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Standard 5: Application of Content

The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.

Description:

Name of Artifact: Journal Article Critique Incorporating Nature of Science and Inquiry in Education

Date of Artifact: July 7th, 2024

Course in which this artifact was produced: Education 224: Introduction to Scientific Inquiry

Rational:

What is the artifact?

The Journal Article Critique Incorporating Nature of Science and Inquiry in Education is about a critique of an article that explores the large role that understanding the nature of science (NOS) and scientific inquiry (SI) plays in science education and achieving scientific literacy.

Why am I choosing this particular artifact for this standard? Why does it fit here?

I am choosing this particular artifact for standard five for a few different reasons. It incorporates the nature of science and inquiry of education which thus allows it to align perfectly with INTASC standard give. This standard emphasizes the importance of connecting concepts and using diverse perspectives to engage students in critical thinking, creativity, and collaborative problem solving especially when it comes to local and global issues. By focusing on the nature of science and inquiry, the article demonstrates how scientific concepts can be connected to real world issues, both local and global. This approach not only fosters a deeper understanding of the subject matter by also encouraged me as a student and it can encourage my future students to think critically and creatively about solving problems as well as critiquing them after the fact. Engaging students like myself in inquiry-based learning helps students develop the essential skills such as questioning, investigating and reasoning, which are very important for addressing issues in today's world. All in all, this critique I am attaching highlights how I understand how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.

How does this artifact relate to the standard as a whole or to a certain part of the standard?

The artifact, my journal article critique that incorporates the nature of science and inquiry in education aligns perfectly with INTASC standard five. This standard emphasizes the importance of connecting concepts using different perspectives to engage students in critical thinking, creativity and collaboration. By focusing on the nature of science and inquiry the article demonstrates how scientific concepts can be connected to real world issues both local and global. Thus, my writing shows my understanding by critiquing the article and connecting to it.

Journal Article Critique

Article Authors and Discussion of Authors Qualifications

The article "Nature of Science and Scientific Inquiry as Contexts for the Learning of Science and Achievement of Scientific Literacy" published in the International Journal of Education in Mathematics, Science and Technology (IJEMST) is authored by Norman G. Lederman, Judith S. Lederman, and Alison Antink from the Illinois Institute of Technology (Lederman et al., 2013). Norman G. Lederman and Judith S. Lederman are known for their teachings and large amount of research in science education, mainly in the area of the nature of science and scientific inquiry. Their work has significantly contributed to understanding how these concepts can enhance science learning as well as literacy.

Norman, sadly passing away on February 26, 2021 held "a distinguished and impactful career as a science teacher, science teacher educator, and science education researcher and leader" (2021). Before passing he earned his Bachelors degree and Masters degree in biology from Brady University in ninteen seventy one and New York University in ninteen seventy three (2021). He had taught biology to not only high school students but as well as college students and then went even further to later gain another masters degree in secondary education from Bradly in ninteen seventy seven (2021). After that he went on to gain his PH.D in science education from Syracuse University in ninteen eighty three and went back to teaching college students (2021). As his life continued on he wrote many articles, publishings and was norminated for many awards or distinguishings (2021).

As for Judith, she is Norman's wife and now widow. Currently, she is still alive and writing articles and other publications earning many awards and distinguishings as well. She is also currently the director of teacher education at Illinois Institute of Technology and is said to have taught ages ranging from as young as preschool to as old as graduate level students over the time of her career (2019). One of her greatest accomplishments was in two thousand and eight when she was awarded "a Fulbright Fellowship to work with a South African university, museum educators, and K-12 science teachers in the area of Scientific Inquiry and Nature of Science" (2019).

Alison Antink one of the other authors of this article, is also still alive from the Illinois Institute of Technology, also brings valuable information and understandings of scientific inquiry. Having a bachelors degree in chemistry as well as a masters degree in secondary science education from DePaul University she now spends her time as a professor and writing articles or publishings independently or aside others (*Allison Antink Meyer* 2021). Together Norman G. Lederman, Judith S. Lederman, and Alison Antink's qualifications and large amount of knowledge make the article a very credible source on the importance of the nature of science as well as scientific inquiry.

Summary of Article

This article explores the large role that understanding the nature of science (NOS) and scientific inquiry (SI) plays in science education and achieving scientific literacy. The authors

argue that understanding NOS and SI is essential for students to learn scientific concepts and processes. Stating that, "The phrase "nature of science" typically refers to the epistemology of science, science as a way of knowing, or the values and beliefs inherent to the development of scientific knowledge (Lederman, 1992, 2007)" (Lederman et al., 2013). As well as the fact that "Scientific inquiry includes the traditional science processes, but also refers to the combining of these processes" (Lederman et al., 2013). By incorporating NOS and SI into the curriculum, students can develop a deeper understanding and appreciation for science as both a way of knowing and a method of inquiry (Lederman et al., 2013). Furthermore, the study also highlights many different instructional strategies and types of curriculum such as the Six Domains for Teaching and Assessing Science Learning models that can be used to teach these conepts (Lederman et al., 2013). The authors then conclude that a good science education, which includes NOS and SI, allows students to gain many different skills as well as think critically, engage in scientific practices and understand the larger impact of science on society (Lederman et al., 2013).

Critique of Article

The article is very difficult to follow or understand at times but it makes a very good case for incorporating the nature of science (NOS) and scientific inquiry (SI) into science education. The authors truly and successfully argue that these elements are a huge part in implementing scientific literacy and critical thinking skills among students. Their stress on the importance of understanding science as both a way of knowing and a method of inquiry is very important overall and can be seen even when they contridict themselves at times.

However, the article could benefit from more solid examples of how NOS and SI can be used in many different education situations. And while the authors discuss instructional strategies and curriculum, providing detailed case studies or classroom scenarios would help educators like myself visualize the use of these particular concepts in use. Additionally, the article could go deeper into the challenges educators or teachers may face when implementing NOS and SI in their very own classrooms and offer more specific solutions to these problems.

Another area for improvement is the discussion on assessment. Now, while the authors do highlight or talk about the importance of NOS and SI, they do not go into great detail of NOS and SI. They do not talk about how to actually access the students understanding and the use of these concepts. Including things like assessment strategies and tools would make the article more comprehensive and useful for educators looking to assess the students and their understanding.

Article's Description of Scientific Inquiry VS My Personal Description

The article describes scientifc inquiry or SI as a large part of science education. It points out the large importance of incorporating SI into the curriculum to help students develop critical thinking skills and a deeper understanding of scientific processes which "…are activities related to collecting and analyzing data, and drawing conclusions (AAAS, 1990, 1993; NRC, 1996)" and how they work (Lederman et al., 2013).

On the other hand, my personal description of scientific inquiry is more based upon real world use and relevance. I think it is greatly important to use it in a way that allows us to understand and gain skills that are in my eyes more important in life, such as social skills, communication, peer connection or friendship, confidence especially when learning and so forth. I believe that my particular perspective or description of scientific inquiry aligns more with the idea of using it to develop life skills and social skills which are a very large part in growing not only as a person but as a learner as well.

References

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