“How can we effectively incorporate scientific concepts and principles into a curriculum focused on the history and impact of slavery?”

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Title Page, Introduction

Background: The Creation of our Research Question

Our research question originated from our participation in our CODES cohort, where our overarching theme is reparative justice. We partnered with the Missouri Botanical Gardens (MOBOT), an organization/site with a complex history that includes connections to slavery. Henry Shaw, the founder of MOBOT, was a slave owner, which gives the garden a unique and dark historical background that has been primarily overlooked.

Our cohort is divided into two teams. Alci's team focuses on exploring the legacies of colonialism and extractive practices at MOBOT, while JB's team focus was designing an outreach program to educate local schools and the St. Louis community about MOBOT's history and its ties to slavery. In our current CODES class 220, centered around science, we were tasked with creating a research question and we realized that if we incorporated scientific methods and concepts and pieces of our topics from both of our research teams, we could develop an interdisciplinary research question that can be impactful and measurable. This led us to identify science as a tool for framing the history of slavery in a new way. Our approach not only conveys historical facts but also explores the environmental, biological, and agricultural implications of slavery. This interdisciplinary perspective led us to our research question: How can we effectively incorporate scientific methods in a curriculum focused on the history and impact of slavery?

1. Topic Importance

Why is this Important? Well, in our history classes, the topic of slavery is often covered only at a surface level. While students learn that slavery existed, the full depth of its impact: social, economic, environmental, and scientific significance is frequently glossed over. This can cause a disconnect, where students know of slavery as a historical fact but lack a true understanding of its complexities and its lasting consequences. It's important/essential to dive into slavery's nuances and engage with it on multiple levels to create meaningful learning, even though it is a

challenging subject to discuss. Only by moving beyond traditional approaches can we help students fully understand this period and its relevance today.

2. Current Gaps in Curriculums

Currently, the standard curriculum on slavery lacks depth and fails to capture the interconnectedness of scientific, social, and environmental factors. For instance, few curriculums address how plantation agriculture shaped both the ecosystems and the economic systems or how the physical toll on the enslaved individuals was linked with the labor demands of the time. The traditional approach limits students' comprehension/understanding of the complexity and impact slavery has on both human lives and the natural world. This essentially leaves students without the tools to critically engage with the topic. Reforming this approach requires integrating scientific concepts into the history curriculum to bridge the knowledge gaps and encourage empathy, critical thinking, and a sense of historical responsibility.

3. Relevant Concepts and Terms

To address this gap, our research will focus on an interdisciplinary approach that incorporates scientific principles such as plant biology, environmental science, and the study of plantation systems. These scientific areas can help students connect slavery's historical and physical effects, allowing for a deep dive of its impacts. For example, understanding plant biology and environmental science as they relate to plantation agriculture can give students a clearer view of how slave labor contributed to economic gains at the cost of environmental degradation and human suffering. This unique blend of science and history will provide students with a greater understanding of both the social and physical impacts of slavery.

4. Research Question

Our research seeks to answer the question: How can we effectively incorporate scientific methods in a curriculum focused on the history and impact of slavery? By addressing this question, we aim to create a curriculum model that combines scientific and historical perspectives to create a deeper understanding of slavery’s legacy.

Review Papers

Review Paper 1:

Lehavi, Yaron, and Bat-Sheva Eylon. "Integrating Science Education Research and History and Philosophy of Science in Developing an Energy Curriculum." *History, Philosophy and Science Teaching: New Perspectives*, edited by Michael R. Matthews, Springer International Publishing, 2018, pp. 235–60. *Springer Link*, https://doi.org/10.1007/978-3-319-62616-1_9.

The article primarily focuses on understanding scientific phenomena and why certain interpretations are favored over others. The authors aim to give students a more well-rounded understanding of science by incorporating science, its history, philosophy, and insights from science education research. The authors show us how four areas have shaped curriculum decisions, when creating materials to teach energy concepts to middle school students.

The article shows us a framework that combines scientific content with its historical and philosophical context. Reflecting on the article, this essentially encourages students to explore how scientific ideas have evolved and how it helps them to not just understand concepts but also the reasons behind their development. This approach is valuable for our research because it suggests that understanding the historical context of science can deepen students' comprehension of scientific principles.

The authors showcase their approach by explaining the curriculum design process for teaching energy in middle school. The authors highlight specific experiments like "Lavoisier and Laplace" in calorimetry and also focus on the idea of energy transformation. By incorporating historical figures and experiments, the curriculum offers students a narrative that connects scientific principles with their historical roots. The way they approach this aims to prevent misconceptions while also promoting consistent use of scientific language across disciplines. This ends up helping students better understand complex scientific ideas.

Reviewing this framework, we found that it is relevant to our research question because it provides a method for integrating scientific and historical content into a curriculum. We can use/adapt this to teach the history of slavery by incorporating scientific concepts like plant biology and environmental science. Incorporating

this, students would gain a deep understanding of the social and physical impacts of slavery from a scientific perspective.

The authors conclude that combining science with its history and philosophy is crucial for building a strong foundation in scientific education. The authors suggest that in the future, when designing a curriculum they should continue to blend historical aspects with scientific principles to create interdisciplinary learning.

Review Paper 2:

Santos, Luis. files.eric.ed.gov/fulltext/ED575667.pdf.

The article primarily focuses on the role of critical thinking within science education. The basic form of science includes mostly facts and this article severely critiques the current way that schools teach science. Questioning is the main focus because they are looking for students to challenge and develop their own opinions. The article ties in multiple opinions and sources to help expand on the point that this is not a new idea. In fact, teachers have been wanting to incorporate a new curriculum for a while but it was not cohesive with the requirements.

Let's go back to the teachers having an opportunity to implement this within the classroom. The article speaks about training teachers to implement a more reflective thinking aspect to the class setting. Some things floating around the article that would be great for our goal are activities that allow students to form an analysis on topics, allowing different opinions to be heard while also allowing the opposing opinion to comment and letting students create a question they can reflect on. With these advancement, we can create a better work experience for the students while also introducing a new concept within the science world.

The role of critical thinking has been applied to multiple points of science and education. The incorporation of this form of thinking has been crucial throughout the years in many studies as well as curricula and will play a substantial role in our project. This article also speaks about a number of reasons that Nature of Science (NOS) in school science is linked to Critical thinking. The article describes adding critical thinking allows a “humanization” effect. Letting students have an opinion about science is a new concept that combines the indefinite solutions to the human opinion.

This article will be very beneficial for our research question in various ways. Its focus on critical thinking within the science realm is exactly what we're looking to

do. This provides the want for a course that incorporates some topics that allow students to have the input that sometimes lacks within these curriculums. We can use certain topics on slavery to provide a new way of analyzing material and give these students a chance to have a different experience with science.

Research Articles

Research Article 1:

Citation for the article: Klein, S. (2016). Preparing to Teach a Slavery Past: History Teachers and Educators as Navigators of Historical Distance. Theory & Research in Social Education, 45(1), 75–109.
https://doi.org/10.1080/00933104.2016.1213677

This research project sets out to explore how Dutch history teachers and museum educators integrate Teaching the Transatlantic Slave Trade and Slavery (TSTS) into their practice. It explores how "historical distance"—the separation between the past and present, the emotional gulf between slavery of past and today—is both understood by instructors and informs choices over sensitive topics such as slavery.

Klein looks at how educators' personal, cultural, and professional backgrounds shape their approach to teaching TSTS, especially in the context of ongoing public debates about the legacy of slavery in Dutch society. The study focuses on how teachers balance the need for objective historical teaching with the need to make the topic relevant to today's students, particularly in a multicultural society like the Netherlands.

The research involved semi-structured interviews with six participants, four history teachers and two museum educators all from diverse backgrounds. Also, Klein conducted an "ecological experiment," where the participants evaluated different historical materials/objects (texts, images, and videos) to assess their appropriateness for teaching TSTS.

We identified two themes. Historical Distancing: For some TSTS teachers, it was easier to think of slavery as a separate, less relevant event while for others the resonance with contemporary social problems made events sense very connected. Those who had personal or cultural connections to slavery's history (Caribbean background of the classroom group) were more inclined to prefer a closer, emotionally related way of approaching the topic in class. In contrast, some other

teachers opted for a neutral, distanced position, addressing the historical evidence but refraining from explicit ties to contemporary themes.

The instructor's views also differ on whether and or how to connect past events to contemporary ethical and social problems. Other teachers, some with more experience teaching history or those who felt their students were too young to learn about current events, refrained from drawing direct links between the past and present: teaching history should happen separately from contemporary politics or moral judgment, they argued. But others, vice versa, argued that students needed to understand the connection between what happened in the past and current problems such as racism and inequality. Klein also suggests that teacher training should include reflection on personal biases, historical identities, and student diversity to prepare teachers to navigate sensitive historical topics. He also advocates for an integrated curriculum design that balances historical understanding with contemporary relevance, especially in multicultural classrooms.

The article's focus on TSTS (Teaching the Transatlantic Slave Trade and Slavery) and historical distance provides valuable insights into understanding our research question from the perspective of history teachers and educators. By examining how these educators approach the TSTS curriculum, we can identify ways to improve certain aspects of teaching and apply these improvements to our curriculum.

Learning about the concept of historical distance—viewing and analyzing past events with some level of objectivity—has been particularly enlightening. This concept allows us to study past events up to the present without the immediate biases, pressures, and emotions of those who experienced the events firsthand. By applying historical distance, we can draw more accurate and objective connections between similar historical events, which is essential for integrating scientific concepts and principles into a history curriculum.

Understanding how educators balance objective historical teaching with contemporary relevance, especially in multicultural settings like the Netherlands, offers a model that can be adapted for our purposes. This approach not only enriches the curriculum but also makes it more engaging and meaningful for students by connecting past events to present day issues.

The authors conclude that the integration of Teaching the Transatlantic Slave Trade and Slavery (TSTS) into educational practices by Dutch history teachers and

museum educators is significantly influenced by their personal, cultural, and professional backgrounds. The study reveals that the concept of "historical distance" plays a crucial role in shaping how educators approach this sensitive topic. Teachers with personal or cultural connections to the history of slavery tend to favor a closer, more emotionally engaged approach, while others maintain a more neutral stance, separating historical events from contemporary issues. The study highlights the importance of balancing objective historical teaching with making the topic relevant to today's students, especially in a multicultural society like the Netherlands.

For future directions, the authors propose that teacher training programs should emphasize critical reflection on personal biases, historical identities, and student diversity. This approach can better prepare teachers to handle sensitive historical topics and connect past events to contemporary ethical and social problems, such as racism and inequality. Furthermore, the authors advocate for an integrated curriculum design that combines historical understanding with contemporary relevance. This integration is particularly crucial in multicultural classrooms, where diverse perspectives and experiences can enrich the learning process.

Research Article 2:

Citation for the article: Legha, Rupinder K., et al. “Teaching the Legacy of Slavery in American Medicine and Psychiatry to Medical Students: Feasibility, Acceptability, Opportunities for Growth.” *MedEdPORTAL*, Sept. 2023, p. 11349. *DOI.org (Crossref)*, https://doi.org/10.15766/mep_2374-8265.11349.

The article presents a workshop that aims at training medical students on the legacy of slavery in American medicine and its aftermath in American racial health disparities. Applying a critical race theoretical approach, the workshop aims to fill the educational gap by providing knowledge of historical racism in medicine-that is, the role of slavery in shaping racial health inequities. This was a two-year workshop including lectures, multimedia presentations, and group discussion with the students.

While there was an increase in student awareness, there was a desire for more interactive and discussion-based formats; faculty felt challenged in processing the emotional responses of students. The study used an evaluation survey completed

by second-year medical students who attended the workshop. The workshop included a 90-minute lecture, optional discussion groups, and multimedia elements. The content and structure were adapted in response to student feedback from the pilot session, with changes made to increase sensitivity and relevance in the second year.

76% of students reported limited prior knowledge of slavery's legacy in medicine, but 94% acknowledged the importance of learning this history. The workshop significantly boosted students' awareness of topics such as forced experimentation and exclusion of Black professionals. Also, the engagement preferences highlighted an interest in more interactive formats of learning, especially small-group discussions, where the emotionally charged material could be processed.

The feedback from faculty showed a level of discomfort in discussing issues of race; this was certainly true for White faculty. For faculty of color, there were concerns about leading a discussion on race within an institutional structure that might be resistant to anti-racist education. This points to the need for support at an institutional level and training for facilitators. Also, students and faculty also recommended that a more general multidisciplinary approach be applied whereby clinicians, historians, and the concerned communities could provide comments to ensure content relevance towards today's practice.

The value of bringing into medical training the perspectives of racism and slavery from a historical perspective is borne out in the study below. As such, this workshop represents a seminal model for approaching sensitive topics in a way that increases awareness while simultaneously advocating for institutional reform. It suggests that active, reflective formats and interdisciplinary approaches are necessary in taking these issues into schools of medicine.

This research is highly relevant to our research question because, the historical knowledge is combined with structured learning frameworks, it deepens critical insight into sensitive areas. Its emphasis on interactive learning, multimedia, and the linking of history to current social issues provides a clear basis from which a slavery history curriculum might be structured to include scientific and historical perspectives. The article also points to the need for faculty training on sensitive topics, which may be relevant if your curriculum requires teachers to discuss emotionally difficult subject matter.

Research Article 3:

Park, Wonyong, et al. "'We Often Forget It Was a Disaster': Cross-Curricular Teacher Collaboration to Develop a Curriculum Unit on the Titanic Disaster." *Science & Education*, July 2024. *Springer Link*, https://doi.org/10.1007/s11191-024-00540-0.

The authors' research seeks to explore the potential for cross-curricular collaboration between science and history teachers in developing a socio-scientific issues curriculum. This study will explore how collaboration can enhance teaching about disasters, using the Titanic disaster as a case study. It is hypothesized that cross-curricular collaboration can provide a more holistic, sensitive, and respectful approach to disaster education, promoting professional development for teachers.

This qualitative research adopted an exploratory case study design in understanding cross-curricular teacher collaboration on disaster education. The participants included seven teachers (three science and four history) from secondary schools in Southampton and two museum educators. Participants were taken through three workshops over a period of three months. Emphasis was placed on developing a curriculum unit on the Titanic disaster. Data collection was through workshop recordings, feedback surveys, interviews, and workshop artifacts. The thematic analysis identified four key themes: initial excitement, challenges of cross-curriculum integration, professional learning, and sensitivity within disaster education.

The teachers involved in the study initially expressed enthusiasm about the possibility of cross-curricular integration. Workshops allowed knowledge to be shared and provided inspiration for teachers with new ideas. For example, history teacher Connor noticed that investigations in science and history shared many similarities; science teacher Amy valued the similarity in teaching approaches. The guided museum tour gave them context for the Titanic disaster and was useful for developing lesson ideas.

While the ideas thrown out for cross-curricular integration were many and exciting, the majority of them did not make it into the final curriculum unit due to practical and logistical reasons. History teachers could more easily justify the Titanic unit within their curriculum while science teachers were having a harder time finding a place for it within the rigid structure of their curriculum. The final unit contained four history lessons and two science lessons. Full integration was limited. Margaret pointed out that though the lessons complemented each other, the content was not fully integrated.

The CPD provided insights to the teachers to view cross-curricular connections and address them, which became quite constructive for their teaching practices. Melanie used scientific experiments in history lessons, and on the other hand, Connor saw the value of the approaches from science in visualizing and quantifying disasters. This encouraged a thought process in teachers of what students learn elsewhere within the curriculum.

Teachers also replayed the Titanic as a tragic event that must be brought to the children respectfully. The project made the disaster human with real-life consequences, questioning the popular media's sentimental portrayal of the event. Science teacher Margaret pointed to empathy and respect in the process of teaching, 'the approach of the teacher would say it all- and not the lesson plan '.

The authors conclude that developing a fully integrated cross-curricular unit was challenging but the collaboration provided significant professional development benefits. Teachers came away with new insights and ideas to inform their teaching about disasters. The study emphasizes the need for intra-school collaboration to meet pragmatic challenges and suggests the value of incorporating local museum resources into the curriculum.

The authors call for further research to extend cross-curricular collaboration into other contexts and levels of schooling, focusing on logistical issues. They also propose an investigation into the impact of collaboration composition on the interactions of the teachers and a cross-curricular approach to teaching about local and global disasters involving violent and catastrophic events.

This research article explores cross-curricular collaboration between science and history teachers in the process of developing a new curriculum using the Titanic disaster as a case study. There was Initial enthusiasm of sharing teacher knowledge that showed potential benefits, though practical and logistical challenges at times limited full integration. The interdisciplinary approaches and TPDs that were the core aspects of this study-according to what is inferable are essential elements to give substance to disaster education. This is relevant to the inclusion of scientific ideas within a historical curriculum of slavery because it leads to a more complex and engaging learning environment. In the future, research on cross-curricular collaboration in other contexts and levels of schooling, on the consequences of collaboration, and the application in teaching about regional and global catastrophes should be done.

Research Article 4:

"Considering the Slave Trade: History and Memory." *The William and Mary Quarterly*, vol. 58, no. 1, 2001, pp. 245–52. *JSTOR*, https://doi.org/10.2307/2674426. Accessed 17 Nov. 2024. https://www.jstor.org/stable/2674426?seq=1

This article by Bernard Bailyn, dives into a more personal analysis of the transatlantic slave trade. He wanted to show homage to the DuBois Institute slave data set, which he used as a backing for a total of three essay's. He starts out by explaining how beneficial the system has been for researchers to gather information, even giving analogies. One analogy he used was astronomers knowing the cosmics before the telescope was invented. He compared this to the equal value of the database the institution provided, with the tracing of 27,233 slave voyages.

His research is on the structure and development of the slave trade, area of origin, and human experiences. The slave trade has created multiple issues in todays world that he goes over in detail. The way it's shaped our world today can be seen everywhere like jobs, racism, loans, and many other things that African Americans have to deal with because of the trade. He gives a complete background on the slave trade with his personal input and fully analysis specific situations that happened during those times.

He mentions only 10 percent of rebellions happened on slave ships and from those 10 percent, 10 percent were killed. This percent was about 100,000 deaths between the 1500's all the way to 1867. Most rebellions were mostly suicidal rebellions like not eating, jumping of the boat, and getting sick. This led to an 18 percent increase in staff as well as other expenses but they didn't increase the ship sizes and if they did it would have led to about 1 million more African Americans being enslaved. He continuously mentions the words "It matters" while describing some interesting statistics. All the facts he presents always have a meaning behind them like he wants you to analyze it yourself. The constant reflection of stats helps describe how it caused so many issues for everyone involved and they still enslaved people through all of this pain.

In his conclusion he considers all the sources he used for this review as not only history but as a collective memory. Whether white or black we have to not only look back into the past for results in the future but also confront our history. All the stories, experiences, and journey's have an impact in today's world as well as in our mental state. We hope to use this article as an example for students and teachers to get a real look at how someone can analyze the past while also including personal opinion. We want students to apply their critical thinking skills to facts, statistics, and studies so they can create a personal hypothesis on their experiences in the past. They can use facts to build a personal rapport on slavery then study the impacts it has on today's world. We hope we can create a seamless connectivity to slavery and science with the help of critical analysis. This can develop our question by linking the emotional aspect of our question to a more streamline data of historical events.

Research Article 5:

Stephen D. Behrendt "Seasonality in the Trans-Atlantic Slave Trade" (Victoria University of Wellington), 2008
https://www.slavevoyages.org/voyage/essays#interpretation/seasonality/introduction/0/en/

This article is an overview of the agricultural standpoint of the transatlantic slave trade. This study starts out with the notice of a pattern within the months of the most fertility, more africans were disembarked within the slave trade. This article links the african agricultural history with the american agricultural history, while also following patterns within the slave trade. He uses the database as a guide to connect the seasonal changes to the needs of more enslaved people.

The enslavers would calculate whether the land needed planting, weeding, and other things, while also calculating the number of enslaved people they needed to meet their requirements. African merchants would hold slaves that had the main skills for agricultural farming so that resulted in new world plantations to purchase more enslaved people to deal with the large production. These slaving captains would wait for Africa's prime farming season, in which they were most profitable, to sell enslaved people to them. Then when the africans season was up, in about 1-3 months later, it was time for the americans prime season to start. These captains created something sort of like the current stock market. Creating a sailing

route with new and old world harvesting cycles which combined the two different agricultural calendars.

It was a rarity that Africans were craftsmen or professionalists before the 18th century. Most enslaved people around that time had strengths in farming and pastoralism. Before enslaved people were first forced overseas, they helped produce millet, sorghum, rice, maize, yams, cassava, plantains, and various other crops. This work was assigned to be done by all ages and genders but it was divided with the severity of the labor they would have had to put in for that task. African towns eventually grew in the later years of the 18 hundreds to 19 hundreds but the number of enslaved Africans also grew.

About 11,000,000 Africans survived the Middle Passage but most were still on plantations harvesting cash crops. Their work varied from tobacco rice, cotton, and many other things including gold. About 1,000,000 enslaved Africans mined gold and silver but this was before 1750. During this time Brazilian gold became very popular between 1690-1750, bringing in about 500,000 enslaved Africans to mine this specific type of gold. This was around the time new age farmers realized the best way they could exploit slavery, which was to force them to do all the hard work while they sit back and reap the rewards. This led to about 750,000-1,000,000 enslaved people working in households and ranching for americans.

This article will be a big part of our plan to incorporate science into the teaching of slavery. The connection to agricultural science and research is just what we need to create activities and curriculums. The research linking how crop harvesting was really the lead factor for the creation of slavery is highly important, and plays a big part in scientific history relating to plant life. The entire agricultural system, at the time, was held up by the enslaved African Americans and this research creates a perfect outline to teach the connection of science to slavery. If we can create a need for this type of study in the current curriculum, then our development of our question will be very beneficial to the education system.

Research Article 6:

Austen, Ralph A. “The Slave Trade as History and Memory: Confrontations of Slaving Voyage Documents and Communal Traditions.” The William and Mary

Quarterly, vol. 58, no. 1, 2001, pp. 229–44. JSTOR, https://doi.org/10.2307/2674425.

This is a reflection on the slave trade data base and it's multiple perspectives, by Ralph A. Austen. Austen makes the claim that African/African-American memories are very subjective in the way it can be perceived. The evaluation of text has a strong presence in this article, mentioning the publicized controversy across multiple platforms about the slave trade data and politics. The main debate is how memories are the backing of some of the most impactful points, he says the accounts can often pivot extremely from the data.

Goree island, in senegal, is a small island that is currently in the harbor of the senegalese capital. This was a commercial entrepot for the slave trade, which means it was a main area for slaves to be auctioned and sold. This island was then developed and was bought out by Goree during the 18th century as a property for his house. During the 1980s the land became a World Heritage Site and has since became a major pilgrim destination for african americans. This is key information because the role Goree had in the slave trade was referred to as a "hoax" and "scam" from other points of view. This is a prime example of how different perspectives can change the entire way history unfolded.

The main point of this article is to challenge the validity of the data within the slave trade database. He mentions that numbers and data might've been skewed by a moral compass within the authors of the articles. The information didn't come from african american communities but rather semi scholar calculations that became a key resource for later text publications. The article comes back to the reason this database was created, which was to give calculations and represent the millions of slaves who could've been lost in history. The importance of the calculations being 100% accurate has less value, according to Austen, than the purpose of the creation of the database.

The moral influence is prominent within the slave trade information as well as the economical data provided. This is a prime example of how personal reflection can be impactful towards history and statistics of history. Our goal overall is to link science to slavery and a way we can implement that, is giving examples of data being controlled by personal influence. This article shows that even data that was perceived as fact, can be challenged with evidence and be analyzed for moral influence. The database at surface level seems to be a database that's purely fact, but as Austen breaks points down within the text from the database, you start to notice how different the stories are. The point of history and memory being not as

different as we think, is a great point of connectivity between the social sciences and the history of slavery. This can then develop students' understanding of social analysis and the importance of opinion.

Science Comms

Sci comm 1:

Turner, Cory. “Why Schools Fail To Teach Slavery’s ‘Hard History.’” *NPR*, 4 Feb. 2018. *NPR*, https://www.npr.org/sections/ed/2018/02/04/582468315/why-schools-fail-to-teach-slaverys-hard-history.

In "Why Schools Fail to Teach Slavery's Hard History," Cory Turner points out lapses in the educational system regarding how slavery is being taught in US high schools. It insists that the teaching method should be changed from a narrow, isolated story to recognition of the centrality of slavery for shaping America's history and current realities. It gives the highlights of the SPLC report and shows the surprising gaps in students' knowledge about slavery and how the subject gives educators discomfort in teaching.

The audience for this article includes educators, policymakers, education advocates, and the general public. It is an educative and informative article overall and would bring awareness regarding the deficiencies of the current approach that is in place in teaching the subject of slavery. The article is authored by Cory Turner, who is a journalist operating under NPR and has interests in education reform and social justice issues.

It does start with some survey findings. For instance, identifying the 13th Amendment, understanding what the Middle Passage was, even naming the correct cause of the Civil War. All these apply to the dismal state of education respecting slavery as a central part of American history.

Throughout this article, it shows that the teachers of the subject of slavery are somewhat uncomfortable. Most of the teachers describe themselves as unprepared to teach slavery because of the lack of resources, supportive textbooks, and state standards, though they realize all this is very important; this is what brings discomfort in the teaching of hard topics like white supremacy and the legacy of exploitation.

The biased way slavery is treated both in textbooks and state curricula is critiqued by the report from SPLC. It puts into light that instruction often falls into the mode of "heroes" like Harriet Tubman and Frederick Douglass, but without contextualized violence of slavery and its ancillary institutions. The report traces how regional biases created a Southern phenomenon of slavery through the erasure of reality in the North. This study now finally urges educators to be more attentive to the racialized dimensions of slavery and the experiences of the enslaved.

It finally concludes by stating that the state standards and textbooks grossly fail in incorporating systems of oppression and ideologies that created the possibility of slavery. In reviewing textbooks, SPLC found that not a single one of them scored more than 70% on an extensive rubric evaluating slavery instruction quality, while many received appallingly low scores.

However, while the article calls for fuller, more honest teaching about slavery, its claims are evidence-based. For instance, it gives statistical results from surveys taken from students and teachers; hence, its findings are based on complete lack of knowledge and uneasiness in teaching slavery. The SPLC analyzed textbooks and state standards as means to expose biases and omissions in how slavery is taught and supported evidence-based analyses in support of its recommendations for reform.

This article will provide critical understanding of the larger context within which historical education on slavery is most often produced via biases and omissions. The inclusions of scientific methods into a curriculum on the history and implications of slavery will directly relate to the findings of the SPLC. This paper advocates an integrated approach to sensitive historical themes in teaching by incorporating the consideration of larger systems and ideologies through which slavery was framed in history.

The article further highlights how uninformed students are about the background of slavery and invokes imaginative pedagogies and materials that could help learners to learn more than the dates. Indeed, inclusion in the curriculum of scientific processes such as critical thinking, evaluation of evidence, and problem-solving will definitely enhance the students' ability for engagement in complex historical issues of slavery and enhance empathy with its consequences.

Sci comm 2:

Citation for the article: Stang, Danielle Allen, Daina Ramey Berry, David W. Blight, Allen C. Guelzo, Robert Maranto, Ian V. Rowe, Adrienne. "Teaching about Slavery." *Education Next*, 21 Sep. 2021, https://www.educationnext.org/teaching-about-slavery-forum-guelzo-berry-blight-rowe-stang-allen-maranto/

This article speaks on slavery in the educational system and the injustice our education system has been for the history of slavery. The George Floyd era has shined a light onto the country's racial issues as well as brought upon a new point of interest to incorporate the history of slavery in our education system. The main questions are, "How should k-12 schools teach about slavery in America? What facts and concepts should they stress? Are schools generally doing a good or bad job of this now?".

Introducing students to this history may be rough on them but it can also open a plethora of opportunities for educational development. The human psychology that stems from the research like empathy, manipulation, love, and hate. These things are all key parts that help us create a connection that students can study. Allen C. Guelzo, a professor at Princeton University, looked into the way slavery in textbooks was treated in the past as well as today's courses. He was "appalled" by the way slavery was depicted in these textbooks, even the wording was a horrible representation of slavery according to Guelzo. Things like, "Untutored" and "enjoy picnics, barbecues, singing, and dancing", were often used to describe the experience. The current way history books glide over slavery is almost meant to comfort the students and make it seem like slavery wasn't too much of a big deal.

The focus of this article is to inform how big slavery actually was and how much it impacted our history. As mentioned in the article, servitude is the main backing of this country. From the day to day labor workers working for a wage, to the

enslaved people who had to work tirelessly for someone who had full ownership of them. Even when African Americans were considered free, there was a term called servants. Servants were considered free but were under extreme law and essentially had the same obligations as an enslaved person. The only thing different between the two were servants would work under a small wage, technically making them an “employee”.

Our pride in our history and flag is something Americans hold deeply within their soul. Our main focus is pride but time and time again, within our textbooks, curriculums, and memory, we tend to sweep slavery under the rug. We hope to change this narrative by introducing slavery within the scientific aspects of our education system. From the research and study of text, to creating viable ways for students to grasp the importance of the impact of slavery within our history. We seek to bridge that gap with the help of this article. It's important to have a full history of slavery to provide a reason for the two aspects of education to connect and develop together.

Proposed Experiment:

Population: Students aged 8-18, would be divided into two age groups (8-12) and (13-18) for specific curriculums.

Procedure:

We will randomly assign students to the control or experimental group and deliver lessons over multiple weeks. This would ensure the same duration and frequency for both groups. Last we would need to assess the engagement, retention, and empathy before, during, and after the intervention.

Independent Variable:

Our independent variable is what we're going to manipulate, which is the curriculum. One of them could be a standard history curriculum on slavery which would be our control group and an integrated curriculum combining history and scientific methods which is what we were testing and our experimental group.

Dependent Variables:

We would measure our dependent variables based on the results of the outcomes.

1.Engagement could be measured through surveys, participation rates, or classroom observation.

2. Knowledge Retention, we could assess this through pre and post intervention quizzes on both historical and scientific content.

3. Empathy and Social Awareness, this will be evaluated using reflective essays or survey scales designed to measure social emotional learning outcomes.

Control:

Our control would be that students in the standard curriculum will receive no integration of scientific methods.

Hypothetical Results of Curriculum Impact on Students:

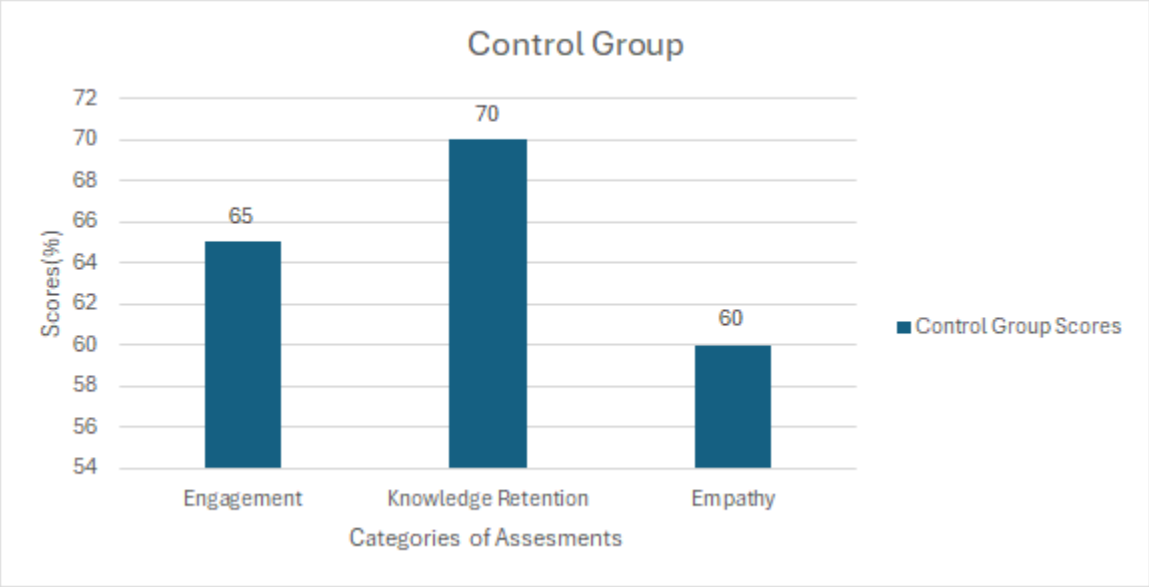

Figure 1: Average scores for Control group on sections of: Engagement, knowledge Retention, and empathy (n=30). n = number of students.

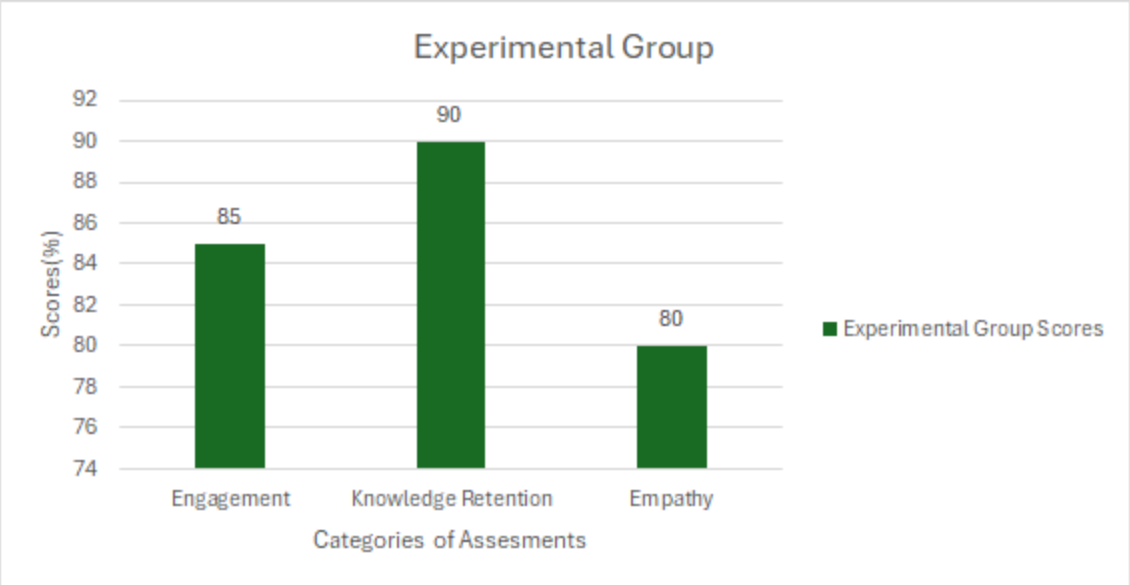

Figure 2: Average scores for Experimental group on sections of: Engagement, knowledge Retention, and empathy (n=30). n= number of students.

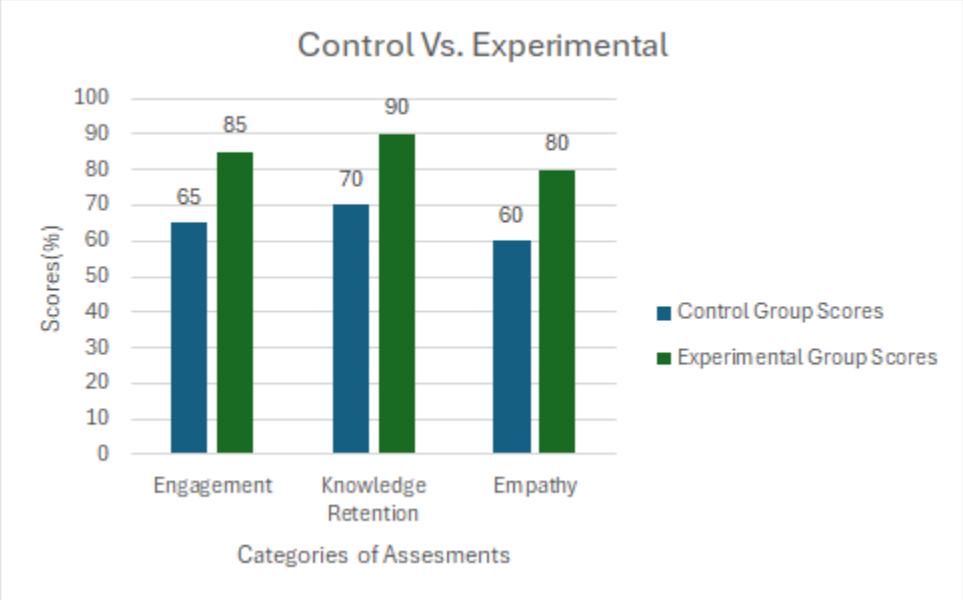

Figure 3: Side by side comparison of average scores for Control group and Experimental group on sections of: Engagement, knowledge Retention, and empathy (n=30) for each group.

Summary

a. Summarize the findings within this report. Did you answer your question or hypothesis?

So, our research question is how can we incorporate scientific lessons into a curriculum focused on the history and impact on slavery. Through our proposed experiment, we want to demonstrate that our proposed curriculum would lead to increased engagement, retention, and empathy in students. With the evidence provided by the articles, we were able to answer our research question.

b. What major conclusions can you make about the data and evidence presented within this report?

Some conclusions we came to from the data and evidence collected is that the topic of slavery is a sensitive topic, and navigating its history and intricacies is a challenge especially when addressing the full truth. We also found that curriculums with cross departments have a more diverse and engaging approach to teaching then a traditional history class.

c. What do you think are the next steps to address your question?

Our next steps could be to further refine our question. We need to continue to refine and reform our integrated curriculum based on feedback and findings during the experiment. Also we could widen and scale up our experiment, and implement it in several schools and regions to gather more data to be assured of its effectiveness across a wide range of students. Possible teacher training, we could design training programs for teachers on how to deliver an integrated curriculum and handle sensitive topics.There also should be longitudinal studies to gather the long-term influence it will have on the understanding and social awareness of its students.

2. Reflection

a. What was the most interesting or surprising thing you learned during this research project?

The most surprising thing we learned during our research was the shear effort we had to put in. From the bibliography, to the article, and even the time it took to type the paper. The most interesting thing we researched

was Austen Ralph's, "The Slave Trade as History and Memory" because he explained the differences within a hard fact study and a morally based study.

b. How did this project change – if at all! – your idea of science and how scientists address research questions?

This project has a large focus on interdisciplinary research to find solutions to complex questions, regarding how to incorporate science into history.This project allowed us to not just perceive how scientists address their research questions but to apply the idea of science and its principles and embody the scientist.

c. Do you think it is important for the public to understand these science processes?

Yes, we believe that it is important for the public to understand science processes such as : encouraging critical thinking, informed decision-making, and appreciating how different disciplines come together to solve real-world problems.

d. What skills did you learn during this project that will help you develop research future questions?

Teamwork and Improved analysis.

Interdisciplinary Approach: Experience in combining methods from several disciplines to meet the research objectives.

Communication: Enhanced skills in presenting complex ideas clearly and effectively.

e. Is there anything else you wonder about now that you've completed this project?

Yes, we've developed a few questions after completing our project such as: How do we further develop the application of the sciences into other branches of the humanities? What might be the long-term implications of such integrated curricula for the students' overall academic performance and their social awareness? How can teachers be best supported in adopting and teaching cross-discipline integrated curricula?

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