplinary subjects into this project design?

Timeframe:

Essential Questions: What essential questions will drive the project?

- Consider the themes that will focus the unit and ones that integrate social justice issues (preferably local ones/issues that are meaningful to student audience).
- This is a great activity to do with your students but it is usually helpful to already have some ideas in the hopper.

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

Silently read and  
jot down notes.

**Based on our discussion thus far, what do you suppose are some key elements of PBI?**



# Your Turn!

Take 6-7 minutes to come up **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).

\*Modeled after and adapted from Vermont secondary PROJECT Science Partnership and Buck Institute for Education ([www.bie.org](http://www.bie.org))

**PBIS PROJECT PLANNER\***

**VISION: What are the big ideas?**

Teacher(s): \_\_\_\_\_

Project Title: \_\_\_\_\_

Grade Level(s): \_\_\_\_\_

Subject(s): \_\_\_\_\_


- How can you incorporate **interdisciplinary** subjects in project design?

Timeframe: \_\_\_\_\_

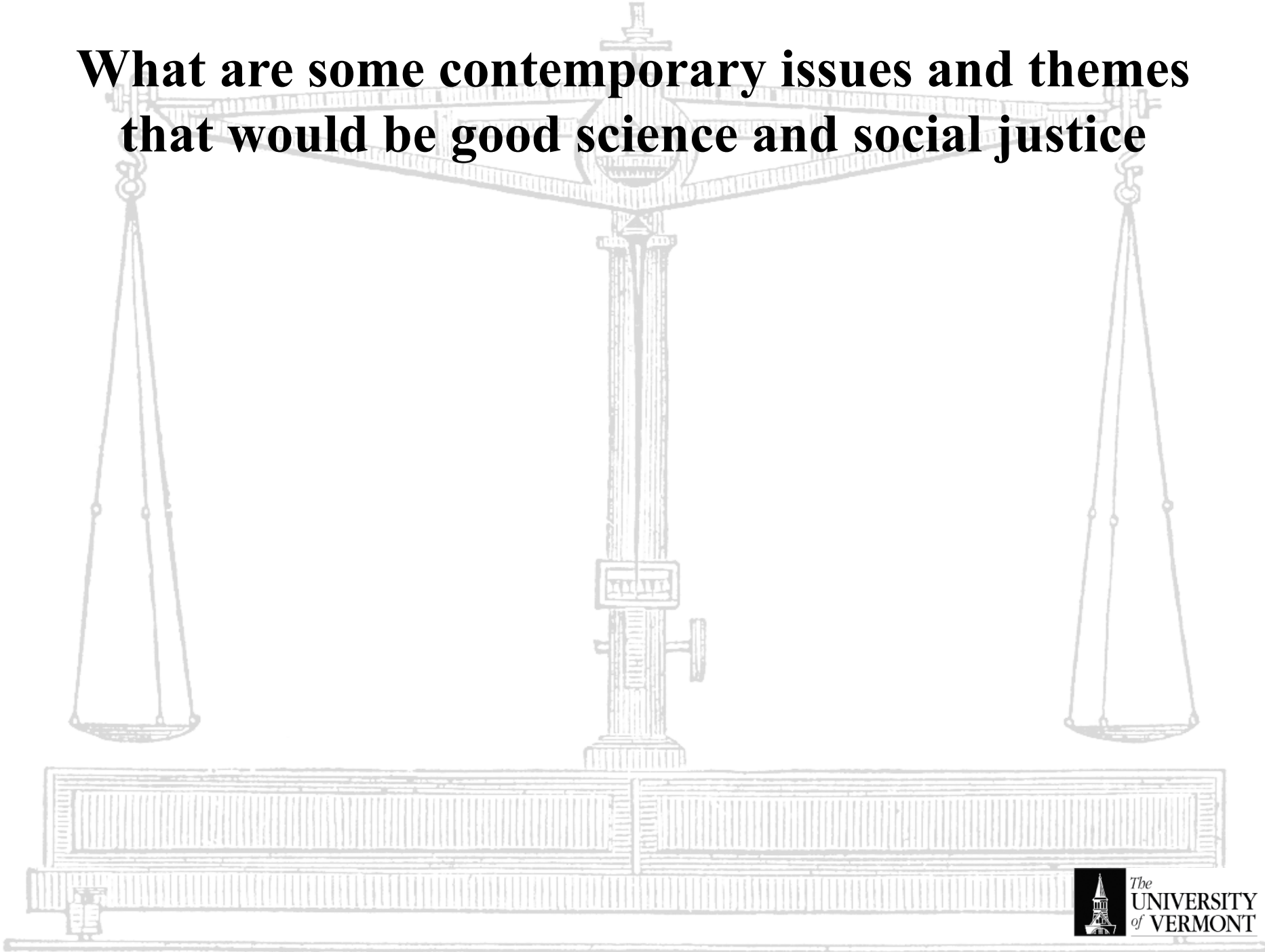
**Big Ideas/Enduring Understandings: What big ideas or real-world dilemma will drive this project?**

**Essential Questions: What essential questions will drive the project?**

- Consider the themes that will focus the unit and ones that integrate social justice issues (preferably local ones/issues that are meaningful to student audience).
- This is a great activity to do with your students but it is usually helpful to already have some ideas in the hopper.



**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)*

# Resources for Guides on Social Justice & Project Based Learning

- 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](http://fiercegreenfire.bullfrogcommunities.com/fgf_resources)
- Teaching Science for Social Responsibility by R.T. Cross and R.F. Price, 1992

# 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!

[rtoolin@uvm.edu](mailto:rtoolin@uvm.edu)

[beth.white@uvm.edu](mailto:beth.white@uvm.edu)