Background

- The students’ viewpoint on science is as important as science itself and drives quality learning.
- Education in science is comprised of 3 major elements (learning science, learning about science and doing science) and it is imperative for students to master this process.
- Therefore, teaching students how to learn using an environmental lens will provide them with the skills to work in the real world (my project). My project aims at making STEM easier to learn and highlights its applicability to the environment.
- Physiology (my project) is in Biology (figure 1)

Figure 1: Demonstrates that biology is the most popular subject STEM seeking students choose. Y-axis in raw count. From (NAM 2022)

Researchable Question

Does the incorporation of an application-based, environmental studies centric curriculum aid physiology lab students in hard to learn content retention and quiz performance?

Climate Change and Vision Impacts!

- Less ozone in the atmosphere increases UV radiation – reaches our eye anatomy. (Wheat 2016)
  - Overall, climate change is linked to an increase in ultraviolet radiation.
  - Causes... (Ellen 2012)
    - Premature
    - Cataract
    - Macular degeneration:

Figure 2: Creating learning tools was the central focus of my internship. This is one of the application-based learning tools that I created. This week’s unit within the course was ‘vision and eye anatomy’. I chose to relate vision to climate change and how ozone interacts with your vision acuity.

Internship & Methods

- From 2020 - 2022 I was a Peer Facilitator (PF) for BIOL 119: Physiology Lab Course at UW. My role increased credibility with students.
- I used my PF skills to pinpoint difficult to learn topics. My topics corresponded to ‘implementation weeks’.
- I implemented 4, application-based learning tools (Figure 2) as a lecture slide/discussion. Each tool used a different learning theory.
- Students took a post-lab, in class quiz every week.
- I analyzed these scores at the midpoint & end of the quarter. Analysis included post-lab quiz score data within and between lab sections.

Figure 3: Post-Lab quiz score averages between sections. Section C, experimental group, had learning tools implemented on weeks 2, 4, 7 and 9. All other weeks act as basic control minus the theory behind the educational tool implementation and general mindset, not content.

Figure 4: Section C average quiz scores between weeks. This chart compares Section C: individually between weeks of learning tool implementation (blue) and non-implementation (purple).

Takeaways

- Content Retention: Suggested through my data, environmental education increases critical thinking in the brain, heightens environmental knowledge and forges important discussions (figure3).
- Quiz Performance: My data suggested a slight increase in quiz scores throughout the quarter, or at least kept them high and constant, which was a major goal of my study (figure 4).
- Learning Theory: Analogical reasoning, which is learning through comparison, was the most effective education theory applied to my learning tool (figure 2).

Broader Significance

- Educators need to work on parallel subject integration in STEM classrooms.
- As I did, the use of modern research should be applied to teaching in classrooms.
- It is important to use common experiences (environmental health) to implement educational tools in introductory courses where base knowledge is not assumed.
- Proper continuation of these tools will create open minded and informed students. This will yield a determined future generational workforce and create change for our environment.

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