**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we found that it is relevant to our research question because it provides a method for integrating scientific and historical content into a curriculum.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.