

CATALySES Action Research Proposal

**Using Emerging Pathogens as a Vector for Increasing Positive Attitudes towards Science
Learning & STEM Career Choices in Middle School Students**

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Abstract:

The purpose of this action research is to evaluate student attitude towards science learning and interest in STEM careers using disease modules as vectors to incorporate applicable problem-based epidemiology. Students will complete baseline and post interest and attitude towards science learning surveys alongside science content assessments as they relate to unit standards. The research will center on the problematic outbreak of the Nipah virus. Student will understand how diseases are identified, studied and preventative measures discovered and offered to protect verses eradicate in order for humans to live in harmony with their environment. Students will gain content knowledge of immunology, parasitic-host interactions and ecology. Students will be introduced to how vital roles of multiple STEM careers collaborate as they work to solve global issues. This plan will evaluate data collected using standard means and T-tests comparing a control group to that of an experimental group of middle school age regular/advance science students.

I need to convert these two sections to Pp's. Thanks

Rationale: This section should describe your “story”, i.e., your particular area of action research emphasis and your reasons for choosing it. These reasons should be based on your own experience, the learning needs of your students, and your review of pertinent literature related to biomedical sciences and infectious disease/emerging pathogens teaching and learning. Library databases and Google Scholar are good starting points. This section should end with your research “area of focus” statement, which includes an intervention and its impacts on students. (You will collect data to determine these impacts on student achievement, interests, attitudes, etc.)

- STEM careers drive our global economy in generating innovative ideas, products and companies that support the demands of the growing populous
- Research suggests the need to expose children to appropriate STEM opportunities early in their education (Bagiati et al., 2010).
- The natural progression of STEM related career choice will grow from the science and math curricula
- Corraling students towards STEM careers must start earlier than high school and even middle school
- Using disease module vectors to introduce intricate roles scientists play in the development of present and future medicine and disease control
- The attitude students take with regards to their learning can positively or negatively affect how well they achieve their learning objectives
- My demographics of students varies from ESE to Advance with a heavy emphasis on ELL students.
- Improve student attitude and interest towards science learning
- Increasing STEM career choice in middle school-aged students
- Improve science content knowledge retention
- Magnify students awareness of various STEM careers in epidemiology

Intervention:

- Administer a pre- and post- interest & attitude surveys and science content assessments to the control group as well as the experimental group (both groups of one-two classes approximately 50-60 students, with only the experimental group receiving the intervention)
- introduce disease module of epidemiology components in my curriculum using Jigsaw games, TBL article reading, info-graphing and ELISA assay of viral antigen
- My students' demographics are ESE, ELL and regular/advance students from 6-8 grade.
- I will be introducing this intervention early in the school year as a hook of engagement in the science learning process early on.
- My proposal differs from what I normally teach in that this will be the first time that I incorporating a disease vector/emerging pathogen to teach the scientific method, immunology, and human impact on the earth as it relates to disease outbreak and prevention

Data Collection and Analysis: Develop and describe a data collection plan linked to your intervention. Describe data analysis and interpretation plans.

This study will utilize both qualitative and quantitative data collection and analysis. The student will take a pre and post survey on their attitudes and interest toward science career choices and science learning in general. This will be a Likert scale survey with a range of 1-5 for SD (strongly disagree) to SA (strongly agree). These students will have pre- and post-science content assessments over standards addressed in the module. Some of the content questions will be reintroduced later on in the year on other assessments to evaluate retention. The students' data from assessments will use standard means and T-tests comparing a control group to that of an experimental group of middle school age regular/advance science students.

Connections to CATALySES summer institute:

The 2018 CATALySES program focused on emerging pathogens as vectors to teach science content, career field experience and lab techniques. This action proposal will be constructed from the information learned during this intense workshop focused on spread, containment and preventative methods of disease control. The spillover of knowledge learned from lectures, activities and field work will be condensed into manageable pieces for my middle

school-age students. The students will begin with an appreciation for lab safety as explained by Mark Yanchisin, followed by proper lab techniques needed to perform successful lab experience utilizing lockers provided by CPET for Pipetting by Design, ELISA and rPCR. The students will utilize Team Based Learning (TBL) module as spelled out by Dr. Wayne McCormack to address a reading passage. Students will further their understanding of various science career involvement in disease prevention by utilizing a jig-saw game modified version of the Ebola/Dengue Dilemma and Fun with Microbes.

Literature cited:

- Bagiati, A., Yoon, S. Y., Evangelou, D., & Ngambeki, I. (2010). Engineering curricula in early education: Describing the landscape of open resources. *Early Childhood Research & Practice*, 12(2). Retrieved from <http://www.eric.ed.gov/PDFS/EJ910909.pdf>
- National Research Council (2011). *Successful K-12 STEM Education Identifying Effective Approaches in Science, Technology, Engineering, and Mathematics*. Retrieved from http://www.stemreports.com/wp-content/uploads/2011/06/NRC_STEM_2.pdf

Permissions:

This proposal will be presented to the principal of Palm Springs Community Middle, Ms. Sandy Jinks. No additional permissions are required for the qualitative survey of the students as they will be using a constructed code which will not reflect upon their individual identity. The lesson plans and action proposal will be shared with the cohort of UF CPET CATALySES 2018 Emerging Pathogens for evaluation and data collection.