

Proposal to Environmental Sustainability Council at TCNJ

April 2022

Air Quality, Traffic and School-Based Neighborhoods:

A Proposal Creating Citizen Scientists through an Environmental Monitoring Simulation (SIM)

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This letter of intent expresses our interest in development of a proposal for **course-embedded class projects** and wider TCNJ participation in a Simulation Exercise with a focus on **air quality** with potential impacts on **educational settings and human health outcomes such as asthma and respiratory disease**. Air-quality related asthma plays a significant role in educational participation by limiting attendance and quality of engagement for children and students of all ages. Data-driven, case study simulations (SIM) are a realistic and effective method for interactive and authentic instructional experiences for students in a variety of departments and programs. Once developed, time-limited SIMs can spike interest and skills augmenting ongoing classes and providing opportunities for interdisciplinary-shared interests. TCNJ faculty can adapt SIM situations, problems, and conditions by tailoring content specific to their respective disciplines. SIMs and teaching, especially related to **environment, climate change, and communications**. Faculty within the Department of Public Health are in the process of developing an interdisciplinary pilot project proposal useful for multiple courses across TCNJ departments.

A primary goal of the proposed project is to develop a TCNJ-wide infrastructure to support an academic foundation for the SIM. Specifically groups involved in environmental studies, education, political science, journalism, anthropology, and sociology, for examples, are likely candidates. Students, staff and faculty would be recruited to identify courses and groups to participate in the SIM. With the convened collaborative, we propose to design a didactic simulation exercise that can introduce TCNJ students (undergraduate and graduate) to a range of regional environmental problems related to traffic, air quality and its impact on neighborhoods with school groups who suffer from asthma.

A second goal is to involve students in development of content for the SIM through active data collection and analysis of air quality samples. Public Health summer interns (PBH 405 and PBHG 705 Capstone) and environmental health fall undergraduate (PBH 379) and spring graduate students (PBHG 504) would develop, refine and test protocols for measuring air quality in selected Mercer County neighborhoods with elementary and middle schools situated near high traffic areas. Students gain experience in collecting data through air monitors, preparing data for analysis, and “translating” data for application in simulation scenarios. In conjunction with interdisciplinary faculty, the students will design a 2-hour SIM for wider audiences of nursing, public health, and other students to create action plans for remediating “hot spots” and communication to political, community, school and academic audiences. The design of the simulation reflects timely real situations for problem solving and communications to different constituents. We are interested in skill building aspects of student-involved data collection for course (simulation) content, as well as for problem solving on personal, group or community levels.

A third goal is to disseminate the guide for integrating air quality “citizen science” to facilitate outreach and integration of materials into science teaching units at the elementary and secondary school levels. A final outcome will demonstrate the educational value of interdisciplinary collaboration and citizen science through student-involved course planning and participation in a simulation involving a variety of

scenarios related to individual health status, community/ school health, public communication strategies, and public health actions.

A proposed timeline is:

Summer 2022

- initial planning meeting of interdisciplinary faculty
- identify and recruit two interns for data collection.
- acquire a sample of air quality monitors (*e.g.* 5-8)
- develop and test protocols for their and map neighborhoods to identify high traffic “hot spots”
- outline a simulation exercise appropriate for a trial course
- refine protocols for extending data collection for existing Public Health courses such as Environmental and Occupational Health (PBH 379/PBHG 504)

Fall 2022

- Evaluate and revise SIM pilot air monitoring data collection protocols with sampled of sites
- develop procedures for data analysis and application of data in simulation scenarios including an estimate of reliability of baseline data and basic correlation between time and measures
- identify 2-3 faculty and courses in other TCNJ departments to participate in a fall Pilot SIM and revised for implementation in Spring 2023
- recruit faculty for interdisciplinary courses and involve them in participation in spring SIM

Winter break 2023

- Core faculty and students summarize evaluation data and experience from fall SIM
- Adjust protocols and piloted course-embedded simulation
- Revise and elaborate for spring SIM

Spring semester 2023

- implement and evaluate simulation with students in three or more courses
 - *e.g.* undergraduate and graduate Environmental and Occupational Health, Health Systems and Policy (PBH 379, PBH 376, PBHG 504)
- At end of spring semester, complete project evaluation and report of implementation
 - *e.g.* process of simulation design and implementation, student learning outcomes, discipline-specific competencies
- adjustments to procedures for data collection and analysis
- revisions of instructional materials relevant to course instruction across selected departments
- implementation of revised data collection procedures and simulation for a summer public health course and additional courses for fall 2023

Based on the experience of the proposed project, the designed simulation could extend to groups, such as teachers in area schools interested in enhancing their awareness of and skills in assessing impacts of air quality in and near school settings.

A tangible **outcome and product** will be to **design and produce a simulation guide** that other TCNJ faculty (and possibly other community-based groups) can use for adaptation into their own courses or professional development sessions (e.g. biology/chemistry, journalism, multimedia, science education).

Anticipated evaluation:

- Simulation Exercise with 3-5 scenarios that require application of collected air quality data for evidence-based decision-making, such as determining needed remediation, mapping of air quality “hot spots” in a given geographic area.
 - Participation of students and faculty from at least three different TCNJ departments and courses Spring 2023 semester
- Student Qualtrics feedback and reflection notes about their simulation participation experience:
 - Pre-and post-test of knowledge, attitudes and decision selections related to air quality monitoring
- Faculty end-of-semester feedback on simulation design and content; use of SIM case study guide for those who students participated in the fall/spring SIMs.
- Integration of simulation as an educational method within environmental and environmental health or other courses for future semesters

We anticipate that a cross-disciplinary committee of faculty and graduate students will serve in an advisory capacity. We may draw upon existing TCNJ committees such as Sustainable Jersey, Environmental Sustainability Education (ESE), the Environmental Education Course Collaboration, and the Environmental Studies Major Committee.

Initial Planning group involved in the project: Alexis Mraz-Project leader, Karen Gordon-project coordinator and simulation designer, Livia Lazzaro Capstone coordinator of summer interns, Natasha Patterson policy and simulation designer, Kim Pearson journalism and simulation designer.

Proposed Budget: \$1275.00

- Portable Air Monitors 5 x \$175.00 = \$875
- Expenses for student assistants \$200
 - travel data collection and analysis coordination, simulation materials in the pilot stage
- Simulation materials/packets \$200