TRANSCRIPT

Hello. Thank you for joining me for this presentation, teaching environmental science and civics with music. My name is Ben Dumbauld, and I'm the Director of Content with the Rock and Roll Forever Foundation. In case you can't tell from the title of my organization, the Rock and Roll Forever Foundation focuses on integrating American popular music in the classroom in order to better engage students in a variety of subjects.

In this presentation, I'm excited to share with you our recent work finding ways to integrate music specifically into science classrooms. For us, such a combination is less focused on rapping about the periodic table. Not that there's anything wrong with that, but rather building lessons based around the perspective that science is deeply interrelated into society, politics and culture. By affirming sciences position as part of society, we hope in this project to get students not only thinking scientifically, but also to consider the way scientific research interacts and converses with the wider world of politics and culture. Hopefully this will inspire students to be lifelong advocates for science, even if they do not ultimately end up with careers in the stem field.

This presentation will be divided into three sections. First, I will quickly introduce the history of the Rock and Roll Forever Foundation, the resources we offer, and the inspiration behind our new and continually developing series of environmental science lessons that we're calling the Environmental Jukebox. Following this, I'll touch upon some of the guiding priorities behind the Next Generation Science Standards or NGSS, and introduced the notion of action civics, an inquiry-based approach to teaching that inspires civic action within classrooms. Finally, I will discuss how both the NGSS standards and action civics approach have inspired our Environmental Jukebox lessons by diving into one of our most recent additions to this collection, which focuses on the Flint water crisis.

The Rock and Roll Forever Foundation was started by musician, actor and activist Steven Van Zandt. Shortly after the ratification of the No Child Left Behind Act, Steven was concerned with the cuts to arts funding to public schools and decided to act. Rather than creating a program just for students in the band room however, Steven consulted with a variety of educators to find ways to introduce music to every classroom. The ultimate goal being to curb the dropout rate across the country by keeping students engaged in school through popular music. The results of that original ideas teachrock.org, a website that offers resources for teachers interested in using

popular music to engage students in a variety of classrooms. All these resources are free. We have over 150 lessons available on the site in addition to a variety of multimedia and interactive resources. Of course, I encourage you to explore the website on your own, but I would like to take a moment to outline the main sections.

Our lessons divided into two main sections. The core lessons and the special collections. The core lessons are further divided into five books. The first four books trace the history of American popular music from around the World War II era to the present. And while they offer an engaging approach to teaching American history, they may not be as applicable to teachers outside of social studies. This is where book five comes in. Music Across the Classrooms, which offers a collection of lessons created specifically for English language arts, visual arts and STEM or STEAM classrooms.

In addition to our core lessons, we also have special collection lessons. These derived from resources we've produced with our various partners from television studios, to film production studios, to academic institutes. For sciences, the collection I really recommend here is the series of lessons we developed for the PBS mini series Soundbreaking, which traces the history of musical production through the lens of emerging studio technology. Finally, I'd like to introduce our quick search feature, which allows our users to define exactly what kind of lessons they may need by grade level, subject, genre and so on. So for example, searching for a STEAM lesson specifically developed for elementary learners, yields four results.

Present on this list of STEAM lessons is cleaning up the plastic beach. This is one of our lessons in our Environmental Jukebox curriculum we are currently developing. The goal with these lessons is not only to showcase the science behind pressing environmental concerns, but also empower students to consider the ways they can address and work to solve these issues in their own capacity. For instance, in the plastic lesson, which is framed by the album Plastic Beach by Gorillaz, students build polyethylene molecular chains, the building blocks of plastic and learn why such chains are very difficult to break down. From there, the science lesson becomes a civics lesson. Students investigate the environmental issues caused by single use plastic and develop an action plan to help curb the use of such plastics in their own neighborhoods. It is this final component that aligns these lessons to Action Civics pedagogy, a project-based civic-minded strategy that empower students to use what they learn at school to immediately effect change in their communities. This is definitely not a new idea. It's

been around since John Dewey, but it's one I personally feel is essential in the current era.

After discovering the science behind pressing environmental problems, our Environmental Jukebox lessons then ask, what are you capable of doing about it? So for the high school version of the plastic lesson, students are asked to put together an engagement plan, ways to curb single use plastics in their community. For the elementary version of the lesson it's a bit more personal. Students are asked to reflect on the ways they use plastic in their daily lives and imagine alternatives, which will allow them to limit their consumption of plastic. By framing science not as an abstract collection of concepts, but an integral part of society, I hope this approach has the additional benefit of engaging students in science. In fact, this idea of engaging all students in science is an important part to reaching the Next Generation Science Standards.

I'm borrowing this slide from a recent presentation by Vanessa Wolbrink from achieved.org, a nonprofit that coordinated the development of the Next Generation Science Standards and helps implement the standards across districts. Embedded in the NGS Standards is the recognition that the sciences in the past have marginalized some student groups who may not see themselves as future scientists, researchers, or engineers. This leads to a lack of diversity in the STEAM or STEM workforce. To address this issue of equity, Wolbrink recommends considering relevant and engaging phenomenon within the science classroom. Fostering asset-based thinking, celebrating student agency and identity, and ensuring accessibility.

For the Environmental Jukebox, we really tried to meet these four goals not only by emphasizing the relevancy of scientific topics by drawing connections to the world of contemporary popular music, but also by instilling within students the confidence that they have a role to play in pressing issues in environmental science. Particularly, by ensuring them that they can use the skills and knowledge they are gaining in the science class right now and not some time in the far off future.

So for the remainder of the presentation, I'd like to dive into one of our more recent Environmental Jukebox lessons. The lesson we're going to look at today is the science and civics of the Flint water crisis, a topic that remains quite relevant today. All of our lessons follow an inquiry-based workshop model that begins with an essential question.

In this lesson, the question is very direct. What is the Flint water crisis and why did it occur? This is followed by an overview, which provides teachers with all the historical and scientific background required to teach the class. So here teachers become aware of the history of Flint and the decisions that were made that led to the water crisis. The following is a list of objectives and materials needed to complete the lesson.

The objectives list in particular provides a clear list of knowledge the students will gain by the end of the lesson, and the skills they will be refining in order to gain such knowledge. All of our lessons begin with a motivational activity, a fun way for students to start thinking about the lesson topic. In this lesson, students are introduced to Jon Connor, a rapper from Flint, and listen to his song, Freshwater for Flint. A word of warning, this song is fairly angry and contains strong language, to the point that Connor apologizes for the strong lyrics within the song. Rather than censoring or dismissing the lyrics, we rather use the song as an opportunity to discuss why Connor might feel the way he does about the Flint water crisis. A question we return to at the end of the lesson after students learn about the details of the Flint water crisis. That being said, we have a version of this lesson available for elementary learners, which features a more innocuous song to analyze.

From there, students move to a hands-on experiment in water treatment. They create their own water filters using two liter bottles and filter materials such as tables and stand. They then run water contaminated with coffee grounds detergent or other readily available materials through the filter and compare the results, either by eye or using various water quality tests if they are available in the classroom. After the test, students should come to the conclusion that filters alone won't create drinkable water, which opens the door to greater discussion of the water treatment process and why it is important.

Following this, students are introduced to Dr. Mona Attisha, the other rock star of the lesson. Dr. Mona as she is referred, is a first generation Iraqi American pediatrician who risked her professional career and reputation to expose the dangerous amounts of lead in Flint drinking water after the water supply was switched to the Flint River. A fact many of the highest governmental and environmental safety officials in Michigan denied for months. Students listen to an interview with Dr. Mona where she explains what led to such high toxicity in the drinking water. As a means of cutting costs, the

process which prevents pipe corrosion was not included in the water treatment procedure for the Flint River.

Students then read and discuss an article from the World Health Organization on the ways led affects the body, why it can be difficult to detect, and why children are especially vulnerable to the effects of lead exposure. What I really like about this lesson is it shows students that as important is designed thinking and creating solutions to problems is for the scientific enterprise, the advocacy of science is just as important. That is the Flint water crisis wouldn't have been solved by a new piece of yet to be invented technology. Rather, it never would have happened if decision making bodies took the science of water treatment seriously and considered the massive and tragic health repercussions of not including essential components to water treatment.

For the summary activity, we returned to Jon Connor's Fresh Water for Flint, and students revisit why Connor's song evokes such feelings of anger and frustration. Following this, students gather in groups and consider a scenario in which they begin to notice a foul odor or taste in their own drinking water. Student groups then outline their approach to address such an event. Who would they speak to about this issue? Would they be able to test the water on their own? How could they become more aware of where their local water is sourced and how it is treated? How would they like Dr. Mona, advocate for cleaner water?

Finally, the lesson concludes with a variety of extension activities teachers might assign students including researching other historical incidents of environmental racism, evaluating contemporary news articles on budget cuts to the environmental protection agency, and summarizing an article that examines the lingering effects of the Flint water crisis for those living in Flint.

So I hope this gives you a good idea of the approach the Rock and Roll Forever Foundation is taking with our Environmental Jukebox lessons. Please check out teachrock.org for our Environmental Jukebox lessons among other lessons. And even if these lessons aren't applicable to your classroom, I really hope our approach to combining science, civics and music inspire you to develop your own unique approaches to teaching science in a more exciting and engaging way.